The Measurement of Taxable Capacity in Jordan

By

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Abstract

The aim of the thesis was to discover, using an econometric approach, whether tax revenues in Jordan can be said to be at their relative taxable capacity. If they are not, the magnitude of the disparity can be quantified and recommendations can be made as to the potential increase or decrease. A decision can then be made on a possible reduction in the budget deficit by means of an increase in tax revenues.

This aim was achieved through estimating the relative taxable capacity of the Jordanian economy during 1973-95 by adopting several approaches. Use is made of econometric models in particular. The models were developed in the present study. The arithmetic approach was also applied to estimate the relative taxable capacity and the tax effort for the four major components of total tax revenues. This study used pooled data which combine both cross sectional (thirty-four developing countries) and time series data (1986-89). It also used the time series data for Jordan covering the period 1973-95.

The principal finding was that there is no room to increase tax revenues in Jordan. The study finds that these revenues could be reduced. This result is consistent with excess burden analysis. The excess burden (welfare loss) decreases as long as the tax rate decreases. This result has positive effects on economic growth, as is shown through the tax multiplier analysis. The best candidates for this reduction are taxes on international trade and property taxes. The decrease of taxes on international trade is in line with IMF advice to the Jordanian authorities and the World Trade Organization (WTO) (previously called GATT).

The significance of these findings is that there is no possibility for reducing the budget deficit by means of raising tax revenues. Hence, the emphasis should be placed on reducing public expenditures. One of the best candidates for this reduction is military expenditures, especially in consequence of the peace treaty with Israel. Privatisation of some public institutions and companies which currently receive financial support from the government is the second candidate for this reduction.
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Introduction

It is believed that chronic budget deficits often discourage economic growth, and adversely affect other macroeconomic aggregates. Controlling the deficit means raising taxes or reducing public expenditures. An increase in taxes is likely to have adverse effects on the private sector and economic growth in general. Reducing expenditures is also a difficult task both in terms in political acceptability and because it involves long run commitments.

In Jordan, the ingredients for structural budget deficit exist in a situation where government expenditure outstrips the capacity to finance it with tax revenues. The government has expressed its desire to increase the degree of its reliance upon the available domestic resources to cover public expenditures. It is attempting to increase these revenues in order to achieve moderate rates of economic growth and improve public services. On the other hand, Jordanian citizens have registered their complaints against the continuous increase of taxes (see sub-section 7.4.6).

Domestic revenues, and tax revenues in particular, have received great attention in Jordan during the last few years. This attention came as an outcome of several economic and political factors and their impact on the Jordanian economy. The most important among them are: the decrease in international oil prices, the Gulf War, and economic stagnation which came at the end of the War and reduced the Arab financial assistance offered to Jordan. There was also a drop in the rate of growth of the Gross National Product, and an increase in the external debt outstanding as a result of the rising fiscal deficit in the Jordanian budget. Consequently, the structural adjustment programmes in Jordan have been using fiscal deficit reduction as one of the policy tools for achieving real economic growth with price stability and a viable balance of payments position. The continuous increase of tax revenues in Jordan has made the study of taxable capacity and tax effort a timely research area (see section 1.6 in Chapter 1 for the definition of taxable capacity and tax effort).
The point of view of this study is that taxable capacity is not the same figure for all countries regardless of the stage of development, the economic structure, or the tax system of each (section 1.4 of Chapter 1). It depends on several factors which can be summarised by the effects of taxation on economic incentives. This means that each country has its own taxable capacity. The empirical results obtained in this thesis can be illustrated and explained by considering two important aspects: the economic structure and the tax system in each country. The availability of tax bases is directly related to the economic structure. The adminstration of taxes is a very difficult matter where employees work in small establishments. Accounting practices of a reasonable standard are necessary if profit tax is to be imposed on firms. Commodity taxes cannot be imposed on retailers if retail establishments are very small and unstable. The agricultural sector is largely non-monetised (much of food is home-consumed).

A country with a high degree of economic openness has at least the attractive option of taxes on merchandise exports and imports passing through ports. A low income country has less scope for the transfer of resources to the government. The low income is needed to buy the necessities of life, to cover the basic needs. Furthermore, the empirical results will be connected with the economic situation prevailing during the period 1973-95 from a public choice perspective.

It is very important to know the level of tax revenues (or public expenditures) which is required to obtain a given economic growth target. Tax policy should be considered along with other aspects of economic policy. It must not be viewed as the dependent variable in the system, responding automatically to the requirements placed upon it. The principal aim of this study is to investigate the possibility of increasing tax revenues in Jordan as a mean for financing public expenditure. The crucial point in this study is to find out whether tax revenues in Jordan can be increased/decreased and by how much. The study also considers which taxes are better candidates for increase/decrease among the components of the tax revenues. Accordingly, we can decide if there is a possibility for reducing the budget deficit by increasing tax revenues or not. In case there is no possibility, the emphasis will be placed on reducing public expenditure.
In an attempt to achieve this goal, the study will investigate first the possibility of applying the optimal tax theory to the Jordanian economy. Taxes cause excess burden. Minimising this burden while the government raises revenues to finance public expenditure is the main aim of optimal tax theory. The current study will show later that this theory cannot be applied to Jordan. The assumptions of the optimal tax theory are not met in Jordan. The current study will also show that some economists take a shortcut as a result of the difficulty associated with deriving optimal tax. They show that tax smoothing is optimal. However, obtaining empirical evidence for this theory requires collecting time series data for a long period. This long series in not available for Jordan.

The study therefore will be directed toward taxable capacity. This capacity can be divided into two main kinds: the absolute taxable capacity for one country and the relative taxable capacity for two countries or more. The former will be connected with the Laffer Curve. It will be shown that this kind cannot be employed in the real world either for the reasons mentioned earlier. As a result of not being able to employ the optimal tax theory or the absolute taxable capacity to answer the question which represents the aim of this thesis, the study will look at relative taxable capacity. This subject has drawn the attention of those who are interested in public finance in general and in taxes in particular. The benefit of relative taxable capacity and tax effort estimation comes whenever the government, as the case of Jordan, has two possible alternatives to determine whether the budget deficits are more effectively controlled and reduced by raising taxes or rationing and controlling expenditure or both.

The goal of this study can therefore be achieved by measuring the relative taxable capacity for the Jordanian economy by adopting several approaches. The approaches have been developed by some economists, mainly using econometric models. The models employed in the present study are adopted to estimate the relative taxable capacity of the Jordanian economy. The arithmetic approach is also one of these approaches by which the relative taxable capacity can be estimated. This study uses, for the first time, pooled data which combine both cross-sectional and time series data.
for the developing countries to estimate the econometric models. The data were collected for a period of four years from 1986 until 1989. The study does not extend beyond 1989 which represents the last year that data are available for the developing countries in the study. The developing countries included in this study number thirty-four including Jordan. Several considerations have been taken into account in choosing the sample. The number of variables for which the data were collected for each year and for every country of the selected sample amounts to twenty.

The present study makes several contributions on both the theoretical and the empirical side. Concerning the theoretical aspect, it, for the first time, collects, compiles and discusses the existing state of scholarly opinion on the subject. This includes the measures of taxable capacity. These measures are: the tax burden approach (TB), econometric models, arithmetic approach, standard tax elasticity (STE), income tax elasticity (ITE), tax effort measurement (TEM) and the estimation of the Laffer Curve. Each of these approaches has its own advantages and disadvantages. This Ph.D thesis has adopted three of them to estimate relative taxable capacity for the Jordanian economy. The reasons will be shown later. These approaches are: econometric models, arithmetic approach, income tax elasticity. The first approach has been divided in this study into two sub-approaches. The first is the whole economy’s relative taxable capacity. The second is the individual’s relative taxable capacity. The study also contains the factors which affect relative taxable capacity. These factors are: the degree of economic development, the composition of the GDP, and the degree of economic openness. Each of these three factors is represented by three variables -a total of nine-. These variables are discussed in Chapters 1, 4, and 5. The work also reviews the previous studies related to its subject.

This thesis also adds the degree of monetisation (measured by the ratio of the money supply to the total population) as a new explanatory variable in the models used to estimate the individual’s relative taxable capacity. This addition is explained by connecting relative taxable capacity, for the first time, with the monetary approach to the balance of payments and with the factors affecting money supply. This addition
improves the explanatory power of the model where this variable is included. Furthermore, the study adds the manufacturing sector as an explanatory variable in the model used for measuring relative taxable capacity. This also improves the statistical significance of the model.

The study also connects explicitly, for the first time, the Laffer Curve analysis with the theory of absolute taxable capacity. The Laffer Curve shows the relationship between tax revenues and tax rates. The present study shows that, theoretically speaking, absolute taxable capacity can be defined as what can be collected in taxation without net disincentives on productivity and growth. This can be achieved by using the positively sloping region of the Laffer Curve up to the peak point of the Curve to maximise tax revenues. This thesis also links taxable capacity both with the excess burden (tax distortion) and with the optimal tax theory which deals with minimising the excess burden and is concerned with the trade-off between efficiency and equity. The study shows that the excess burden increases as long as the tax rates increase. This result is maintained regardless of whether tax revenues reach their maximum or not. In other words, the excess burden decreases as long as the tax rates decline.

Concerning the empirical feature, the study introduces a vital adjustment to measure the tax burden in order to estimate the models of relative taxable capacity. This adjustment takes the form of excluding net indirect tax proceeds from the Gross National Product (GNP) as a preliminary to measuring the tax burden of the developing countries in the study. This burden is measured by dividing total tax revenues (excluding social security contributions) in a certain year by the GNP at current factor cost (GNP minus net indirect taxes). The study also develops econometric model to estimate the individual’s relative taxable capacity for the developing countries in the study. It also estimates the relative taxable capacity of the Jordanian economy, for the first time, for the period 1973-95. The empirical results are explained by connecting them with the economic structure of the developing countries and with some public choice hypotheses.

In order to achieve the aim of the present study, it is divided into eight chapters.
Chapter 1 deals with the theoretical framework of taxable capacity and tax effort in addition to the measurement of these concepts. Chapter 2 reviews the development of the budget deficit as well as the development of tax revenues in Jordan during the period 1973-95. It also looks at the relative importance of taxation in domestic revenues. Meanwhile, Chapter 3 reviews the tax revenues in the developing countries under study and the main characteristics of these countries during the period 1986-89. The whole economy’s relative taxable capacity and the tax effort of the developing countries in the study (including Jordan) are estimated for the period 1986-89 in Chapter 4. Chapter 5 is devoted to measuring the relative taxable capacity of the individual for the developing countries under study during the same period. In Chapter 6, the relative taxable capacity and the tax effort of the same developing countries including Jordan will be estimated for the same period using the arithmetic approach. The tax effort and the relative taxable capacity of the Jordanian economy for the period 1973-95 will be estimated by adopting several approaches in Chapter 7. Chapter 8, the last chapter, presents the main conclusions and recommendations of this study. It also makes suggestions about the further research and studies that should later be conducted. Several Appendices appear at the end.
1.1. Introduction:

Economists study the real world in the hope that improved knowledge will lead to better economic policy and performance. It is well known that fiscal policy stands side by side with monetary policy in the field of macroeconomic policy and management. Co-ordination and consistency between the two kinds of policy is indispensable. Fiscal policy raises many of the same issues as monetary policy. It has the potential, theoretically speaking, to reduce fluctuations in aggregate demand and in that way to increase economic welfare. This has long been a theme of Keynesian macroeconomics. The trade-off for fiscal policy is between output stabilisation and the distortion from tax and spending policies.

Fiscal policy has important effects on the macroeconomy. It affects aggregate demand: through direct government expenditures on goods and services, consumption demand restricted through taxes (current & anticipated), and through public-sector debt. The aggregate demand, in turn, affects the level of employment and of prices (Musgrave and Musgrave 1989). Fiscal policy also affects the division of national income between consumption and investment. This, in turn, influences the rate of economic growth. This will be shown in more detail when government purchase multiplier and tax multiplier are discussed. Taxes in the developing countries have started to attract ongoing and great attention as an instrument of fiscal policy and for their influence on macroeconomic variables.

Empirical studies (see for example Khadrawi 1987, Mansur 1986) show that the financing of the budget deficit in developing countries by external and internal borrowing contributes significantly to bringing about disequilibrium in the money
market. This, in turn, leads to external imbalance. Consequently, in an effort to avoid such adverse consequences, governments in these countries resort to policies aimed at reducing budget deficits through controlling and rationalising public expenditures and raising public revenues, particularly tax revenues, so as to finance increasing proportions of expenditures from these revenues. Jordan, like other developing countries, has adopted a fiscal policy which relies heavily on tax.

Jordan has adopted, as it will be shown in Chapter 2, continuous medium growth-oriented adjustment programmes starting from the programme covering the period 1989-93. These programmes have been designed by the government of Jordan in cooperation with the International Monetary Fund (IMF). At the heart of these programmes’ goals is the reduction of the budget deficit. Considerable effort has been made on both sides of the budget (taxes and public expenditures) since then. The tax burden increased, on average, from 17% of the GNP at current factor cost (GNP minus net indirect taxes) for the period 1973-89 to 26% of the GNP at current factor cost for the first six years of the 1990s. However, the ratio of public expenditures to the GDP decreased, on average, from 44% for the period 1973-89 to 40.5% for the first six years of the 1990s. This gives a clear indication that the focus was heavily on taxes to reduce the budget deficit.

In consideration of the importance of taxable capacity and tax effort, authors on public finance have discussed this subject from different perspectives. Their conclusions differ according to the objectives of each. Some of them have concentrated on identifying the concepts without broaching or identifying the methods of measurement. Meanwhile, some others have designed methods to estimate taxable capacity and tax effort.

The central task of this Chapter is to explain the theoretical concept of taxable capacity and tax effort. In addition, the Chapter will consider the methods of measuring both capacity and effort in real world. The Chapter looks at the factors which determine relative taxable capacity and tax effort. All the relevant previous studies of this subject which have added new contributions to this field are reviewed.
and discussed. The Chapter also includes a brief introductory section which tackles the basic concepts and definitions, and the areas which are covered by various studies about taxes.

1.2. The Methodology of the Chapter:-

The subject of the current thesis is public finance. The argument of this study is restricted to taxes. Public expenditure therefore will not be discussed in detail. Jordan, as shown earlier, focuses heavily on taxes to reduce the budget deficit. The main aim of the study is to answer the following question: can tax revenues in Jordan be increased/decreased and by how much? Which taxes should be increased/decreased? A decision can then be made on a possible reduction in the budget deficit by means of an increase in tax revenues. In an attempt to answer this question, the study will investigate first in this Chapter the possibility of applying optimal tax theory to the Jordanian economy. The theory will be discussed in more detail in this Chapter. Taxes cause excess burden. Minimising this burden while the government raises revenues to finance public expenditure is the aim of optimal tax theory (Auerbach and Feldstein 1985). The optimal tax theory is also interested, as will be shown, in the trade-off between efficiency and equity. Furthermore, the optimal tax addresses the redistribution of income. This subject is one of the most important concerns of this theory. The current study will show later that this theory cannot be applied to the real world. All the studies conducted about the same theory have reached the same result. The main problem facing the translation of the optimal tax theory concept into its empirical counterpart is the availability of information and data (Musgrave and Musgrave 1989). Applying the above-mentioned theory requires a significant amount of information which is not usually available (Auerbach and Feldstein 1985, Cullis and Jones 1992, Musgrave and Musgrave 1989).

The current study will also show later in detail that some economists take a shortcut as a result of the difficulty associated with deriving optimal tax (Blanchard and Fischer 1993). They show that tax smoothing is optimal (Barro 1979 and 1987, Ingberman and Inman 1988, Stokey 1983). On average the general budget will be
balanced. Taxes are set in such a way as to balance the budget. When production is high, tax revenues will be above average. When the production is low, the tax "take" will be below average. However, obtaining empirical evidence for this theory requires collecting time series data for a long period as Barro and Horrigan did. This long series is not available for Jordan. Several major areas will also be discussed in this Chapter to investigate the possibility of applying any in order to achieve the aim of the current study. These are: the effects of taxation on macroeconomic variables, tax system design and use of tax instruments. All are seen to be suffering from a similar defect.

The study therefore will be directed toward taxable capacity. This capacity can be divided into two main kinds: the absolute taxable capacity for one country and the relative taxable capacity for two countries or more. The former will be connected with the Laffer Curve. It will be shown that this kind cannot be employed in the real world either for the reasons mentioned earlier.

The subject of relative taxable capacity has drawn the attention of those who are interested in public finance in general and in taxes in particular. Many studies have appeared to address this subject. In this regard, the International Monetary Fund (IMF) has played an important role in this field. The IMF has made many attempts to find a basis to estimate relative taxable capacity and tax effort in developing countries. This subject has also been discussed and estimated in the real world by many economists such as Williamson, Plasschaert, Hinrichs, Thorn, Weiss, Lotz, Mors, Shin, Bahl, Chelliah, Baas, Kelly, Musgrave and Musgrave, Tait, Grata, Eichengreen, Newlyn, Roberti, and Sarojini (see section 1.11 for details). Many of them are senior economists in the Fiscal Affairs Department of the International Monetary Fund (IMF) at the time of this research. This capacity is concerned with the economic structure. The availability of tax bases is directly related to that structure and also reflects the ability-to-pay principle.

Therefore, this subject (relative taxable capacity) is employed in this study to estimate the Jordanian economy's relative taxable capacity in order to answer the
question which represents the aim of this study. The relative taxable capacity is a comparative measure. It may represent a proxy for absolute taxable capacity. It is useful to be estimated in the light of not being able to measure optimal tax or absolute taxable capacity. The comparison of the tax burden among countries by applying econometric models taking into consideration the factors which determine relative taxable capacity and the explanatory variables which represent these factors is helpful. Estimation of relative taxable capacity gives a quantitative measurement which could be useful to help policy makers in designing fiscal policy.

The benefit of relative taxable capacity and tax effort estimation comes whenever the government, as the case of Jordan, has two possible alternatives to determine whether the budget deficits are more effectively controlled and reduced by raising taxes or rationing and controlling expenditure or both (Baffes and Shah 1990). Martin and Fardmaresh prefer reducing the budget deficit through increasing taxes rather than decreasing public expenditure. The present study will show later that the government cannot raise tax revenues as high as it wants to reduce the budget deficit. Continuous rises in tax revenues will be in danger of stifling economic growth. Support for this result can be found in the International Monetary Fund (IMF) studies.

1.3. Introduction to Taxation:-

This section introduces some concepts and definitions which are related to the subject of this study. It defines tax and reviews the main objectives which can be achieved by imposing taxes. It considers the characteristics of a good tax system. In addition it states standards which are usually adopted to classify taxes into direct and indirect. It discusses the excess burden (tax distortion) and the optimal tax theory in more detail. This is done because these two issues are relevant to the subject of this thesis. The section also highlights the major issues which are relevant to the subject of the study and discusses briefly the advantages and disadvantages of each. Then, it will be shown that one among these issues has been chosen to be the concern of this study because it achieves all its aims.
1.3.1. Tax Definition and Objectives:-

Tax is defined as a compulsory deduction, nowadays almost always of a monetary kind. It is one of the means by which a government finances its public expenditures (Al Batreek 1984, Dalton 1961, Griffiths and Wall 1995, Maraar and Al Hundi 1980). There are several goals behind imposing taxes. The primary one is to finance government expenditure. Discouraging consumption of particular goods, providing protection to specific domestic industries, influencing the balance of payments (Dajani and Hosny 1989), redistribution of income and influencing the economic growth rate are additional objectives that can be achieved by imposing various taxes (Musgrave and Musgrave 1989).

1.3.2. Requirements for A Good Tax System:-

A good tax system should have several attributes. The most important among them are: equity, efficiency and simplicity. Equity means that the tax burden should be distributed in a manner that is "just"; while justice is hard to define, it may mean that people in an equal position should be taxed equally or at least proportionally (Musgrave and Musgrave 1989). This requirement is based on two alternative principles: the first is called the benefit principle. An equitable tax system is one under which every taxpayer contributes in line with the benefits received from public services (Musgrave and Musgrave 1989). This principle links the tax with the spending side of the general budget. It relates, therefore, to the supply of publicly-provided goods. The second is the ability-to-pay principle. It neglects the public spending side. This ability depends on the income and wealth of the taxpayer. In other words, the ability-to-pay principle means that the rich taxpayer should pay a higher marginal rate of tax than the poor one (equality of sacrifice). The ability-to-pay-equity is divided into two types: firstly, the horizontal equity means taxpayers with equal capacity should pay the same; secondly, vertical equity emphasises that people with greater ability should pay more taxes (Musgrave and Musgrave 1989). Musgrave and Musgrave (1989) showed that relative taxable capacity provides a comprehensive measure of the ability-to-pay principle. The latter principle is,
therefore, very important because it is directly related to the measurement of relative taxable capacity which is the subject of this study.

An equitable distribution of tax burden is one major characteristic of a good tax system but it is not the only one. Efficiency is also a very important attribute. A tax system can be considered inefficient, if it distorts the free choices of individuals. Product tax which distorts the pattern of consumption is inefficient. A tax which is imposed on labour which reduces the supply of labour since it distorts the choice between leisure and work is also inefficient. The principle of least price distortion means that the more efficient the tax, the less loss of satisfaction to the taxpayer. Imposing a tax on a good affects its price. This reduces both consumer and producer surpluses. That reduction is divided between government revenue and net deadweight loss. That loss is called excess burden. The excess burden depends on the price elasticity of supply and demand. The less the elasticity of supply and demand, the less excess burden. The excess burden will be discussed in more detail later on.

The consumption and production of some commodities entail social costs. Imposing tax on these goods may reduce the marginal social cost. This tax can be viewed as a corrective rather than a creative distortion (Sandford 1992). Pigou had also earlier emphasized the use of taxation to correct distortions such as externalities (Ghandhi and Others 1987, Stiglitz 1987). In other words, if the market itself operates in an inefficient way, imposing taxes may be used to compensate and correct such inefficiencies (Musgrave and Musgrave 1989). Taxes can generate a net gain to society if governments use their yields in such a way as to produce growth (Skinner 1989). Efficiency means minimising the welfare loss of any taxpayer. In other words, the distortive effects of taxes should be kept to a minimum.

Simplicity is one of tax principles. It means that the cost of collection and compliance should be minimised. Tax operating costs consist of collection costs (administrative costs of collect taxes) and compliance costs (costs incurred by taxpayers) (Cullis and Jones 1992). There are mainly two kinds of compliance costs: money costs (accountant, postage travel to the tax office, fees of a tax adviser) and
time costs (filling tax data). Time costs can be converted into money costs. These costs might be measured as a percent of GNP or of tax revenue (Sandford 1992). The less the costs of compliance and collection of a tax, the simpler the tax.

1.3.3. Direct versus Indirect Taxes:-

Taxes can be divided into two groups, namely direct (such as income tax) and indirect (such as value added tax) (Sloman 1995, Tait 1988). There are several standards to differentiate between direct and indirect taxes (Griffiths and Wall 1995). Direct taxes are those where the taxpayer fully bears the burden, while in indirect taxes, the burden can be transferred to another person (Sandford 1992). The degree of impersonality of tax is an important distinction between direct and indirect taxes. This means that direct taxes are those which take into account the social and the personal conditions of the taxpayer, whereas indirect taxes do not take these into consideration. That is to say that there is general agreement that tax is considered to be direct if it is imposed on income when it is earned or on capital when it is owned (Abdel-Halek 1965, Griffiths and Wall 1995).

Tax is considered to be indirect if it is imposed on income or wealth when they are being spent. In other words, indirect taxes are imposed on the uses of income and wealth (Due 1968, Musgrave and Musgrave 1989). The present study is concerned with the division of revenues to direct and indirect taxes because the proceeds of indirect taxes will be excluded from the GNP as a preliminary to measuring the tax burden of the developing countries in the study. This burden is measured by dividing total tax revenues (excluding social security contributions) in a certain year by the GNP at current factor cost (GNP minus net indirect taxes) (see section 3.3 of Chapter 3 for the reasons lying behind this procedure). Taxation can also be divided into taxes on consumption and on saving (Musgrave and Musgrave 1989).

The main targets which should be considered in designing a tax system are equity and efficiency through using direct and indirect taxes. Direct taxes are more equitable because they are based on the ability-to-pay principle. Indirect taxes are more
efficient because they generate lower excess burden as will be shown later. Indirect taxes also are in line with simplicity since they require lower administration and compliance costs than those of direct taxes. Poll tax is used to raise revenue based on efficiency grounds. Commodity tax is used to achieve equity with heavy tax rates on luxuries and low rate on necessities (Cullis and Jones 1992).

1.3.4. Excess Burden and Consumer Behaviour:

The excess burden (the welfare costs or the deadweight losses) can be identified by analysing the utility maximisation using the indifference curve and the budget line. The indifference curve is defined as a locus of points which give at each point the same level of satisfaction (Gravelle and Rees 1992, Pindyck and Rubinfeld 1995). Figure 1.1 shows the indifference curve and the budget line for the individual. The budget line represents the combination of goods that the consumer can purchase given the income and the prices of the goods (Gravelle and Rees 1992, Pindyck and Rubinfeld 1995). The slope of the budget line reflects the relative prices of these two goods. Two goods are assumed. $Y_0$ and $X_0$ are the quantities that the consumer can purchase if he allocates all of the income to buy one good only.

The maximisation of utility is achieved when the budget line tangential to the highest possible indifference curve. At this point the slope of the budget line (relative prices) equals the slope of the indifference curve (marginal rate of substitution for the two goods). In other words, the marginal utility per unit of currency spent on each good must be equal. Prior to tax, to maximise his utility, the consumer will choose a combination of the two goods $X$ and $Y$ shown by point A. If we introduce excise tax on good $X$ only into picture, this shifts the budget line to a new position (from $Y_0 X_0$ to $Y_0 X_1$). This position reflects the change in the relative prices after tax. The difference in the price of good $X$ is the amount which should be paid to the government. Now the combination of goods $X$ and $Y$ which achieves the utility maximisation, after tax, is shown by point B. It is observed that tax affects the consumer utility since tax shifts the utility maximisation to the left from point A (before tax) to point B (after tax). At point B the slope of the budget line still reflects
the relative prices, but the price of good X includes the tax (Cullis and Jones 1992).

Which kind of taxes are more efficient to impose in order to minimise the utility loss of the consumer. Following the same analysis shows that lump-sum tax or poll tax are more efficient than selective excise tax in view of minimising the consumer utility loss (Cullis and Jones 1992). A poll tax shifts the budget line to the left parallel to the original one \((Y_0, X_0)\). Point C is the consumer maximum utility. This point shows that the relative prices as well as the marginal rate of substitution are unchanged. Tax does not affect the free choices of the consumer. This tax, therefore, according to the efficiency point of view, is preferable to the selective excise tax (Auerbach and Feldstein 1985, Cullis and Jones 1992). This analysis is not consistent with the equity principle analysis.
1.3.4.1. Tax Distortion in Partial Equilibrium:-

The current study discusses tax distortion in partial equilibrium rather than in general equilibrium. This is done to focus on the concepts of the excess burden in a simple fashion and to connect this burden with the optimal taxation theory. This is also done to link excess burden generated by taxes with the tax rate and tax revenues. These concepts and the ways they work are directly related to the subject of this thesis.

Figure 1.2 illustrates what has been mentioned in the above paragraph. For the sake of simplicity, a product tax is considered, producers' prices are assumed fixed, and the market operates in an efficient way (Musgrave and Musgrave 1989). Quantities (Q) are measured on the horizontal axis, while prices (P) are measured on the vertical axis. The supply curve of this product is represented in the Figure by S. However, the demand curve for this good is expressed in the same Figure by D. Point C at the Figure is the equilibrium point which is determined by the intersection between supply and demand. The demand curve can be viewed as an expression of willingness to buy, while the supply curve reflects the willingness to sell. Therefore, P₀ and Q₀ are the equilibrium of price and quantity respectively.

Consumer surplus can be defined as the amount that consumers would pay in excess of the amount they are paying for the amount they are purchasing. Area B, therefore, represents the consumer surplus. This triangle (area B) is the area restricted between the equilibrium price and the demand curve. The same area can be measured by calculating the integration to the vertical gap between the demand curve and the equilibrium price over the quantity. The producer surplus represents the level of profits received in offering the quantity sold. This surplus is given by the area A in

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1 Partial equilibrium analysis is sufficient to understand market behaviour. However, general equilibrium analysis determines quantities and prices in all markets at the same time. It takes into consideration the adjustment in price and quantity in one market which is caused by price and quantity in related markets. This is known as the feedback effect (Pindyck and Rubinfeld 1995). Tax distortion in general equilibrium is discussed in both Musgrave and Musgrave (1989), and Cullis and Jones (1992).
Figure 1.2: The sum of the consumers and producers surpluses (A+B) is maximised when price equals marginal cost (Musgrave and Musgrave 1989).

Introducing tax on cost into the picture shifts the supply schedule upward to $S_1$ (see Figure 1.3). The new equilibrium point is at E. The effect of the tax is to raise price and reduce quantity (Sloman 1995). The equilibrium price and quantity, therefore, move to $P_1$ and $Q_1$. Output falls from $Q_0$ to $Q_1$. Tax revenues are given by the area $P_0P_1EF$. Prior to tax, consumers paid $0P_0FQ_1$ for quantity $0Q_1$. After tax, consumers must pay $0P_1EQ_1$. The extra amount equals $P_0P_1EF$. This additional amount also equals the tax revenues which are received by government. This is not the whole story about the consumers burden. Before tax, they paid $0P_0CQ_0$ for the amount of $0Q_0$ (all units were priced at the marginal values). However, they would have been willing to pay $0DCQ_0$. Accordingly, as earlier shown, the consumer surplus is given by the area $P_0DC$. After tax, it is reduced to $P_1DE$. Consumers, therefore, receive a consumer surplus equals to the difference between actual and potential payment. Consequently, they suffer a loss of surplus equals to $P_0P_1EC$. Out of this loss $P_0P_1EF$ is offset by the tax revenues. The triangle $FEC$ remains as a deadweight loss or excess burden to the economy.
Similarly, it can be noted that the producer's excess burden is represented by the triangle FCG. Therefore, the total excess burden to the economy equals the sum of consumers' and producers' excess burden. This burden is shown by the triangle ECG. This excess burden is also measured by multiplying the change in consumption by half the tax (Auerbach and Feldstein 1985, Cullis and Jones 1992). This is true under the assumption that the excess burden is a linear function of tax rate. If, however, the excess burden is non-linear, it will equal approximately the change in consumption multiplied by half of square of the tax (Auerbach and Feldstein 1985)\(^2\). In other words, as the tax rate is increased, the excess burden rises in proportion to the square of the tax rate imposed on the product (Musgrave and Musgrave 1989). This leads to suggest that using several small taxes rather than a large one to raise tax revenues might reduce the excess burden (Auerbach 1982, Auerbach and Feldstein 1985).

The excess burden, as observed in Figure 1.3, depends on the supply and demand elasticity (Musgrave and Musgrave 1989). It becomes smaller as demand and supply

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\(^2\) The change in consumption after tax depends on the price elasticity of demand (Cullis and Jones 1992).
become less elastic. The excess burden equals zero when inelastic supply and demand are received. In this case, the triangle vanishes and this tax is equivalent to lump-sum tax (no excess burden). The excess burden also depends on the amount of tax (tax rate). Figure 1.3 shows that increasing the tax rate will increase the excess burden (assuming that supply and demand are not inelastic). It is worth saying that a similar analysis can be applied to a tax on the rent for land (note that the supply curve for land is inelastic) and on wages, the choice here between goods and leisure as will be shown later.

1.3.4.2. Excess Burden, Tax revenues, and Tax Rate:-

This sub-section considers the relationship between tax revenues, tax rate, and excess burden (deadweight loss). To illustrate this, the case of commodity tax will be employed. It is worth saying that the analysis used by Musgrave and Musgrave (1989) is considered here. Point A in Figure 1.4 shows the initial equilibrium point between supply (S) and demand (D). Tax is introduced at several rates to see the effect of these rates on consumer surplus and excess burden. For the sake of simplicity, inelastic supply is assumed. Based on the illustration of diagrams 1.2 and 1.3, prior tax, production equals 0Q0, price is given by 0P0, consumer surplus equals triangle P0DA. Let us Introduce a tax rate at P1P0/0P0. The supply schedule moves to P1B, consumer surplus drops to P1DB. The reduction in consumer surplus equals P0P1BA, out of which P0P1BE is tax revenues. The excess burden, therefore, equals the triangle EBA (the difference between the consumer surplus prior and after tax). A new higher tax rate P2P0/P00 is imposed. The supply schedule again shifts to P2C, output falls to 0Q2, tax revenues increases to P0P2CF, consumer surplus declines to P2DC. The excess burden now equals the triangle FCA. We can observe that a further increase in tax rate to P3P0/P00 will lead to a decreased output to 0Q3, tax revenues to P0P3HG and increases the excess burden (the triangle GHA).

3 Excess burden also depends on the income distribution (Auerbach and Feldstein 1985).
Figure 1.4: Excess burden.

Figure 1.5: Excess burden (EB), tax revenue (TR), and tax rate.
The various tax rates, tax revenues and excess burden illustrated in Figure 1.4 are plotted in Figure 1.5. Figure 1.5 shows that the tax rate is gradually increased from zero up to a point where it becomes very high (prohibitive, tax revenue is nil at zero tax rate then it increases until it reaches a maximum after that tax revenue starts declining). It can be observed that there are two rates of tax which achieve the same tax revenues: one below and one above the maximum of these revenues (Auerbach and Feldstein 1985). This curve as will be shown later was developed by Professor Laffer. We can observe from Figure 1.5 that the shape of this curve depends on the demand elasticity.

The second result which can be shown by Figure 1.5 is that excess burden increases as long as tax rate increases. This result is maintained regardless of whether tax revenues reach maximum or not. In other words, the excess burden decreases as long as the tax rate declines. This means that if the tax rate is reduced to $P_1P_0/P_00$, this will increase tax revenues and reduce excess burden. We can conclude, therefore, that any reduction in the tax rate after tax revenues reaches its maximum will generate more tax revenues and reduce the excess burden. However, raising the tax rate, therefore, declines the quality of the tax defined as the ratio of tax revenues to excess burden (Musgrave and Musgrave 1989). The optimal tax is defined as that which minimises the excess burden. The optimal tax problem deals with how the excess burden can be minimised while the government increases tax revenues to finance its public spending. Therefore, the above analysis is in line with the optimal tax theory. This is also consistent with the Laffer Curve analysis as will be shown later.

1.3.5. Optimal Tax Theory:-

It is observed when the excess burden and tax distortion were discussed in this study that taxes might be ranked according to efficiency. For example, general consumption tax creates lower excess burden than that of selective excise tax. Tax on goods that are price-inelastic demand such as food (necessities) has lower excess burden than that on goods which are price-elastic demand. However, most taxpayers
who pay tax on food are the poor. This conflicts with the equity principle which was discussed earlier. The optimal tax theory deals with minimising the excess burden or the welfare costs. The optimal tax theory, therefore, is interested in the trade-off between equity and efficiency.

1.3.5.1. Optimal Commodity Tax:

This sub-section discusses the optimal commodity taxes. Figures are used to illustrate the argument. It is assumed that the government wishes to raise revenues by taxing commodities using lump-sum tax. The target is to minimise excess burden (Cullis and Jones 1992). To achieve this aim of increasing efficiency, the government should impose equal proportional taxes on all taxed goods to raise revenues (Auerbach and Feldstein 1985). This shifts the budget line to a parallel place without altering the relative prices. In this case, there is no excess burden. This is the first best solution. This case is similar to what was illustrated in Figure 1.1.

The above-mentioned analysis is also valid for the labour market. However, the problem with the labour market is that it is difficult to tax leisure time. In this case, the second best solution will be applied to minimise excess burden. This can be illustrated by explaining the "Ramsey Rule". Taxing all goods by the same proportion generates an equal proportionate decline demand for these goods (Heady 1988). This can be achieved when tax rates are set inversely proportional to the price elasticity of demand for goods. In other words, the inverse elasticity rule should be applied. This means high proportional taxes on goods with low price elasticity of demand (Auerbach and Feldstein 1985). This minimises the excess burden and satisfies the Ramsey rule. That is to say, excess burden increases as the price elasticity of demand rises. If tax makes the proportional decline in demand for good X equal to the proportional reduction in demand for good Y, this tax will be considered optimal. This means that to minimise excess burden, a higher tax rate should be set on goods with the a lower price elasticity of demand and a lower tax rate should be imposed on goods with high price elasticity of demand. This is inconsistent with the equity principle of taxes as shown earlier. This analysis is valid under the assumption that
Figure 1.6: Excess burden with flatter demand curve.

Figure 1.7: Excess burden with steeper demand curve.
goods under consideration are independent (neither complements nor substitutes) (Cullis and Jones 1992).

Figures 1.6 and 1.7 show how price elasticity of demand affect excess burden. Introducing tax raises the price from \( p_0 \) to \( p_1 \) in each Figure. This moves the equilibrium point from \( C \) to \( A \) in Figure 1.6 and from \( G \) to \( E \) in Figure 1.7. In turn, this decreases the quantity demanded from \( Q_0 \) to \( Q_1 \) for each good. The excess burden is much greater in the case of good X (triangle ABC) compared with that of good Y (triangle EFG). This reflects the higher price elasticity of demand for good X compared with that of good Y.

It is assumed that there are no cross effects between goods (neither substitutes nor complements). When this assumption is relaxed, Corlett and Hague say that goods which are substitutes for leisure should be taxed less than goods which are complementary to leisure. This is because leisure is not a taxable good. This is also the second best solution (Cullis and Jones 1992). The Ramsey rule is a specific case of Corlett and Hague's analysis. Goods which are more substitutable with leisure should be candidates for relatively lower tax. When these substitute goods are price-elastic in demand, this is in line with the Ramsey rule. On the other hand, goods that are less substitutable (more complementary) with leisure should be taxed relatively heavily (Musgrave and Musgrave 1989). These goods usually are price-inelastic in demand. This again is not consistent with the equity principle of taxes because usually goods which are price-inelastic in demand are necessities (food).

1.3.5.2. Optimal Linear Income Tax:-

The preceding section showed that minimising excess burden in not consistent with the equity principle. To address both equity and efficiency which lie at the heart of optimal tax theory, the optimal linear (for the sake of simplicity, not non-linear) income tax is considered in this section. The optimal income tax also addresses the redistribution of income. This subject is one of the most important concerns of optimal tax theory. The government tax policy here is to make income transfers from
rich to poor people via negative income tax. The government makes a transfer to everybody (lump-sum payment) and therefore, a constant rate of tax is imposed on all income exceeding the starting point of tax (the amount of the negative income tax received by each individual). Figure 1.8 illustrates this analysis. Tax revenues (TR) in this case depend on both the lump-sum transfers (-b) and the marginal rate of tax (t) on income (Y) \((TR=-b+tY)\). The slope of the line depends on the marginal rate of tax (t). Point A is the break-even point where the taxpayer would pay no tax.

How the tax rate and the lump-sum payment should be set to obtain optimal linear income tax in order to minimise the excess burden associated with achieving redistribution of income policy. The higher the marginal tax rate, the greater the excess burden losses created in the labour market (Cullis and Jones 1992). For the sake of simplicity, two individuals (A and B) and identical preferences are assumed. The two individuals are different in income levels. Individual A’s wage rate exceeds that of B. The slope of the budget line is determined by wage rate. Figure 1.9 shows that the equilibrium point is at A, This point reflects a combination of work and leisure (L) which maximises utility. Figure 1.10 demonstrates that the slope of the budget line which is determined by the wage rate is flatter than that of individual A. This reflects that individual B has a lower wage than that of A. Point B expresses the equilibrium point for individual B. This is the initial situation.

![Figure 1.8: Optimal linear income tax.](image)

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How linear income tax is set to minimise excess burden and at the same time lead to the best distribution of income, given that tax revenues are required for the redistribution target only. A specific optimal linear income tax with a marginal rate of tax and a lump-sum payment is illustrated in Figures 1.9 and 1.10. Introducing tax to the analysis shows that the marginal rate of tax is CD/0D on individual A and EF/OF on individual B. The tax rate is the same for both individuals. Therefore, the angle at which the budget line changes is the same in the two Figures. The new equilibrium points are A2 and B2 for individuals A and B respectively. The tax revenue will be redistributed through a lump-sum payment to both individuals. This shifts the budget line for both to a new parallel position (lump-sum payment)(G for individual A and H for individual B). Accordingly, the new equilibrium points are A3 and B3 for individuals A and B respectively. It is observed that individual A is a taxpayer (income before tax and after tax & transfer as shown in Figure 1.9 are Y0 and Y1 respectively. Note that Y1 is less than Y0. However, the same corresponding points for individual B are (as shown in Figure 1.10) Y0 and Y1. Note that Y1 is higher than Y0.

The redistribution generated by the linear income tax may be considered a good or bad result. The result depends on the social welfare function. This function has been discussed by many economists. The redistributed income after tax can be viewed as a good result, according to the Rawlesian social welfare function which established the increasing welfare of the worse-off individual. This is realised for individual B. However, the redistribution income after tax can be viewed as a bad result if the social welfare function where someone could be made better-off and no one else be made worse-off is considered. Individual A is worse-off after this policy. If we are concerned with the net effect of the policy on welfare, it depends on the gain/loss of each individual. If the net effect is a gain in welfare, this means a good result for the redistribution of income policy, otherwise it will be considered a bad result. The optimal marginal rate of tax is that which maximises welfare and efficiency (minimises excess burden). It depends on the elasticity substitution between work and leisure. The higher the elasticity, the greater the excess burden.
Figure 1.9: Optimal linear income tax (individual A).

Figure 1.10: Optimal linear income tax (individual B).
1.3.5.3. Criticism of Optimal Tax Theory:

The optimal tax theory suffers from several criticisms (Cullis and Jones 1992). Firstly, the theory misses the analysis of consumer behaviour or what is called the welfare problem. This is because consumption does not give goods the values; the values come from knowing that goods cannot be consumed at the same time by other individuals. Secondly, the theory also ignores the general equilibrium. It is assumed that there is no shifting effect of the burden of income tax. The imposition of high tax rates usually causes wage demand increases. Thirdly, optimal tax theory neglects the administration costs by assuming no cost in setting tax rates (Cullis and Jones 1992).

1.3.6. Areas of Tax Issues:

Analysis of taxable capacity forces one to think about a number of issues. These can be summarised in five major areas: optimal tax theory, smoothing tax theory, the effects of taxation on macroeconomic variables, tax system design and use of tax instruments. In addition to this, it is necessary to look at the issue of taxable capacity and tax effort. Many studies have been conducted in relation to each of these issues. The following is a brief review under each heading:

1. Optimal tax theory: This issue was discussed in more detail in a separate sub-section. A brief review which deals with other aspects of this theory is given here. Taxes cause excess burden. Minimising this burden while the government raises revenues to finance public expenditure is the aim of optimal tax theory (Auerbach and Feldstein 1985). Optimal tax theories involve unavoidable questions of public finance such as the progressivity of income or capital gains tax, whether expenditure or income is the appropriate basis for taxes, the balance between direct and indirect taxes, the desirability of proportional goods tax (Brito, Hamilton, Slutsky and Stiglitz 1991, Anderson 1992, Correia 1992). At the heart of these questions the optimal tax theory is interested, as will be shown, in the trade-off between efficiency and equity.
There are three different approaches for optimality of a tax system. The first argues that a good tax system is that which minimises the resource cost involved in collecting and paying taxes. This concerns tax administration (Sandmo 1976). This is directly related to the simplicity principle of tax which has already been mentioned. The second assesses alternative tax systems in terms of fairness or justice (Slemrod 1990). The third ranks the tax system according to the economic efficiency (Cullis and Jones 1992). The optimal tax system is the one which minimises the loss for any given level of tax revenue-public spending. This theory has been extended to take into account distributional matters (Boskin and Sheshinski 1978, Musgrave and Musgrave 1989).

The optimal tax theory states that the social cost of increasing revenue is minimised when the social marginal cost of increasing revenue is equalised across all tax bases (Auerbach 1985, and Dahlby and Wilson 1994). It also states that the social cost of increasing revenue depends on both the tax base and the responsiveness of the base to changes in tax rates. The lower the elasticities of supply and demand of the activity, the more efficient it is to tax it (Dahlby and Wilson 1994). This was illustrated in more detail when the excess burden and tax distortion were discussed. This approach cannot be applied in this study to Jordan. The reasons will be discussed in detail in subsection 1.3.7.

2- Tax smoothing theory: Some economists take a shortcut as a result of the difficulty associated with deriving optimal tax (Blanchard and Fischer 1993). They show that tax smoothing is optimal (Barro 1979 and 1987, Ingberman and Inman 1988, Stokey 1983). On average the general budget will be balanced. Taxes are set in such a way as to balance the budget. When production is high, tax revenues will be above average. When the production is low, the tax "take" will be below average. In other words, tax smoothing means keeping tax rates smooth. This is done by running a budget deficit in unusually low income years (such as wars and recessions) and obtaining a
surplus during economic booms. This would add up to a balanced budget over the economic cycle (Mankiw 1994). The stock of debt represents actual future taxes/less future expenditures (Blanchard and Fischer 1993). This argument is normative. However, Barro (1987) has found that British government behaviour during more than two centuries (1701-1918) was consistent with the tax smoothing theory. Horrigan has also found support for the tax-smoothing theory (Ingberman and Inman 1988). He used USA data which covered the period 1790-1981. Horrigan found that the budget deficit is higher in periods of abnormally high level of government expenditure or in periods of abnormally low level of national income (Ingberman and Inman 1988).

The major conclusions of the tax smoothing theory as stated by Barro (1987) can be summarised as follows: transitory government expenditure will be financed during wartime by a budget deficit, then tax rates will be raised uniformly during and after the war. A permanent increase of government expenditure will lead to a matching increase in tax rates, the budget deficit remaining constant. There are deficits during depressions and surpluses in booms. This is in order to prevent tax rates from being high during depression and low during booms.

Obtaining empirical evidence for this theory requires collecting time series data for a long period as Barro and Horrigan did. This long series in not available for Jordan. The well organised and reliable data available for Jordan starts from 1960. The country has been suffering, as will be shown in Chapter 2, from a budget deficit since then. This may be, as mentioned earlier, because the time series is very short in comparison with the data used in Barro’s study (1987) which covered more than two centuries and about two centuries for Horrigan’s study (Ingberman and Inman 1988). The short time series available for Jordan reflects only one stage of the theory. That stage is represented by financing expenditures through budget deficit because this period has witnessed several wars. Accordingly, no further emphasis will be placed on this theory.
The impact of taxes on macroeconomic variables: Both sides of the general budget (taxation and government spending) influence the economy in several ways (Aschauer and Greenwood 1985, Chari 1985, Jackman and Layard 1990). There are impacts on the economic growth (Anton 1986, Cashin 1995), consumption (Barro 1989, Bernheim 1989, and Yellen 1989), savings (Kotlikoff 1984, Smith 1989), investment, labour supply and the general price level (Zee 1996). There are also effects on the budget deficit and current account balance (Barro 1987, Mankiw 1994). In order to decide what tax system should be imposed, the effects of taxes on macroeconomic variables should be modeled to see the disincentives which may arise as a result of any tax and to see how to minimise the distortion of imposing this or that tax as was shown when the efficiency principle was discussed. These effects depend mainly on the elasticities of supply and demand of labour as well as commodities and on the result of income and substitution effects.

For example, showing the effects of both direct and indirect taxes on real wages requires building a model to estimate these influences. Knoester and Windt (1987) have developed a model to achieve this purpose. Based on the theoretical framework they develop, they present their econometric model. The explained (dependent) variable is represented by the percentage change in nominal wages. Meanwhile, the independent variables are represented by consumer prices, the difference between GDP deflator and consumer price, productivity, forward shifting of direct taxes and social security contributions and a transformation of the unemployment rate (the operation of the Phillips-curve mechanism). When they applied this model to ten OECD countries, they found that the shifting forward of direct taxes into higher real wages is theoretically accepted, but that little empirical evidence for it has been noticed.

Mankiw (1994) shows that the budget deficit leads to lower both investment and saving and to increase current account deficit. The budget deficit also leads to higher foreign borrowing and higher taxes on future generations.
Knoester and Windt have shown, using the Keynesian perspective that the effects of increasing both public expenditures and taxes at the same time on employment and income are positive. The forward shifting of taxes showed that an increase in taxes would lead to raising the real wages. This, in turn leads to a decline in employment and profits which results in lower investment as well as slower economic growth. These adverse influences of taxes can overcompensate for the positive impact of an increase in public expenditures at the same time (Knoester and Windt 1987).

Applying the above-mentioned model to Jordan requires collecting data about the above-mentioned variables for a certain period. However, data are not available for most of these variables. This is the main limitation of applying several models to Jordan to estimate the effects of taxation on the macroeconomic variables. Consequently, this approach cannot be followed in this study.

4- Tax system design and use of tax instruments: Achieving economic objectives through adopting the most efficient use of taxes and incentives is the subject of recent tax studies which have reviewed some of the desired features of the tax system (Dajani and Hosny 1989). Unlike the literature on optimal tax theory, these studies show empirical experience of developing country problems and describe the administrative feasibility of various taxes (Tanzi 1990, Taube and Tadesse 1996).

These studies have suggested that developing countries should adopt a tax reform by the use of a broadened tax base. There should be limited exemptions but also relatively low tax rates. The moderate tax rate is consistent with both tax smoothing theory and analysis of the Laffer Curve (as will be shown later). The tax cuts are also in line with reduction of the excess burden. The number of taxes should be reduced to cut the administration and compliance costs. Severe penalties for payment delays and minimisation of lags in collection are also suggestions that have been made. These will
presumably reduce the decline of the real value of revenue during inflation (Sandford 1992).

The considered as point 4 approach -tax system design and use of tax instruments- is adopted by the International Monetary Fund (IMF). The main aim of it is to generate more tax revenues for the developing countries to finance their public expenditures. This in turn reduces the budget deficit and its adverse consequences. The current study criticises the aim of this approach. This aim (generating more revenues), according to the studies conducted by the IMF, should be achieved regardless whether the country exploits its taxable capacity to the full or it has surpassed it. Hence, this approach will also be left here in this study.

5- Taxable capacity: This is the last issue which is referred to above. It deals with taxable capacity. This can be measured, as will be seen later, by different approaches. These constructs are picked up mainly by the econometric models approach and the arithmetic approach. Relative taxable capacity for Jordan as well as for a sample of developing countries (selected to illustrate and compare) will be estimated by adopting these two approaches. The Laffer curve will also be considered as a measurement of absolute taxable capacity. This issue is very relevant to tackle, especially in the present study, because the aims of this study are represented by answering the following questions: can tax revenues in Jordan be increased/decreased and by how much? Which taxes should be increased/decreased?. Consequently, the rest of this Chapter will be devoted to discussing the literature on this issue in more detail.

1.3.7. Optimal Tax Theory’s Conditions and the Possibility of Applying to Jordan:-

All taxes affect consumer behaviour to some extent. It is impossible for an individual to pay tax without reducing consumption and savings or increasing income
by borrowing. Taxation (income tax) can also influence labour supply and educational choice (Jackman and Layard 1990, Smith 1989, Yellen 1989, Zee 1996). The optimal tax theory was discussed in more detail in separate sub-sections (see sub-sections 1.3.5 and 1.3.6). A brief overview which deals with other aspects of this theory is given here. Taxes cause excess burden (Musgrave and Musgrave 1989). As mentioned earlier, minimising this burden while the government raises revenues to finance public expenditure is the aim of optimal tax theory (Auerbach and Feldstein 1985). Optimal tax theories involve unavoidable questions of public finance such as the progression of income or capital gains tax, whether expenditure or income is the appropriate basis for taxes, the balance between direct and indirect taxes (Anderson 1992, Correia 1992). At the heart of these questions, the optimal tax theory is interested in the trade-off between efficiency and equity.

The optimal tax theory states that the social cost of increasing revenue is minimised when the social marginal cost of increasing revenue is equalised across all tax bases. It also states that the social cost of increasing revenue depends on both the tax base and the responsiveness of the base to changes in tax rates (Auerbach 1985, Dahlby and Wilson 1994). The lower the elasticities of supply and demand of the activity, the more efficient it is to tax it. This was illustrated in more detail when the excess burden and tax distortion were discussed. The main problem facing the translation of the optimal tax theory concept into its empirical counterpart is the availability of information and data. Applying the above-mentioned theory requires a significant amount of information which is usually not available (Cullis and Jones 1992, Musgrave and Musgrave 1989). Furthermore, the optimal tax theory has its own limitations which are discussed in the following pages.

There is clearly a close relationship between the analysis of the optimal tax theory and tax reform. The optimal tax system, which is based on the concept of utility, is one in which there are no possible reforms that will increase welfare. The only difference between them is that the aim is not to find the best tax system, but to find a better one (Ahmad and Stern 1991). Consequently, the optimal tax theory may be helpful for practical policy-making (Heady 1996). It has been used by many
economists who have been asked to advise governments on tax policy (Heady and Mitra 1992). However, like any theory, it has practical limitations and must be applied with great care. The optimal tax theory, as mentioned earlier, is concerned mainly with equity and efficiency criteria.

The main targets which should be considered in designing a tax system are equity and efficiency through using direct and indirect taxes (Sloman 1995, Tait 1988). Direct taxes are more equitable because they are based on the ability-to-pay principle (Griffiths and Wall 1995). Indirect taxes are more efficient because they generate a lower excess burden. Indirect taxes are also in line with simplicity since they require lower administration and compliance costs than those of direct taxes (Sandford 1992). Poll tax is used to raise revenue based on efficiency grounds (Musgrave and Musgrave 1989). Commodity tax is used to achieve equity with heavy tax rates on luxuries and a low rate on necessities (Cullis and Jones 1992).

There are several limitations which make applying the optimal tax theory to Jordan a very difficult matter, if not impossible. One of most important among these is neglecting simplicity (minimum costs of collection and compliance) (Cullis and Jones 1992). Economists find it very difficult to model the relationship between tax rates and administrative and compliance costs (simplicity). Therefore, they have ignored this cost in their analysis and have concentrated on efficiency and equity criteria (Heady 1996). The neglect of administrative costs is a major shortcoming of the optimal tax theory. In Jordan these costs are very high and cannot be neglected. It is worth saying that tax operating costs consist of collection costs (administrative costs of collect taxes) and compliance costs (costs incurred by taxpayers). There are mainly two kinds of compliance costs: money costs (accountant, postage, travel to the tax office, fees of a tax adviser) and time costs (filling in tax data). Time costs can be converted into money costs (Sandford 1992). People who are working in most of the economic sectors such as the wholesale & retail trade sector and manufacturing sector do not keep accounts of their transactions. This makes taxation of this sector very costly. In other words, taxes are not feasible until accounting practices attain minimal standards. Retail establishments are impermanent and very small. In addition there
is the ease of tax evasion and the possibility for the employers to avoid taxes because of the difficulty of auditing accounts which are presented by them since it is so costly.

It is worth saying that most, if not all of the economic theories are designed to meet the conditions in developed not developing countries. This is due to the huge gap between the two groups (the differences in economic structure such as infrastructure, per capita income, degree of rationality of people, political climatic conditions in each group. Jordan is one of the developing countries with a low middle income country.

Perfect competition is assumed in all optimal tax theory studies. This means that there is no distortion in consumption, production and distribution. In other words, the economy is efficient. This assumes that all the conditions of perfect competition hold. The most important among these are: free mobility of resources, perfect knowledge, many buyers and sellers, free entry and exit (Griffiths and Wall 1995). As is the case in Jordan, the application of optimal tax results in situations where imperfect competition or externalities are significant requires considerable care. In Jordan most of the conditions of perfect competition do not exist (such as many sellers, perfect knowledge). The producers of most goods and services can be viewed as monopolists. Royal Jordanian Airlines, Water Authority of Jordan, the Jordan Electricity Authority are good examples. The government grants generous tax preferences to people to establish their investment projects outside great Amman in order to enhance regional development. As previously stated, people still prefer Amman to be the centre of their companies. Therefore, what is achieved by this policy is not much and below the level targeted. This is because, as the Tiebout hypothesis states (1956), people move to jurisdictions that meet their particular

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5 There are three main conditions for economic efficiency. First, the marginal rate of substitution of any two goods in consumption must equal their marginal rate of transformation in production. Second, the marginal rate of substitution of leisure for goods must equal the marginal rate of transformation of leisure into goods. Third, the marginal rate of substitution of future for present consumption must equal the marginal rate of transformation of present into future goods in production. These conditions require a perfect competition economy (see Musgrave and Musgrave for further detail).
preferences such as provision of public goods and services. Therefore, human capital is not free in mobility. This is because of traditions, norms, and culture rather than economic considerations. The public choice framework gives further explanation for the behaviour of citizens and the government. To avoid repetition, this framework is discussed in separate sub-sections (see sub-sections 7.4.6 and 7.5.6).

Furthermore, the government of Jordan imposes high tax rates on some goods such as tobacco, petrol, and alcohol. The tax rate on these items exceeds 100% of their cost. These rates can be justified in terms of considering these goods as externalities. In this case, a high tax rate to control the consumption of them can be viewed as a corrective rather than a creative distortion. Optimal tax analysis assumes the absence of environmental effects and externalities. It does not prove that these high tax rates imposed on some goods are optimal (Heady 1996).

In Jordan the assumption that individuals are identical is unrealistic. The assumption means there is no diversity of households in terms of their composition and preferences. For example, it is difficult to establish the form of the complete personal income tax schedule in a model of different types of workers (Heady 1996). This needs further research to tackle this assumption. Moreover, the optimal tax theory ignores the different needs of different demographic groups. Demographic attributes of households (such as the number of children) must be reflected in the tax system which can be considered as a good system (Heady 1996). In other words, optimal tax models ignore differences in preferences between households that might arise from differences in demographic attributes. This problem can be overcome by imposing a unified tax rate on all goods for efficiency considerations and using direct payments to households (child benefits). Such benefits do not exist in Jordan. It is worth saying that about half of the population are under the age of 14 (IMF, Recent Economic Developments 1993). Thus, these benefits may be considered in order to leave the general sales tax to deal with problems of efficiency rather than equity. This represents a limitation for optimal tax analysis.

Moreover, optimal tax analysis does not cover all kinds of taxes. It concentrates
on some of them (only personal income and commodity taxes, including taxes on international trade (sales taxes {value added tax}) (Heady 1996). It has not dealt with capital gains tax, property tax, and company taxes. This is because the effects of taxes on behaviour and utility are less understood than those of personal income and commodity taxes. This means an extra difficulty in applying the result of this theory to Jordan. Personal income tax proceeds in Jordan constitute about one-fifth of the proceeds of tax on income, profits, and capital gains. In other words, the share of personal income tax in total tax revenues equals 3% only. However, this share for profits and capital gains tax amounts to 12%. This reduces the significance of applying optimal tax to Jordan as a result of not dealing with these kinds of taxes (profits and capital gains taxes). On the other hand, commodity taxes in Jordan (customs duties and domestic taxes on goods & services) form almost half of total tax revenues. Optimal tax analysis can be applied to these taxes with great care because it is not consistent with one of the most important attributes of a good tax system which is equity. However, taking the other assumptions of this theory which do not hold in Jordan such as perfect competition makes it unsuitable and difficult to be applied. The lack of knowledge of the government is one barrier to applying optimal tax analysis to Jordan. The government cannot know in advance the precise level of the highest income, or the actual tax base.

Furthermore, optimal tax analysis does not show which is better to impose; expenditure or income taxes (Heady 1996). In other words, the theory does not provide a comprehensive analysis for an optimal tax system. Therefore, we can say that optimal tax theory can help in some but not all areas of tax reform (policy).

1.4. Absolute Taxable Capacity:-

In the previous section the current study showed that there is no possibility of answering the question which represents its aim by applying optimal tax theory to the Jordanian economy. The reasons behind this have been discussed earlier. The study in this section therefore will investigate the possibility of employing the absolute taxable capacity as a proxy for optimal tax in order to achieve the aim of the thesis.
Dalton shows that there are two kinds of taxable capacity: the absolute taxable capacity for one country and the relative taxable capacity for two countries or more (Dalton 1961). The absolute taxable capacity means that which can be taken and collected as a tax without producing economically damaging. Accordingly, the negative influences coming out as a result of applying a tax system, means exceeding the absolute taxable capacity of this country (Dalton 1961).

The first problem encountered identifying the absolute taxable capacity of any country is determining the meaning of economically damaging. Do they connect the absolute taxable capacity with government expenditures? Because public services are a part of government expenditure, this gain helps to compensate for the sacrifice represented in tax paying (Dalton 1961). This problem will be solved in this study by connecting absolute taxable capacity with the Laffer curve as it is shown in a separate section. Therefore, this definition for absolute taxable capacity will be adopted in this study after making minor modifications.

Josiah Stamp determined the maximum point of absolute taxable capacity as total production minus the amount required to maintain the population at subsistence level. In other words, it is the margin of total production over total consumption. It depends upon the distribution of income and it increases when the inequality of the income distribution increases (Dalton 1961). The current study criticises Stamp’s definition because total consumption exceeds total production or what is called the Gross Domestic Product (GDP) in many developing countries such as Jordan. These countries achieve negative saving figures. According to the previous definition, there is no margin over total consumption to tax. This means that these countries should impose no total taxes. This is absolutely wrong and cannot be applied to the real world.

Hajeer (1966), a respected Egyptian economist, participated in determining the upper limit of taxation. This limit is represented by the maximum amount of money that could be collected through taxes without exceeding total government expenditures. Hajeer’s definition calls explicitly for a balanced budget at all stages in
the cycle in order to achieve the exploitation of absolute taxable capacity. The current study shows that Hajeer's definition and approach ignore economic cycles. It is better for a country to have a deficit in the budget during depressions and to run surpluses during economic booms. This would add up to a balanced budget over the cycle.

It could be said that absolute taxable capacity is very close and directly related to the maximum tax rate (Gandhi and Others 1987, Griffiths and Wall 1995), that is to say that the factors which determine absolute taxable capacity are the same which define the tax rate (Fullerton 1980). This will be shown by connecting absolute taxable capacity, in this study, with the Laffer curve.

The current study has defined the absolute taxable capacity for a country as what can be taken and collected in taxation without producing various adverse consequences on incentives. In other words, we can increase tax rate as high as the GNP increases. This means that using the upward sloping portion of the Laffer Curve to minimise economically damaging effects and to maximise tax revenues. The first problem is represented by identifying the meaning of adverse effects, and do they connect the absolute taxable capacity with government spending. This study connected these effects with the Laffer Curve analysis. In other words, the absolute taxable capacity can be defined, theoretically speaking, (as will be shown in the following section in more detail) as what can be collected in taxation without injecting the economy with net disincentives. This can be achieved by using the upward sloping portion (positively sloping region [Waud 1988]) of the Laffer Curve up until reaching the peak point of the Curve to maximise tax revenues.

1.5. The Measurement of Absolute Taxable Capacity (Laffer Curve):-

This section goes a step further in determining the absolute taxable capacity. The main attempts which have been made to determine this capacity will be stated here. The presentation will proceed without supporting or discussing any because none of them will be employed in this study. All are seen to be suffering from one major defect in general. This is that they specify one figure for absolute taxable capacity for
all countries ignoring the unique characteristics of each. Some of these attempts have justified their views while others did not. The point of view of this study is that absolute taxable capacity is not the same figure for all countries regardless of the stage of development or the economic structure and the tax system of each. It depends on several factors which can be summarised by the effects of taxation on incentives in the economic activities. This means that each country has its own taxable capacity. This is directly related to the analysis of the Laffer Curve. This study, for the first time, connects explicitly the Laffer Curve with absolute taxable capacity as well as with the effects of taxes on the economic incentives as is shown in this section.

Many attempts have been made to assign a maximum point to absolute taxable capacity. Subject to the caveat in the previous paragraph, it will be interesting nonetheless to comment briefly on them. Clark suggested with the support of Keynes that the safe upper limit for taxation as a percentage of net national income should not exceed 25% (Griffiths and Wall 1995). Clark thought that taxes above this percentage generate inflationary pressures (Prest, Clark, Elkan, Rowley, Milnes and Pearce 1977). Musgrave and Musgrave (1989) showed that it is usually agreed that developing countries should be expected to achieve a tax burden of at least 18% of the GNP.

Professor Laffer has shown that tax revenues (TR) will be zero in two cases. The first is when tax rates are zero. This case reflects a situation when there is no willingness for government to impose and collect tax. The second is when tax rates are 100%. Revenue is zero here because there is no incentive to work or produce, hence the tax base will be zero. Tax revenue is positive between these two extreme values of the tax rate. Therefore, it should be a point between them which maximises tax revenues (see Figure 1.11). This is interpreted by a curve named after Laffer. This curve reflects the disincentive influences of taxes on the economy (Beenstock 1979).

Supply-side economists use the Laffer Curve, which clarifies the relationship between the tax rate and the tax yield (Gandhi and Others 1987), to maintain that increasing the tax rate increases its yield up to a certain level. This is called the range
of the upward sloping portion of the Laffer Curve (normal area or range [A]) (Waud 1985 and 1988). Within this range increasing tax rates lead to an increased tax base by injecting a net incentive effect into working behaviour (Beenstock 1979).

After reaching the peak of this curve, any increase in the tax rate leads to an increase in its yield in the short run as a result of the inability of the taxpayers to adapt themselves to the new situation. The increase, however, decreases the yield of the tax revenues in the long run (Bender 1984, Griffiths and Wall 1995). This range is called the downward sloping portion of the Laffer curve (prohibitive range [B]) (Waud 1985). Through this area, a net disincentive effect is operative which decreases the tax base results when tax rates are raised (Beenstock 1979). Buchanan and Lee (1982a and 1982b) viewed the Laffer Curve in the context of supply-side economics. They expressed the same idea but they developed this by establishing short and long run Laffer Curves. The short run Laffer Curve is less curved than the long run one. This reflects that taxpayers, when the tax rate raises, cannot make a full adjustment to the new tax rate in the short run. This shows that tax revenues rise higher in the short run than those in the long run.

Jude Wanniski suggests that the peak of the Laffer Curve is at a 25% tax rate without justifying this (Fullerton 1980 and 1982). This thesis shows that this peak is different from one country to another and there is no way to determine it unless the Laffer Curve is estimated. Beenstock and Gosling (1979) found that the peak of the Laffer Curve for the United Kingdom was when the aggregate tax rate equalled 60% (Griffiths and Wall 1995). This was obtained by estimating the Laffer Curve based on using the regression equation which covered the period 1946-77 (Beenstock 1979). This will be illustrated in more detail when Beenstock’s study (1979) is reviewed within the previous studies section appearing later in this Chapter (section 11).

The idea of an inverse relationship between tax rates and revenues is not entirely new. One of the economists (Bartlett) indicated that the first discovery of the Laffer Curve idea goes back to "Ibn Khaldoun", a fourteenth century Arabic philosopher.
TR

Figure 1.11: The Laffer Curve.

(Gandhi and Others 1987). Adam Smith also, in his book, "Wealth of Nations", referred to this idea: "high taxes sometimes by diminishing the consumption of the taxed commodities and sometimes by encouraging smuggling, frequently afford a smaller revenue to government than what might be drawn from more moderate taxes" (Fullerton 1982: P.5).

Therefore, the economics of the supply-side, which is a new approach that focuses on the importance of economic behaviour at the level of the factors of production, confirms that reducing tax rates after reaching that ceiling limit would create an expansion in economic activity which would broaden the tax base and, consequently, increase tax revenues (Buchanan and Lee 1982, Gandhi 1985). A Laffer Curve is, therefore, indirectly estimating a relationship between taxation and incentives and directly estimating absolute taxable capacity.

Supply-side economists focus on the incentive effect of reducing the tax rate. E.g. they argue that a cut in income tax would encourage people to work more. This is due to the rise in the income after tax. Dornbusch and Fischer (1994) show that there is a contradictory effect in cutting tax. Firstly, this cut makes work more preferable
Secondly, individuals need to work less to maintain their standard of living when they have higher after tax income. People may work less, raise their income and enjoy more leisure. Dornbusch and Fischer (1994) also considered that tax cuts in the USA in the 1980s did not raise work incentives or savings, but budget deficit increased.

The point of view of the current study is that even a tax cut has neutral effects on incentive as Dornbusch and Fischer (1994) showed, tax cuts reduce tax evasion as a result of increasing the evasion costs. This will broaden the tax base and, therefore, increases taxation which, in turn, reduces the budget deficit.

The current study shows that Dornbusch and Fischer have mentioned half of the whole story of the tax cut occurring in USA during 1980s. The second half is represented by that during the Reagan presidency, a combination of fiscal policies were adopted: increasing military expenditures and reducing taxes (Mankiw 1994). The result of these policies were an increase in the budget deficit. This deficit, therefore, raised the interest rate (as a result of government borrowing to finance this deficit) which, in turn, lowered national saving (Mankiw 1994).

The third point of view of this thesis is that there is a good example which shows the positive effect of a tax cut on economic growth and employment. The Council of Economic Advisers suggested, during Kennedy’s Presidency, that expansion of national income required a tax reduction. This led to a considerable cut in personal and corporate income taxes in 1964. These cuts aimed at stimulating expenditure on consumption and investment which in turn led to higher levels of income and employment. As anticipated, the tax cut was followed by an economic boom. The growth rate of the real GNP increased gradually during 1964 and 1965. The unemployment rate fell gradually during the same period (Mankiw 1994). Supply-side economists argued that the economic boom was due to the incentive effects created by the tax cuts. The economists showed that the supply of labour increased and then expanded the aggregate supply of goods and services. This was the result of allowing workers to keep a higher share of their income as a result of the tax cuts. It is
observed that the tax cut in USA in 1964 had a positive effect on expanding national income. This income represents the comprehensive tax base. The expansion tax base leads to increased tax revenues which in turn reduce the budget deficit and its adverse consequences.

The current study agrees with Dornbusch and Fischer's (1994) point of view that tax cut has two contradictory effects. These effects depend on the substitution and income effects. Tax which changes the relative prices creates distortion in the market because it affects the individual choice between work and leisure (Cullis and Jones 1992). The income effect leads to working less (the individual buys more of it as income rises). The substitution effect (incentive for work) leads to a substitute in favour of the cheaper good (work). Which effect is greater, depends totally on the individual preference (Cullis and Jones 1992).

The present study shows that, theoretically speaking, the absolute taxable capacity can be defined as what can be collected in taxation without injecting the economy with net disincentives. This can be achieved by using the positively sloping region [Waud 1988] of the Laffer Curve up until reaching the peak point of the Curve to maximise tax revenues. The Laffer Curve may be viewed as absolute taxable capacity. We have three possible cases. The first is when a country uses the upward portion of the Curve. This country does not exploit its absolute taxable capacity to the full. This means that there is room to increase tax revenues by increasing tax rates without producing net disincentives until tax revenues reach the peak point of the Curve. The second case is when a country reaches the maximum point of the Laffer Curve. The country exploits its absolute taxable capacity to the full. In other words, any increase in the tax rate will decrease tax revenues and will produce a net disincentive effect on the economy. The third case is when a country uses the downward portion of the Curve. This means that reducing the tax rate will increase tax revenues. The increase of revenue here is due mainly to decreasing the net

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6 Waud (1988) shows that optimal tax, which minimises the excess burden, occurs on the upward sloping portion of the Laffer Curve not at the peak point of the Curve.
disincentive effect on the economy which therefore, increases the tax base. Cullis and Jones (1992) show that reducing the marginal tax rate for rich people will reduce their disincentive to work. As a result they increase their income and this may increase tax revenues. The difference in revenues (before and after reducing marginal tax rate) can be devoted to the poor people for redistribution. This does not necessarily make the richest people worse-off.

The estimation of the Laffer Curve will not be employed in this study to estimate the absolute taxable capacity of the Jordanian economy. The main problem, apart from the criticisms which have been shown (given the logic of the analysis), is the availability of information and data about tax revenues and tax rates. Beenstock and Gosling (1979) was the only study which estimated the Laffer Curve. The study suffered from several defects. Beenstock and Gosling (1979) used total tax revenues. This made it impossible to separate the effects of each tax on incentives. They also established the tax burden (measured by the ratio of total tax revenues to the GDP) as a tax rate instead of using the actual tax rate which was imposed by the tax authority on each tax (income tax) (see previous studies’ section for more detail).

1.6. Relative Taxable Capacity and Tax Effort:-

As a result of not being able to employ the optimal tax theory or the absolute taxable capacity to answer the question which represents the aim of this thesis, this section will look at relative taxable capacity. The advantages of measuring this capacity will be discussed in detail in the following section. It is very important to know the level of tax revenues which is required to obtain a given economic growth target. Tax policy should be considered along with other aspects of economic policy. Tax policy must not be viewed as the dependent variable in the system which will respond to the requirements placed upon it automatically (Musgrave and Musgrave 1989). This section discusses the concepts of both relative taxable capacity and tax effort. There are several definitions of relative taxable capacity; through reviewing and discussing them in this section, one definition for this capacity is reached. This section starts discussing and reviewing the earliest definitions then goes further to the
Relative taxable capacity for two countries or more, Dalton thought that the comparison of the contribution of tax revenues to public expenditures between two countries can show that one of the countries might exceed its relative taxable capacity, the other not achieve it. Capacity depends on the ability to pay of the taxpayers (Dalton 1961). The current study shows that Dalton connected relative taxable capacity with public spending and neglected the tax bases. These bases determine the ability to pay taxes. The latter, in turn, determines the relative taxable capacity.

Some studies have called relative taxable capacity "International Comparisons of Taxation" because these studies have not dealt with measuring absolute taxable capacity for one country, but with estimating relative taxable capacity for several developing countries (Tait, Gratz and Eichengreen 1979). These countries may have exceeded taxable capacity for each country by itself, but the difference between these countries is the extent of the excess (Tait and Eichengreen 1978). These may also still be below the level of taxable capacity, but the comparison between the countries made some of them appear not to have exceeded relative taxable capacity and the others not to have exploited their relative taxable capacity to the full (Tait and Eichengreen 1978, Tait, Gratz and Eichengreen 1979). Therefore, relative taxable capacity can be called international comparison of taxation to refer to the same concept.

Many attempts have been made to estimate relative taxable capacity in the developing countries by the Fiscal Affairs Department in the International Monetary Fund (IMF). One of these studies (Bahl 1972) has identified relative taxable capacity as the tax revenues that have to be collected when each country applies the same tax rates for each type of tax system (Bahl 1972). Relative taxable capacity (Tait, Gratz and Eichengreen 1979) was also identified as the tax ratio to the Gross National Product (GNP) that the government obtained as a result of applying a set of a tax rate averages for different bases of taxes through executing regression analysis (Bahl
1971, Musgrave and Musgrave 1989, Sarojini 1992). Economists who dealt with relative taxable capacity (such as Bahl, Chelliah, Baas, Kelly, Musgrave and Musgrave, Tait, Grata, Eichengreen, and Sarojini) agreed with these definitions. The two definitions, therefore, are the most acceptable for relative taxable capacity.

Accordingly, the relative taxable capacity is defined as the total taxation, whether it is relative to the GNP\(^7\) or to population to facilitate the comparison between countries, that would be collected when each country applies the same tax rates for the bases of the tax system\(^8\). This capacity can be estimated by using econometric models. The models take into consideration the factors which determine this capacity. These factors reflect the ability of individuals to pay taxes and the government’s willingness to impose taxes and collect them. The models take into consideration the limitation on information available to the government and other limitations on the government’s ability to impose taxes.

We can see therefore that the definition includes both sides (the ability of individuals to pay taxes and the government’s ability/willingness to impose taxes and collect them). In other words, the definition picks up both the relative taxable capacity for the whole economy of each developing country and the relative taxable capacity of the individual. The question asked in each case is different. Consequently, different approaches are adopted.

The first approach (the relative taxable capacity of the whole economy) estimates the relative taxable capacity of the developing countries by dividing each of the independent variables and the dependent variable by the GNP. The following model

\[\text{Model} = \frac{\text{Independent variables}}{\text{GNP}} + \frac{\text{Dependent variable}}{\text{GNP}}\]

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\(^7\) The current study introduces a vital adjustment to measure the tax burden in order to estimate the model of the relative taxable capacity. This adjustment takes the form of excluding net indirect tax proceeds from the GNP as a preliminary to measuring the tax burden of the developing countries. This burden is measured, in this study, by dividing total tax revenues (excluding social security contributions) in a certain year by the GNP at current factor cost (GNP minus net indirect taxes) (see section 3 in Chapter 3 for more details).

\(^8\) In other words, the relative taxable capacity is the estimated tax burden or the estimated individual’s contribution to tax revenues.
can be specified:-

\[
\text{TRA}_i = \alpha + r_1 \text{GNPP}_i + r_2 \text{M2A}_i + r_3 \text{AA}_i + r_4 \text{WA}_i + r_5 \text{MANA}_i + r_6 \text{NA}_i + r_7 \text{MA}_i + u_i
\]

Where:

TRA: the tax burden (TR/GNP).
GNPP: per capita GNP.
M2A: the ratio of the money supply to the GNP.
AA: the share of the agricultural sector in the GDP.
WA: the share of the wholesale & retail trade sector in the GDP.
MANA: the share of the manufacturing sector in the GDP.
NA: the share of the mining sector in the GDP.
MA: the ratio of merchandise imports to the GNP.
i = 1, 2, … n (countries included in the regression).
u: the disturbance term which is due to measurement errors in TRA and errors in the specification of the relationship between the explained variable (TRA) and the explanatory variables.
\(\alpha\): the intercept or autonomous element in taxable revenue in the model (individual effect).
r_1, r_2, r_3, r_4, r_5, r_6, and r_7 (coefficients of the explanatory variables): represents the tax rates.

The capacity is expressed by the output (GNP) and how much of that is estimated to be deducted by taxes. It also reflects the willingness of the government to impose taxes. This can be clarified by discussing the relationships between the capacity and the independent variables affecting it. These will be discussed in detail in section 1.9 of this Chapter. For example, the relationship between the relative taxable capacity and the share of the wholesale & retail trade sector in the GDP is negative. The reason behind this relationship is that the people who are working in the wholesale & retail trade sector in developing countries do not keep account of their transactions. This makes taxation of this sector a very difficult matter. In addition there is the ease
of tax evasion and the possibility for the employers in this sector to avoid taxes because of the difficulty of auditing accounts which are presented by them. On the other hand, the same relationship exists between the capacity and the share of the manufacturing sector in the GDP. The government has no willingness to impose taxes on this sector even if it can afford to do so. It gives generous exemptions and tax holidays in order to encourage it.

This brings us to discuss the differences between the ability to pay/collect taxes and the willingness to pay/collect taxes. It is worth saying that there is a huge difference between the ability and the willingness to pay taxes. The former is an objective magnitude while the latter is a variable and a public choice. The former represents one of the two alternatives on which equity is based (the benefit and the ability-to-pay principles) (Sandford 1992, Brown and Jackson 1995). This ability depends on the income and wealth of the taxpayer (Musgrave and Musgrave 1989, Sandford 1992). This principle was discussed in detail in Chapter 1 section 3. Musgrave and Musgrave (1989) showed that the relative taxable capacity provides a comprehensive estimate of the ability-to-pay principle. On the other hand, the latter (willingness to pay taxes) is reflected in the wariness of the public and the degree they are convinced about paying taxes. Citizens may have the ability to pay taxes but not the willingness to do so (see sub-section 7.4.6 for more details).

The second approach (the individual’s relative taxable capacity) estimates the relative taxable capacity for each individual by dividing the explanatory variables and the explained variable by population. The relationship can be shown as follows:

\[
TRP_i = \alpha + r_1 GNPP_i + r_2 M2P_i + r_3 AP_i + r_4 WP_i + r_5 MANP_i + r_6 NP_i + r_7 MP_i + u_i
\]

The descriptions of the variables are the same as in the first approach but the

\[
9 \text{ The above analysis is also valid for the willingness of the government to impose and collect taxes and its ability to do so.}
\]
The capacity here is expressed by how much the individual’s contribution to production is and how much of that is estimated to be deducted as tax. This approach measures the ability of citizens to pay taxes. The theoretical relationship between each independent variable and the individual’s relative taxable capacity is positive. This positive relationship shows that any increase in the individual’s share of each independent variable causes an increase in his ability to pay taxes, consequently increasing his relative taxable capacity (Tait and Eichengreen 1978).

The relative taxable capacity can also be estimated for total tax revenues using an arithmetic approach. This approach is a special case of the econometric models mentioned above. It is the case when the TRA is regressed on intercept only ($\text{TRA}_i = \alpha + u_i$). TRA (tax burden) for each country can be viewed as a tax rate. The average for TRA for the countries, obtained by regression, represents the relative taxable capacity. The same result can be reached by using the following identity:

$$\text{RTC} = \left( \frac{\sum_{i=1}^{n} \text{TRA}_i}{n} \right).$$

The abbreviations are as mentioned earlier.

The whole economy’s relative taxable capacity (RTC) is connected with two other concepts: the tax burden and the tax effort. The tax burden (TRA) represents the ratio of tax revenues to the GNP at current market prices (Griffiths and Wall 1995). The tax effort (TE) is measured by the ratio of the tax burden (tax ratio) to the relative taxable capacity ($\text{TE} = \text{TRA}/\text{RTC}$) (Sarojini 1992). In other words, it is the ratio of actual to predicted tax ratios (Tait, Gratz and Eichengreen 1979). A similar analysis is valid for the individual’s relative taxable capacity. In this case, the tax effort is measured by the ratio of individual’s contribution to tax revenues to the relative taxable capacity ($\text{TE} = \text{TRP}/\text{RTC}$).

The assessment of actual and potential tax performance of any country is a matter of judgement that should be based on a consideration of the stage of development and
the structure of the economy and should also take into account national traditions,
norms and the public choice perspective (see sub-sections 7.4.6 and 7.5.6 in Chapter
7). The relative taxable capacity is based upon the fitted values from the econometric
models. The residuals reflect economic and non-economic variables which are not
included in the models. These include social factors (demographic structure, tax
Lotz and Morss 1969, Tait, Gratz, and Eichengreen 1979). They also include political
factors (Cullis and Jones 1992, McNutt 1996, Mueller 1989). It is difficult to quantify
these factors. The quantities are unmeasurable and the data are not available
(Musgrave and Musgrave 1989) (for more detail see footnote 18 of this Chapter).

When the tax effort of the country goes beyond one, the taxes actually paid exceed
the relative taxable capacity of that country (Sarojini 1992). This means that the
country has surpassed its relative taxable capacity. The ratio of the excess depends
on the difference between one and the tax effort figure of that country. However, if
the revenues that are actually collected through taxes are less than the relative taxable
capacity, the tax effort in this case will be less than one indicating that the country
has not exploited its relative taxable capacity (Tait, Gratz and Eichengreen 1979).
Meanwhile, if the tax effort reaches exactly one, this means that the country has
exploited its relative taxable capacity to the full.

1.7. The Aims of Estimating Relative Taxable Capacity:-

Estimation of relative taxable capacity gives a quantitative measurement which
could be useful to help policy makers in designing fiscal policy (Chelliah 1971). The
benefit of relative taxable capacity and tax effort estimation comes whenever the
government, as the case of Jordan, has two possible alternatives to determine whether
the budget deficits are more effectively controlled and reduced by raising taxes or
rationing and controlling expenditures or both (Baffes and Shah 1990). Martin and
Fardmaresh found that cutting government spending has a greater impact on economic
growth than raising taxes (Ehdai 1990). In other words, a larger cut in taxation is
necessary to achieve the same effect on GNP as a rise in government purchases
(Sandford 1992). Consequently, Martin and Fardmaresh preferred reducing the budget deficit through increasing taxes rather than decreasing public expenditure. This result drives us to consider government purchase multiplier and tax multiplier in the following two sub-sections.

The present study shows that we cannot raise tax revenues as high as we want to reduce the budget deficit. Continuous rises in tax revenues will be in danger of stifling economic growth. Support for this result can be found in the International Monetary Fund (IMF) studies. An example will clarify the point. McDermott and Wescott (1996) showed that reducing the budget deficit should be achieved by government spending cuts. Further rises in tax revenues will be in danger of stifling growth. Hence, it is reasonable to suppose that reducing public expenditures offers the best means, if not the only means, to reduce the budget deficit. The reduction in government spending might lead to lower interest rates, currency depreciation, and positive expectational effects that might offset or even swamp the traditional, and undesirable, Keynesian effects of a reduction in the deficit, especially unemployment and an economic slow-down (McDermott and Wescott 1996). Knight, Loayza, and Villanueva (1996) found that military spending cuts have a positive impact on long run economic growth performance.

A comparison between the situation of a country with the other developing countries, in terms of relative taxable capacity, throws light on the possibility of imposing more taxes or decreasing public expenditures. This does not necessarily mean that the estimation of relative taxable capacity represents a normative measurement (what ought to be), but it is a comparative process between countries (Bahl 1972, Musgrave and Musgrave 1989). That is to say where as the empirical results of estimation relative taxable capacity should be employed with care, they nevertheless offer a framework in which appraise comparative tax efforts (Musgrave and Musgrave 1989). It gives an indication that might be useful in adopting a fiscal policy suitable to the country. Furthermore, the estimation of relative taxable capacity and tax effort could be useful for both the government to assess their own performance, and the donors, lenders and investors to assess the extent of effort in the
past and the potential effort for the future (Newlyn 1983 and 1985).

1.7.1. Government Expenditure Multiplier:-

The government expenditure multiplier is defined as how much a change in government expenditure will affect the income (output). This multiplier is usually larger than one. Figure 1.12 illustrates the government expenditure multiplier. Income \( Y \) is measured on the horizontal axis, while expenditure \( E \) is measured on the vertical axis. For the sake of simplicity, closed economy is assumed. The initial equilibrium point A is the intersection between the \( 45^\circ \) line and the expenditure line. At this point income exactly equals expenditure. Assuming that a decrease in government expenditure has occurred. The equilibrium point moves from A to B. It is noted that income declines, according to the new equilibrium point, from \( Y_0 \) to \( Y_1 \). It is observed that this decline is greater than that of government expenditure (Mankiw 1994, Musgrave and Musgrave 1989). The process of how the government expenditure \( G \) operates is as follows: the change in government spending \( G \) will be reflected in a similar change in income \( Y \). In turn the change in income creates

![Figure 1.12: Government expenditure multiplier.](image-url)
a change in consumption (C) by the result of multiplying marginal propensity to consume (MPC) by the change in government spending (MPC* Δ G). The change in consumption creates a change in total expenditure and income. The second change in income which is given by MPC* Δ G (Δ here and throughout refers to change and * refers to multiplying) changes consumption again by MPC*(MPC* Δ G) or (MPC^2* Δ G) and so on. The total change in income, therefore, can be given by the following identity: Δ Y = (1 + MPC + MPC^2 + MPC^3 + MPC^4 + ….. MPC^n)* Δ G.

It is well known that for any geometric series such as 1 + MPC + MPC^2 + MPC^3 + MPC^4 + ….. MPC^n equals, as n goes to infinity, (1/1-MPC). Rewriting the above identity leads to Δ Y/ Δ G = (1/(1-MPC)). This means that the marginal propensity to consume (MPC) is the only determinant factor of the government expenditure multiplier. The MPC is usually less than integral one (Musgrave and Musgrave 1989). This shows that there is a positive relationship between government expenditure and income (output). It also shows that any change in government purchases will lead to greater change in income.

10 The effectiveness of government policy is reduced once income tax is introduced to the model. This will reduce the government purchase multiplier which become: Δ Y/ Δ G = 1/1-c(1-t), where t is the income tax; c is the first derivative of consumption (C) (marginal propensity to consume ([MPC]). Turning to more realistic case where the economy is open (existence of external trade leakages), this will create more reduction in the government purchase multiplier to be given by: Δ Y/ Δ G = 1/1-c(1-t)(1-m), where m is the marginal propensity to import (imports as a function of income). The reduction in the government purchase multiplier depends on t and m. The lower the m and t, the higher government purchase multiplier is obtained. For further details see Musgrave and Musgrave (1989).

11 It is worth mentioning that the same result can be obtained by using mathematics as follows:

Y = C(Y) +I +G

69
1.7.2. Tax Multiplier:

The tax multiplier can be defined as the amount of output (income) changes in response to change in taxes. The multiplier works the same as the government expenditure multiplier (Mankiw 1994). However, the tax impact on income is opposite to the government spending affect. The former is negative while the latter is positive. Figure 1.13 illustrates the effect of tax increase on income. The initial equilibrium point is A, where the income is $Y_0$. Introducing tax shifts the expenditure line from $E_0$ to $E_1$ by ($\Delta T \times MPC$). The new equilibrium point is B. The income declines from $Y_0$ to $Y_1$. It is observed that an increase in tax is the same as a decrease

$$\text{Differentiate with respect to } Y$$
$$DY = cDY + DG$$
$$DY - cDY = DG$$
$$DY(1-c) = DG$$
Rearrange
$$DY/DG = (1/(1-c))$$
where T: tax; I: investment: the other abbreviations are as mentioned in footnote 6.
in government spending. The only difference is the expenditure line when a change in tax occurs shifts by the amount \( \text{MPC} \times \Delta T \) not the whole amount of tax.

However, this shift reflects the whole amount of change in government expenditure. The tax multiplier identity, therefore is: \( \Delta Y / \Delta T = -\text{MPC}/1-\text{MPC} \) (Musgrave and Musgrave 1989). This shows that the higher the marginal propensity to consume (MPC), the greater is the effect of the tax cut on consumption. Comparing the government purchase multiplier \((1/1-\text{MPC})\) and tax multiplier \((-\text{MPC}/1-\text{MPC})\) shows that the former is higher than the latter. This confirms the point of view of Martin, Fardmaresh and Sandford which shows that a tax increase has lower adverse effects on the economy than government expenditure cut.

1.8. The Measurement of Relative Taxable Capacity and Tax Effort:-

In view of the fact that the subject of relative taxable capacity is new and modern, the image is not yet clear. In spite of this, the subject has attracted great attention. Many specialists have produced studies in order to find some methods to estimate this capacity. Some studies have succeeded in attaining one measurement or more to estimate it.

Two main approaches have been used to estimate relative taxable capacity. The first involves calculating the tax effort by measuring relative taxable capacity using

\[ Y = C(Y-T) + I + G \]

using calculus to differentiate

\[ DY = c(DY-DT) \]

Rewrite

\[ DY = cDY - cDT \]

Rearrange

\[ DY - cDY = -cDT \]

\[ DY(1-c) = -cDT \]

\[ DY/DT = (-c/1-c) \]

where \( T \): tax; \( c \): marginal propensity to consume (MPC); \( Y \): income (output). \( I \): investment; \( G \): government purchases.

\[^{12}\text{The same identity can be obtained by using mathematics as follows:}\]

\[ Y = C(Y-T) + I + G \]

using calculus to differentiate

\[ DY = c(DY-DT) \]

Rewrite

\[ DY = cDY - cDT \]

Rearrange

\[ DY - cDY = -cDT \]

\[ DY(1-c) = -cDT \]

\[ DY/DT = (-c/1-c) \]
econometric models. Meanwhile, the second involves measuring relative taxable capacity of the economy using an arithmetic approach. Each approach has some advantages and some disadvantages. These will be discussed in this section. There are six methods for measuring relative taxable capacity (or the tax performance) of the economy. Each will be discussed in turn in a sub-section below. This study will adopt three methods among these. This selection has been based on strengths and weaknesses of each taking into account which methods could achieve the aims of this study by answering the questions which have been set to represent its objectives. Below are some details:-

1.8.1. The Tax Burden Approach:-

The first and easiest method is represented by tax burden (or tax ratio) measurement (Abu-Hammour 1989). A quantitative estimation of relative taxable capacity can be obtained by taking the tax burden of a group of developing counties and computing the average tax ratio of these countries. This average represents the relative taxable capacity. Accordingly, the countries of which the tax burden is below the average have not yet reached a point where they can exploit their relative taxable capacity to the full. Meanwhile, those countries which the tax burden has gone beyond that average can be considered countries exceeding their relative taxable capacity. This method was used by the IMF to estimate the relative taxable capacity in Jordan during 1984-88 (Abdel-Rahman, El-Khoury, Casey, and Papavassiliou 1989). The relative taxable capacity, according to the previous study, was represented by the average of the tax burden computed from the countries subject to the study.

The tax effort could be computed for each country of the sample by dividing the tax burden or tax ratio in each country by relative taxable capacity. Consequently, those countries in which the tax effort reached below one have not yet exploited their relative taxable capacity. Meanwhile, the countries in which the tax effort exceeded one could be considered to have exceeded relative taxable capacity. Each in exceeding or not exploiting their relative taxable capacity depends upon the difference between tax effort and integral one. Meanwhile, the country in which the tax effort exactly
equals one will be a country exploiting its relative taxable capacity to the full.

What is defective in this method is that it ignores all economic and non-economic factors which contribute to determining relative taxable capacity. It also neglects the variables which represent these factors. This method gives a comparative indication of tax burden between the countries (Abu-Hammour 1989). It will be ignored in estimating relative taxable capacity of the Jordanian economy because it is included in the third method as will be shown later.

1.8.2. Econometric Models:

The econometric models and the linear regression approach is considered the most common one. Most of the previous studies have adopted this approach. Chelliah, Baas and Kelly (1977), Tait and Eichengreen (1978), Musgrave and Musgrave (1989), and Sarojini (1992) have employed this approach in their studies to estimate relative taxable capacity. It differs from the others by using econometric models that rely upon a single equation regression model. This approach estimates relative taxable capacity of the developing countries during a specified period of time. The summary of this approach is represented by assigning the major determinant factors of relative taxable capacity, then defining the independent variables which represent these factors. Therefore, the dependent variable (tax ratio or tax burden) regresses on the independent variables for the countries subject to the study by using the ordinary least squares (OLS) (Tanzi 1981). Two separate sections (sections 9 and 10) are devoted in this Chapter to discussing these factors as well as independent variables which represent each in addition to the theoretical relationship between each variable and relative taxable capacity.

This method will be adopted. It will be divided in this study into two sub-approaches. The first concerns the whole economy's relative taxable capacity. This approach estimates relative taxable capacity by dividing some of the independent variables and the dependent variable by the GNP, the other independent variables by
the GDP, of the sample of the developing countries under study\textsuperscript{13} (Chapter 4). Meanwhile the second is called the individual’s relative taxable capacity. This approach estimates the relative taxable capacity for each individual by dividing the explanatory variables and the explained variable by the number of population\textsuperscript{14} (Chapter 5).

Therefore, the former approach estimates relative taxable capacity of the whole economy expressed by the level of output and the part estimated to be deducted by taxes. In other words, this approach reflects the willingness of the government to impose taxes and collect them (see section 1.6 in this Chapter and sub-section 7.4.6 in Chapter 7). However, the latter approach estimates the average of relative taxable capacity of the individual which means how much the average of the individual’s contribution to the production is and how much of that is estimated to be transferred to the state via the tax deduction. That is to say that this approach reflects the ability of citizens to pay taxes and bear their burden. This approach is adopted in this study for the following reasons:-

1- Most the aims of this study can be achieved by this approach.

2- It takes into consideration the factors which determine relative taxable capacity and the independent variables which represent them. All these variables represent directly or indirectly a tax base.

3- This approach can be used to forecast relative taxable capacity for the future provided that the independent variables are known or estimated in advance. This advantage is due to using econometric models. This will be employed in Chapter 7. The capacity will be estimated for the period 1973-95 by using the models of Chapters 4 and 5.

\textsuperscript{13} The denominator of the independent variables and the dependent variable is the GNP or the GDP.

\textsuperscript{14} The denominator of the independent variables and the dependent variable is the number of population.
1.8.3. Standard Tax Rate (STR) (An Arithmetic Approach: Tax Effort [TE]):

The standard tax rate was developed by Tait and Eichengreen (1978). Musgrave and Musgrave (1989) employed this approach as will be shown in this sub-section. This method does not take into consideration the determinant factors of the relative taxable capacity and their variables. This method does not use econometric models in measuring relative taxable capacity. Hence, it avoids econometric problems (such as heteroscedasticity). This problem will be discussed in more detail in section 12 of this Chapter. This approach estimates relative taxable capacity by finding the breakdown of total tax revenues (Dahlby and Wilson 1994) into four major components as follows:

1- Tax on income, profits & capital gains.

2- Taxes on international trade.

3- Domestic taxes on goods & services.

4- Other taxes.

Then each type of the above taxes is divided over its base to obtain the actual tax yields (ATY). The GNP is considered a base for both the first (tax on income, profits & capital gains) and the fourth (other taxes) components of the tax revenues as well as total tax revenues. However, the degree of economic openness (exports plus imports) is considered to be a base for the second part (taxes on international trade) of tax revenues. Meanwhile the GNP minus exports represents the base for the third part (domestic taxes on goods & services). Therefore, the average actual tax yields for all the sample which represents the standard tax yield (STY) is computed. When the ATY of each country and each type of tax is divided by the STY for all countries and all of the above types of taxes, the standard tax rate (STR) is obtained.

This measurement shows how much the country exploits the available tax base to
collect tax revenues in comparison with the other countries subject to study (Tait and Eichengreen 1978). If the STR for a country exceeds one, this means that the ATY for that country is more than the STY for the sample. It also means that the country has surpassed its relative taxable capacity. However, if the STR is less than one, this means that the relative taxable capacity of the country has not yet been exploited. Meanwhile, if the STR is exactly equal to one, this means that the relative taxable capacity of the country has been exploited to the full.

It is worth saying that the STR of total tax revenues properly represents the first approach for measuring relative taxable capacity and the tax effort which was previously reviewed (Tax Burden (TB) Approach). The STR of total tax revenues is measured by the ratio of the ATY (ATY represents the tax burden) to the STY (STY expresses the average of tax burden for the sample). The Tax Burden Approach (TB) is estimated, as shown earlier, by following the same procedure of the STR Approach. These two approaches are typical. The numerator as well as the denominator of the former (STR) equals those of the latter (TB). This will be proved empirically when the TE for the Jordanian economy is measured in Chapter 6.

One of the studies conducted by the International Monetary Fund (IMF) estimates relative taxable capacity and tax effort without resorting to the use of regression analysis. It uses what the study called a representative tax system (RTS) (Bahl 1972, Dahlby and Wilson 1994, Sarojini 1992). This approach takes all the major kinds of taxes and relates them to their bases. It then finds out the tax ratios. After that, it calculates an average of these ratios extracted from all the bases for all the countries in the study. This average represents the effective tax rate for all countries (Bird and Slack 1990). Then, the effective tax rate is applied to its base for each country and for the above kinds of taxes to find out total tax revenues for each country. The actual tax revenues are divided by total tax revenues computed by applying the RTS to compute the tax effort. The empirical results of the tax effort of this approach are the same as the STR approach because the effective tax rate for each tax in the RTS approach is also the STY in the STR approach.
Musgrave and Musgrave (1989) estimated relative taxable capacity of selected states of the USA by applying what they called "Standard Tax System". This system started with determining the average tax rate which states as a whole apply to the major tax bases. Musgrave and Musgrave then, applied this average rate to the bases of a particular state to obtain relative taxable capacity. They connected the relative taxable capacity of each state with the per capita income. As a trend, a positive relationship between relative taxable capacity and per capita income was found. It is observed that the standard tax system (STS) runs the same as the STR. Both of them can be employed to measuring relative taxable capacity for the major components of tax revenues using cross sectional data (states among a particular country or different countries).

The STR is adopted in this study to estimate relative taxable capacity of the Jordanian economy as well as of the other developing countries subject to the study after renaming the basic terminologies to be consistent with the other chapters. This will not affect the analysis or the empirical results of the approach. This approach (STR) will be called throughout the thesis "the arithmetic approach". Furthermore, the corresponding names for the concepts are as follows: ATY (actual tax yields), STY (standard tax yields, and STR (standard tax rate) will be called TB (tax burden), RTC (relative taxable capacity), and TE (tax effort). To avoid repetition, see section 1.6 in this Chapter for more detail.

The main advantage of this approach is represented by measuring this capacity for total tax revenues as well as for the four major components of these revenues. Therefore, it gives an indication whether there is a balance in exploiting the bases of these taxes within the same country or not. If not, conclusions can be made relating to what the government should do to restore the balance of the tax system. In other words, the empirical results of the erythematic approach can be compared across economic sectors (tax bases) to show which of them are better candidates for increasing/decreasing taxation in an overall reform package (Dahl and Mitra 1990).
1.8.4. Standard Tax Elasticity (STE):-

The standard tax elasticity was also proposed by Tait and Eichengreen (1978). It is like the first and the third methods, discussed in this section, in that it does not need to use regression analysis and does not take the determinant factors of relative taxable capacity into consideration. However, it differs in that measures the standard tax elasticity during a period dynamically.

There is common factor between this approach and the previous one (arithmetic approach). Both of them estimate the actual tax yield and the standard tax yield for each major components of taxes as mentioned in the previous method. However, in this approach, this should be done for two periods separately instead of one as the TB method does. Then the growth rate of the actual tax yield (ATY) and the standard tax yield (STY) for each type of the previous mentioned taxes should be computed. Therefore, the growth rate of the ATY is divided by that of the STY to obtain the standard tax elasticity (STE) for each country (STE=percentage change in ATY/percentage change in STY) (Tait and Eichengreen 1978). The integer one (1) or one hundred percent (100%) represents the unitary elasticity and the figure of standard tax elasticity which is less than/exceeds 100% indicates that taxes are in/elastic.

The standard tax elasticity (STE) reflects the growth rate of the actual tax yield in comparison with that of the standard tax yield. It also reflects the development that has occurred in tax revenues as a result of changing their bases in comparison with the correspondent standard figures. It is worth saying that this approach will not be adopted here because the aims of this study cannot be achieved by it, since it gives no answer to the questions which represent the goals of this study. In addition, the explanatory aims of this approach can be largely achieved by the next method. Furthermore, this elasticity can be estimated by using the econometric models’ approach. This will be shown in Chapter 5.
1.8.5. **Income Tax Elasticity (ITE):**

The income tax elasticity method is different from the previous one (standard tax elasticity [STE]). The former can be measured for each country alone. The latter, however, is measured based on the average tax rate prevailing in the sample subject to the study. However, there is a common factor between these two methods which is represented by measuring the tax performance dynamically. This method requires two periods in which to estimate the growth rates of tax revenues and Gross National Product (GNP). Then the former is divided by the latter to reach the income tax elasticity (Chelliah 1971). Accordingly, this method compares the growth rate of tax revenues with that of GNP in a country. If the growth rate of the former exceeds that of the latter, the income tax elasticity is said to exceed unity. The income tax elasticity goes down below unity\(^{15}\) if the GNP grows faster than the growth rate of taxes. Meanwhile, it equals unity if the growth rates of both are equal. Therefore, the tax performance could be measured by estimating the income tax elasticity of each type of tax\(^{16}\).

There are two kinds of income tax elasticity. The first concerns built-in elasticity. It can be estimated by adjusting the time series of total tax revenues for the effect of discretionary changes. This can be done by deducting from taxation the amount of total annual revenue that results from discretionary tax changes (Newlyn 1985). Then, a time series for the built-in growth element must be generated. After that, the tax revenues regresses on the GNP in an ordinary way to obtain the long and the short run income tax elasticity. The second type is total tax revenues (buoyancy) elasticity. It follows the same procedures of the first kind, but without adjusting the tax revenue series for the discretionary change effects (Ehdaie 1990, Newlyn 1983). Therefore, both kinds can be estimated and the result of each may be compared to see the effect

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\(^{15}\) The National Income was replaced by the Gross National Product (GNP) at current market prices.

\(^{16}\) Income tax elasticity can be measured by applying the regression equation for tax revenues on the Gross National Product (GNP) after taking the natural Logarithm for each of them (Chand 1975).
of the discretionary measures.

This approach can be connected with the productivity of the public expenditures financed by taxes or other sources by referring to government purchase multiplier (Mankiw 1994, Musgrave and Musgrave 1989). This has a positive effect on the GNP. The tax multiplier has a negative influence on that output (Mankiw 1994, Musgrave and Musgrave 1989). These two multipliers (government purchase and tax) were discussed in more detail in sub-sections 1.7.1 and 1.7.2.

This approach will be adopted in this study. This is done because it can be computed for one country only using the regression analysis for data from a long time series instead of measuring the standard tax elasticity for a group of countries for a short period. Therefore, this is one of the advantages of this approach. It is easier to collect updated data for a long time series for a single country than to do so for a group of developing countries. Furthermore, the long run as well as the short run income tax elasticity can be estimated (Maddala 1992, Stewart 1991). It also gives an indication about the tax system if it progressive (income tax elasticity is more than unitary), or regressive (when it is less than unitary) or proportional (when income tax elasticity exactly equals one). The progressive tax rate best reflects the ability-to-pay principle (Musgrave and Musgrave 1989). This was discussed earlier in this Chapter.

1.8.6. Tax Effort Measurement (TEM):-

This measurement was employed by Newlyn (1985). The author described it as a unique and unambiguous measure of the tax effort. This approach evaluates the government policy towards each major kind of tax. It does so through measuring the effect of discretionary tax changes on the resulting tax revenues. In other words, this approach measures how much the government has succeeded in raising tax revenues by introducing discretionary measures. The tax effort measurement is represented by obtaining the sum of the increment in tax revenues resulting from discretionary measures over a period of time not less than five years. Then the change in total annual tax revenue over the same period is computed. The difference is taken between
the terminal years (i.e. the first and the final years). Therefore, the tax effort measurement (TEM) is computed as the ratio of the former to the latter (Newlyn 1985). This approach can be summarized by the following simple equation:

\[ \text{TEM} = \left( \sum_{t=1}^{n} \frac{\Delta R_d}{\Delta TR} \right) \]

Where:
- TEM: Tax Effort Measurement.
- Rd: discretionary changes.
- TR: total tax revenues.
- t: time (year).
- \( \Delta \): change.

The tax effort index (TEI) can be calculated by dividing the ratio of the tax effort measurement for each country over the mean sample value of TEM. Consequently, if the tax effort for any country exceeds integral one, this means that the tax performance, as a result of the government effort through introducing additional discretionary measures, is satisfied (Newlyn 1983). However, if the tax effort for any country is less than integral one, this means that the tax performance, as a result of the same policy, is not satisfied.

The current study does not adopt this approach to measuring the relative taxable capacity and the tax effort for the Jordanian economy for the following reasons:-

1- The difficulty of determining the revenue effect of discretionary measures for several developing countries. This problem was solved in Newlyn’s study by relying on the ex-ante estimate made by the Ministry of Finance or Treasury. Then the tax effort measurement (TEM) for the major components of the tax system in several countries can be computed (Newlyn 1985).

2- A unified standard for the estimation on the above point for all countries is not available. That is to say, every country estimates these revenues according
to its own experience. These estimations may sometimes be biased (under/overestimated). This may be done to minimise the adverse response of citizens for political reasons or to serve and market the government tax policy. Consequently, these estimations are not reliable.

3- This approach ignores the burden of this effort on the individuals. In other words, it does not take into account the ability of individual to pay taxes.

4- Adopting this approach does not come in line with the aims of this study. This approach cannot answer the questions by which the goals of this study are represented.

5- This approach is based on government tax policy and the discretionary measures incorporated in it. These, in turn, are based on the size of government expenditures and the cost of other sources of finance. This means that tax revenues are determined according to public expenditures. Hence, according to this approach, the government will continue inducing discretionary tax changes up until tax revenue covers the entire expenditure. This is rejected in this Ph.D thesis for two reasons. First, this enables the government to increase its expenditures (regardless of the productivity of these expenditures) and to finance them by introducing new discretionary tax changes to generate more revenues. Therefore, the government neglects reviewing the possibility of rationalising and directing public expenditures toward productive spending. Second, the government in this case, ignores the level of the tax burden figure or the range that the government exploits each tax base. In other words, according to the point of view of the current study, tax policy must not be viewed as the dependent variable in the system which should respond to the requirements placed upon it. This contradicts Newlyn’s approach.

1.8.7. The Adoption of more than Approach:-

This Chapter has already discussed three approaches among the six enumerated in
this section to measure relative taxable capacity. These approaches are:

1- Econometric models. This approach is divided in the current study into two sub-approaches. The first is called the whole economy’s relative taxable capacity. The second is called the individual’s relative taxable capacity.

2- An Arithmetic Approach.

3- Income tax elasticity (ITE).

The advantages of each adopted approach have been shown earlier. The adoption of the previous approaches in this study, and not being limited to one of them to estimate the relative taxable capacity in Jordan, gives an integrated conception to this capacity. So a multi-purpose measure makes it possible to compare the empirical results of each with those of the others as well. The reason is that these approaches estimate:

- The whole economy’s relative taxable capacity (the first sub-approach of the first approach) versus the individual’s relative taxable capacity (the second sub-approach of the first approach).

- The static relative taxable capacity (approaches 1 and 2) versus the dynamic relative taxable capacity (approach 3).

- The relative taxable capacity for total tax revenues (approaches 1, 2 and 3) versus the relative taxable capacity for the major components of these revenues (approach 2).

1.9. Determinant Factors of the Whole Economy’s Relative Taxable Capacity and their Variables:

This section and the next section discuss the factors which determine the whole
economy’s relative taxable capacity and the individual’s relative taxable capacity respectively. Also discussed are the explanatory variables which influence them. These two sections are part of the second approach measurement of relative taxable capacity which, as previously mentioned, is based on econometric models. This study adds a new independent variable to express the composition of the GDP and its sectoral distribution as shown in this section. Studies which deal with taxes have differed according to the degree of importance and the goal of each. Regarding the studies that have dealt with the subject of relative taxable capacity, it is clear that there is general consent about the determinant factors of this capacity. These factors are as follows:

1 - The degree of development.

2 - The sectoral composition of the GDP.

3 - The degree of economic openness.

In spite of the general agreement of all studies on these factors, there are some disagreements about the order of importance of the causal influences. Below is a summary review of the most important variables which represent the above-mentioned determinant factors of relative taxable capacity:

1.9.1. The Degree of Development:

Any increase in the degree of development in a country increases its relative taxable capacity. This appears clearly when dealing with the variables that represent the degree of development as a determinant factor of relative taxable capacity. This section will show the theoretical relationship between relative taxable capacity and these variables and justify why these variables are chosen. This factor is represented in empirical studies conducted to estimate relative taxable capacity by per capita GNP, the share of the agricultural sector in the GDP and the degree of monetisation. Several reasons are behind the process of choosing one of these explanatory variables
as a representative of the degree of development.

Per Capita GNP:

There is a positive theoretical relationship between per capita GNP and relative taxable capacity. The reasons behind this are as follows:

1. The increase of per capita GNP increases the individual ability to pay tax (Sarojini 1992, Tait and Eichengreen 1978).

2. The increase of per capita output increases the demand for public goods and services and then increases the duties of the government and its need for financial resources to fulfill the accelerated requirements (Bahl 1971). This forces the government to expand its tax base and the scope of its activities (Laramie and Mair 1995).

3. A low per capita income country has less scope for the transfer of resources to the government. The individual income is needed to meet the very necessities of life (such as food) (Musgrave and Musgrave 1989).

Therefore, the justification of the positive relationship between per capita GNP and relative taxable capacity came as a result of increasing the individual's ability to pay taxes. This is an outcome of tax base increases. It is also an outcome of the increase of the government's capacity to collect these taxes and its need for the financial resources to improve the level of the public goods offered to the community.

All studies have shown the significance of this variable (per capita GNP) when using the developing and developed countries in these studies, as will be shown when the previous studies are discussed later. Yet they did not prove it statistically significant when the sample was confined only to the developing countries (Bahl 1971, Chelliah 1971). Therefore, studies have turned to looking for an alternative to this variable to express the level of economic progress. The share of the agriculture
sector in the GDP was at the top of these variables. Statistically, it is significant, and it is supported by economic logic.

The Share of the Agricultural Sector in the GDP:-

There is an inverse relationship between the share of the agricultural sector in the GDP and relative taxable capacity (Chelliah 1971). This negative relationship is the result of the following reasons:-

1- An economy with a high share of the agricultural sector in the GDP is likely to have a low need for public goods (Tanzi 1981).

2- An increase in the share of the agricultural sector in the GDP means a decrease in taxable benefits due to the relatively low level of agricultural sector income (Bahl 1972).

3- There is a high degree of non-monetisation in the agriculture sector (Musgrave and Musgrave 1989). Such output cannot be subjected to taxes, because the agricultural community is distinguished by consuming a great deal of its production (Chelliah 1971, Musgrave and Musgrave 1989).

4- It is administrationally difficult to tax farmers. Also the government has no willingness to impose taxes on the agricultural sector for political reasons that will emerge later in this thesis.

5- There is an inverse relationship between the relative importance of the agriculture sector in the GDP on one hand, and the degree of industrialisation and openness to the external world on the other hand (Bahl 1971, Musgrave and Musgrave 1989).
The Degree of Monetisation:

This explanatory variable is measured by the ratio of money supply (money plus quasi money [M2]) to the GNP at current market prices (Bahl 1971). There is a positive theoretical relationship between the degree of monetisation and relative taxable capacity which is due to following reasons:

1- The widespread reliance on barter in the developing countries reduces the use of money as a medium of exchange. Note here the dominance of the primary sector. Taxation of this sector is a difficult matter. Monetisation in the economy is clearly an explanatory variable of relative taxable capacity (Datta 1977, Lotz and Morss 1969, Musgrave and Musgrave 1989).

2- Indirectly too, the level of monetisation in the economy may be seen as an explanatory variable of relative taxable capacity. Consider the monetary approach to the balance of payments (BOP) (Dornbusch and Fischer 1994, Haque, Lathiril, and Motiel 1990, Khadrawi 1987). This approach has been employed by the International Monetary Fund (IMF) to restore a balance to the BOP. The monetary approach to the balance of payments will be discussed in more detail in sub-section 1.10.1. The empirical studies in this field have shown that the government budget in developing countries suffers from a permanent deficit which makes these countries turn to loans to finance their deficits (Mansur 1986). This is reflected in the increase in the foreign assets which in turn reflect on the money supply without an increase in the GNP. Accordingly, the increase in the degree of monetisation in the economy may indicate that the increase in the fiscal deficit in developing countries’ budgets results from the failure of the domestic resources. This then, causes an increasing demand for domestic resources, especially the tax revenues to decrease deficits. This creates upward pressure on tax revenues (Khadrawi 1987). Therefore, this justification came out of the demand for tax revenues. The former, meanwhile, which is represented by the increase in the taxable abundance of money reflects the supply-side of tax revenues.
3- There is a direct positive relationship between relative taxable capacity and inflation. During inflation, progressive tax, for example helps to transfer taxpayers to higher tax brackets. This, therefore, increases tax revenues (for further discussion see sub-section 1.10.1). There is also a positive relationship between the inflation rate and money supply. Hence, the current study shows that there is a positive relationship between relative taxable capacity and money supply.

The nature of the relationship between the rate of inflation and money supply can be shown by considering the quantity theory of money. This theory says that controlling money supply has the ultimate control over the rate of inflation (Dornbusch and Fischer 1994). This means when a country has a high growth rate of money supply, it will have a high rate of inflation. This is simplified by considering the equation of the quantity theory of money (MV=PY). Where M: money supply; V: velocity of money17; P: price level; and Y: output (GNP). The velocity of money and the output are assumed constant. Thus, the increase in money supply will increase the price level. Friedman agreed with this result. He said: "inflation is always and everywhere a monetary phenomenon" (Mankiw 1994: P.150). Friedman used data since the 1870s for the USA to prove that. The data certify the link between growth in money supply and inflation (Mankiw 1994).

1.9.2. The Composition of the Gross Domestic Product (GDP):-

The productive structure of the GDP and its sectoral distribution plays an important role in determining the relative taxable capacity of the economy. In other words, the availability of tax bases is related to the economic structure of a country (Musgrave and Musgrave 1989). This factor is represented by three variables: the share of the mining, the manufacturing and the wholesale & retail trade sectors in total output.

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17 The velocity of money is defined as the number of times the money circulates in the economy over a year. It is measured by the ratio of GDP (or GNP) to the money supply (Dornbusch and Fischer 1994, Mankiw 1994).
There is supposed to be a positive theoretical relationship between the first variable and relative taxable capacity and an inverse relationship between the last two variables and relative taxable capacity (Chelliah 1971, Malki 1978).

The Share of the Mining Sector in the GDP:

There is a positive theoretical relationship between the share of the mining sector in the GDP and the relative taxable capacity. The increase of relative importance of the mining sector in the GDP increases the tax base, as a result of the exports produced in the mining industries. This, in turn, will be reflected positively on per capita GNP (Chelliah 1971). This produces the tax bases. Empirical studies have shown this kind of positive relationship between the relative importance of the mining sector in the GDP and relative taxable capacity (Malki 1978).

The Share of the Manufacturing Sector in the GDP:

This study adds the share of the manufacturing sector in the GDP as an explanatory variable which influences the composition of the GDP and its sectoral distribution. There is supposed to be an inverse theoretical relationship between the share of the manufacturing sector in the GDP and the relative taxable capacity. The intuition behind this relationship is that the government has tried to encourage this sector by giving it generous exemptions and tax holidays for a period of years. Government exempts the imported inputs of this sector (manufacturing) from customs duties and other taxes. Therefore, the government has no willingness to impose taxes on this sector even if it can afford to do so.

The Share of the Wholesale & Retail Trade Sector in the GDP:

There is an inverse theoretical relationship between the share of the wholesale & retail trade sector in the GDP and relative taxable capacity (Malki 1978). The reason behind this relationship is that the people who are working in the wholesale & retail trade sector in developing countries do not keep accounts of their transactions. This
makes taxation of this sector a very difficult matter. In other words, taxes are not feasible until accounting practices attain minimal standards. Taxes are very difficult if retail establishments are impermanent and very small (Musgrave and Musgrave 1989). In addition there is the ease of tax evasion and the possibility for the employers in this sector to avoid taxes because of the difficulty of auditing accounts which are presented by them. Practical studies have shown the inverse relationship between the share of this sector in the GDP and relative taxable capacity (Malki 1978).

1.9.3. The Degree of Economic Openness:-

This factor is measured by three alternatives: the ratio of exports or imports or both to the GNP at current market prices. The relationship between each and relative taxable capacity is positive. There are several reasons for adopting this factor and for expecting a positive relationship:-

1- The base of customs duties and other taxes such as import and export licenses is exports and imports (Griffiths and Wall 1995).

2- Exports and imports play a part in the ease of imposing and collecting taxes on them. That is to say taxes are simplified in a highly open economy where merchandise exports and imports pass through ports. These exports and imports can be readily established by tax authorities (Musgrave and Musgrave 1989).

3- Increasing exports or imports reflect the increasing degree of monetisation, the industrial and mining structure in the economy. Consequently, this creates monetary surpluses apt for tax deductions. Taxes are imposed directly on exports or imports and indirectly on incomes earned by exporters or importers. This reflects the increase in the individual’s ability to pay taxes and the capability of the government to collect them (Bahl 1971).

4- The government imposes taxes on imports (i.e. customs duties) in order to
decrease the balance of trade deficit (Bahl 1971) and to encourage and protect domestic industries which increase the foreign assets in the economy\(^{18}\) (Dajani and Hosny 1989).

1.10. Determinant Factors of the Individual’s Relative Taxable Capacity and their Variables:

This section discusses the determinant factors of the individual’s relative taxable capacity and the independent variables. It represents part of the second approach-measurement which adopted the regression analysis and econometric models. This study adds a new explanatory variable to represent the degree of development as shown in this section. The individual’s relative taxable capacity is determined by the same factors which determine the whole economy’s relative taxable capacity. These factors are:

1- The degree of economic development: This factor is expressed by three alternative independent variables: per capita GNP, the individual’s share in the agricultural sector, and the money supply (M2) per capita.

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\(^{18}\) Other independent variables represent the factors which determine the taxable capacity. Most important among them are: inflation, economic growth, tax structure or composition of tax revenues, composition of government expenditures, in addition to the population, geographical areas, and the degree of centralization in the government (Chelliah 1971, Lotz and Morss 1969, Musgrave and Musgrave 1989, Tait, Gratz, and Eichengreen 1979). The factors which determine the taxable capacity are not limited to the previous economic factors which may be measured, but there are other factors that effect theoretically on taxable capacity that may be summarised as follows:

1. Social factors represented by demographic structure, general consumption level and tax awareness.
2. Other economic factors, not mentioned above, include distribution of income, because taxable capacity increases according to the increasing differences in income distribution. Besides, there is the extent of the productivity of public expenditures, monetary fluctuations, and political factors (Cullis and Jones 1992). As always, it is difficult to quantify these factors which influence taxable capacity. The quantities are unmeasurable and the data are not available (Dalton 1961. Musgrave and Musgrave 1989).
2- The composition of the Gross Domestic Product (GDP) or its sectoral distribution. This factor is also represented by three explanatory variables: the individual’s share in the mining sector, or his share in the manufacturing sector or his share in the wholesale & retail trade sector.

3- The degree of economic openness: This factor is represented by the individual’s share in the gross commodity exports plus imports and his share of each of them separately as three alternative explanatory variables. This approach includes per capita merchandise exports plus imports as an explanatory variable for relative taxable capacity of the individual. However, the first approach (as will be shown in Chapter 4) adopts the ratio of merchandise imports to the GNP, as an independent variable that represents the degree of economic openness. The reason behind this is that imports are considered to be a good base for imposing customs duties. This is besides the other economic objectives that will be realised by imposing such taxes. Therefore, the ratio of imported goods to the GNP reflects the ability of the government to impose taxes and collect them, and its willingness in doing that. This is what is the first approach measures.

On the other hand, the second approach can adopt the ratio of merchandise exports plus imports to the number of inhabitants as an independent variable. This would represent the degree of economic openness. This is adopted, in this approach of the study, because these goods relative to the population reflect the ability of the individual to pay taxes and his ability to bear their burden. This is what the second approach measures.

The theoretical relationship between each independent variable and the individual’s relative taxable capacity is positive. This positive relationship shows that any increase in the individual’s share of each independent variable causes an increase in the monetary surpluses for the individual. This, in turn, increases his ability to pay taxes, consequently increasing his relative taxable capacity (Tait and Eichengreen 1978). The reasons behind the positive relationship between the whole economy’s relative taxable
capacity and each of per capita GNP, the share of the mining sector in the GDP, the
degree of monetisation, and the three independent variables which represent the
degree of economic openness are also valid to explain the same relationship between
the individual’s relative taxable capacity and the individual’s share in each. This study
adds a new explanatory variable to express the degree of economic development to
estimate the individual’s relative taxable capacity. Below is a further discussion of this
variable:

1.10.1. The Degree of Monetisation:

It is worth mentioning that this study adopted the degree of monetisation as a new
independent variable to represent the degree of economic development. This variable
shows how much people in a country use money as a medium of exchange or a means
of payment. This is very important in determining taxation since taxes are nowadays
of a monetary kind (Musgrave and Musgrave 1989). This explanatory variable is
measured by the ratio of the money supply (money plus quasi money [M2]) to the
number of population. There are several reasons for adopting this as an explanatory
variable to determine the individual’s relative taxable capacity. These reasons can be
signified through reviewing the factors which affect the money supply (money plus
quasi money [M2]). This is in line with the monetary approach to the balance of
payments (Dornbusch and Fischer 1994, Haque, Lathiril, and Montiel 1990). Similar
analysis is adopted in both the monetary approach to the balance of payments and
factors affecting money supply. To avoid repetition, the current study sets this
approach in a footnote and goes ahead with the factors which affect the money
supply19.

19 The monetary approach to the balance of payments showed that external imbalances
are usually monetary in nature. It also showed that the balance of payments (BOP) deficit
reflects an excess money supply. This means that obtaining a deficit in the BOP can be
treated by contracting money supply through raising interest rates and controlling
expenditures (Dornbusch and Fischer 1994). This will ultimately reduce imports and correct
the BOP position. The final result can be achieved by adopting tight fiscal policy
(rationalising and controlling public expenditures to reduce fiscal deficit of the budget)
(Dornbusch and Fischer 1994).
These factors are: net domestic credit, net foreign reserves in the banking system (Dornbusch and Fischer 1994) and all other items such as the capital of the banking system. There is a positive relationship between the first two factors and the money supply (Dornbusch and Fischer 1994). However, a negative relationship exists between the third factor and the money supply. In other words, the increase of the net domestic credit or of the net foreign reserves will increase the money supply.

This approach has been adopted by the International Monetary Fund (IMF) to restore a balanced BOP. More illustration can be given by looking at the following identity: dNR = dM2 - dDC. Where NR: foreign reserves holding at the monetary authority; M2: money supply; DC: domestic credit offered by the central bank; d: refers to the change (difference). This identity represents the balance sheet of the monetary authority. Both NR and DC are the asset side, while M2 is the liability side. Foreign assets include foreign reserves, gold, special drawn rights (SDR)…etc. Domestic credit consists of claims on public (mainly government debt) and private sectors. The left hand side of the identity (dNR) is the BOP position. It is clear that any change in the money supply and domestic credit will affect the foreign reserves or the BOP and vice versa.

Setting a target for the BOP position (dNR) shows how much the expansion/contraction in both domestic credit and money supply should be to meet this target. In a BOP deficit country, the IMF suggests putting a ceiling on domestic credit expansion. This limits the loans to the government and private sector. Therefore, adopting tight monetary policy by controlling domestic credit causes a contraction in money supply (Dornbusch and Fischer 1994). This leads to a rise in interest rates and reduced spending which, in turn, improves the balance of payments position.

It is observed that controlling domestic credit expansion is the target of this approach to improve the balance of payments achievement. In developing countries, the domestic credit represents mainly claims on the government to finance public expenditures. This is the result of obtaining a deficit in the budget of these countries. In other words, the budget deficit leads to raising claims on the government to finance this deficit. This is reflected in the rise in money supply. The expansion in money supply causes an external imbalance.

I based on the following identity of money supply (M2) :-

\[ M2 = DC + NR - OTM \]

where:-
- M2: money supply (money plus quasi money).
- DC: net domestic credit.
- NR: net foreign reserves in the banking system.
- OTM: other items, such as the capital of the banking system (Dornbusch and Fischer 1994, Mansur 1986).

The money supply is also computed through its components, by adding the money in circulation with the public to the demand deposits and savings & time deposits (Mankiw 1994).
(liquidity). Meanwhile, if the other items increase, the money supply will fall.

The increase of the net domestic credit, whether offered to central government or to other economic sectors, reflects the ability of the banking system to create money (Dornbusch and Fischer 1994, Mansur 1986). That results in profits that may be taxed. On the other hand, the increase of the net domestic credit offered to the government by the banking system mostly refers to the rise in fiscal deficit from which the general budgets in the developing countries tend to suffer. The deficit results from the lack of revenue which is available to the government to cover public expenditures. Public spending creates an increase in the demand for domestic resources, especially tax revenues, to lessen the deficit and its consequences.

From the third point of view, the increase of the net domestic credit offered to the other economic sectors (private sector) mostly refers to the rise in the dividends accrued in those sectors and in the banking system. These dividends enable them to pay their debt service easily. Moreover, this reflects the ability of these sectors (mainly the banking system) to pay taxes.

Regarding the foreign reserves in the banking system, the increase of these reserves comes from the increase in the capital inflow of foreign currencies. This increase can be more than the capital outflow of these currencies. If so, this denotes that the net position of transactions with foreign countries is positive in regard to the foreign currencies. This can be due to several causes: firstly, because the value of exports is higher than the value of merchandise and service imports; secondly, because government disbursements from foreign loans are more than the amount of the repayments and the debt service of those loans; thirdly because, the investment income from abroad is higher than the income flowing to foreign countries from foreign investment inside; finally because the amount of official and private assistance received is higher than the value of the aid paid out. The increase in the net foreign reserves may be realized from one of the previous factors, some of them, or all of them. Therefore, the degree of monetisation does not only reflect the degree of economic development, but also reflects the degree of economic openness.
Consequently, this indicates the monetary surpluses which, in turn, increase the ability of individuals to pay taxes.

There is another point that is no less important than what has been mentioned above. It is the fact that if the increase in the money supply is matched by a similar increase in the production, this indicates, in general, the possibility of increasing the tax revenues in absolute terms. Meanwhile, the tax burden (the ratio of tax revenues to the GNP) remains unchanged. On the other hand, if the increase in the money supply is not accompanied by an increase in production, this mostly leads to an increase in general price levels or what is called inflation. Since many tax systems in the developing countries are characterised, in part, by progressive taxes, this helps to transfer the individuals to higher tax brackets as a result of the increase in monetary income or what is called fiscal drag (Griffiths and Wall 1995, Sandford 1992). In addition to the outcome of an increase in monetary income, there are people who fall into money illusion (Dornbusch and Fischer 1994). This results in an increase in spending as a percentage of real income. Such spending is usually subject to taxes (Sanford 1992).

1.11. Previous Studies:

The subject of relative taxable capacity and tax effort has drawn the attention of those who are interested in public finance in general and in taxes in particular. Many studies have appeared to address this subject. In this regard, the International Monetary Fund (IMF) has played an important role in this field. The IMF has made many attempts to find a basis to estimate relative taxable capacity and tax effort in developing countries. The methodology of these studies has differed but they have

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21 Some studies indicate that inflation occurs as a result of an increase in the money supply that is not reflected in a similar increase in the production of the closed economic countries. On the other hand, in the open economic countries, this increase will also lead to an increase in the demand for imports.

22 Fiscal drag can be defined as the extra tax proceeds which results from the fact that changes in both tax brackets and tax allowances may not happen until after inflation has had its effect on money income. For more details see: Griffiths and Wall 1995.
followed the same direction. They have also differed in determining and restricting
the determinant factor of relative taxable capacity and the variables representing these
factors. This section will discuss and review the empirical studies which have
contributed new ideas in this regard. The economic framework for all these studies
was discussed in sections 9 and 10 of this Chapter. All these studies have estimated
relative taxable capacity except one which has estimated the Laffer Curve (the
absolute taxable capacity). The shortage of studies concerning the latter subject is a
result of the difficulty in estimating the Laffer Curve.

Williamson’s attempt in 1961 can be considered the first attempt in this regard. It
was executed to study the relationship between the degree of development represented
by per capita GNP and tax revenues. This study dealt with a sample of 33 developing
and developed countries. It showed a positive relationship of statistical significance
between those two variables (Bahl 1971). This attempt was followed by Plasschaert’s
study which included 20 less-developed countries. This study was based on the
previous one. It adopted per capita GNP as a representative independent variable of
the degree of development. It also added another determinant factor which is the
degree of economic openness represented by the ratio of imports to the GNP at
current market prices. This study showed the statistical significance of each variable
(Bahl 1971).

Hinrichs made a study (1965) covering the period 1957-60 which contained 60
countries out of which 40 were developing and the rest (20) were developed
countries. Hinrichs used the regression equation to show the relationship between tax
revenues as a percentage of the GNP and the degree of economic development. He
also correlated tax with the degree of economic openness. These two factors are
represented in his paper by per capita income and the ratio of imports to the GNP at
current market prices respectively. The author applied the regression equation to each
independent variable alone as well as to both of them together. His study showed a
positive relationship of statistical significance between per capita income and tax
revenues for all countries subject to the study, developing and developed, together.
Meanwhile, the relationship was not statistically significant when the study was
restricted to developing countries only.

This study found that the degree of economic openness as a determinant factor is statistically significant for the developing countries (Tanzi and McCuistion 1967). The explanatory power (represented by the coefficient of determination \([R^2]\)) was higher when per capita income was excluded from the equation so that causality restricted to the degree of economic openness. This study showed that the degree of economic openness rather than per capita income is the central and determinant factor of the government revenues’ ratio to the GNP in the developing countries.

In a study conducted by Thorn and including 32 developing countries using the same included variables as Hinrichs study, the empirical results contradicted the results of Plasschaert and Hinrichs (Bahl 1971). This study has shown that there is a positive relationship of statistical significance between tax revenues, as a ratio of the GNP, and per capita income. Yet, this relationship was not statistically significant regarding the degree of economic openness. Openness was represented by the ratio of imports to the GNP at current market prices.

Weiss (1967), in a study including 66 developing countries, added several dummy variables, in addition to per capita income and the degree of economic openness, aiming at representing the social and cultural variance among countries (Lotz and Morss 1969). These differences were expressed by the degree of development and employment in the agricultural sector, in addition to the geographical region. This study established that geographical areas are statistically significant in explaining the change of tax revenues as a ratio of the GNP. This is due to the close distance between countries of the same geographical region socially and politically.

In a joint study prepared by Lotz and Morss (1969), the capacity of tax collection was taken as a basic element in measuring relative taxable capacity. They added to the previous studies the degree of monetisation measured by per capita circulation of notes and coin. This study demonstrates that there is a relationship between the degree of monetisation and relative taxable capacity. This relation is the reason why
monetisation is more suitable for measuring taxable surpluses than per capita GNP. This is because transactions that take place in the self-sufficient sectors do not use money. Accordingly, per capita GNP was replaced by the degree of monetisation as a representative of the degree of economic development.

Shin (1969) benefited from the several earlier studies. He built upon them, and added three independent variables: the share of the agriculture sector in the GDP, the rate of inflation and the growth rate of population (Bahl 1971). He used the share of agriculture sector in total output because the increase in the relative importance of the agriculture sector in the GDP will decrease the taxable surpluses. According to this, he saw that the share of agriculture is inversely correlated with the degree of industry, civilization and trade. The growth rate of the population was used as an explanatory variable in estimating relative taxable capacity, because the rapid growth of population means the increase in tax exemptions. That, in turn, leads to a decrease in tax revenues.

The current study supports Shin’s point of view by adding two more reasons for the inverse relationship between relative taxable capacity and the growth rate of population. The first is represented by the fact that any growth-rate of the population in excess of the growth rate of the GNP causes a decrease in per capita GNP which causes a decrease in the taxable monetary surpluses. The second is the decrease of per capita GNP, indicating a decrease in the level of living and an increase in the consumption expenses which normally go to essential basic commodities which mostly have tax exemption.

In regard to inflation\textsuperscript{23}, Shin believed that the increase in general price level would increase the ratio of tax revenues to the GNP. It is worth mentioning that this assumption is true if it is supposed that most taxes are progressive: during inflation, in the absence of bracket changes (Waud 1988), taxpayers creep into higher tax

\textsuperscript{23} The inflation is indeed a tax on cash balance, still, the requirement by banks to hold revenues at a return below the market rate is another implicit tax on money (Faig 1986).
categories (Sandford 1992). However, several kinds of taxes, particularly indirect
taxes, are proportional taxes (Sandford 1992). In addition, the nominal income is
usually increased to meet the raise in the general price levels. This may neutralise the
effect of inflation on tax revenues in the long run (Sandford 1992). Shin’s study
included 47 countries and showed statistically significant the rate of inflation and
population growth.

A study prepared by United Nations Conference on Trade and Development
(UNCTAD) focused on 36 developing countries. It covered the period 1955-66. It
examined per capita income, the share of the agricultural sector in total output and
the degree of economic openness as explanatory variables of relative taxable capacity
(Bahl 1971). It found that all of these variables are statistically significant. The study
also found that the ratio of tax revenues to the GNP was high in countries which had
a high degree of economic openness with a low level of the agricultural sector share
in the GDP. The study excluded inflation as an independent variable because it
believed, on logical grounds, that it would be too weak to be used as an explanatory
variable of the relative taxable capacity.

Chelliah, Baas, and Kelly (1975) studied relative taxable capacity on the light of
the following two explanatory variables: the share of the agriculture and the mining
sectors in the GDP separately. The effect of the former was negative on the relative
taxable capacity. The influence of the latter was positive. This study showed the
statistical significance of both independent variables. The explanatory power of this
equation, represented by the coefficient of determination ($R^2$), reached 41%. This
study included 47 developing countries and covered the period 1969-71.

Malki (1978) estimated the relative taxable capacity of a sample of around 37
developing countries and covered the period 1969-71. He added a new explanatory
variable in explaining the relative taxable capacity. He relied on the factors that were
used in the previous studies. These factors are the degree of economic development,
the composition of the GDP and the degree of economic openness. He expressed them
by using the following variables respectively: the share of both the agriculture and the
mining sectors in the GDP separately and the ratio of imports to the GNP. However, he added the share of the wholesale & retail trade sector in the GDP as an additional explanatory variable to express the composition of the GDP. There is an adverse relationship between this variable and relative taxable capacity. The intuition behind adding this explanatory variable was previously mentioned. This addition achieved a slight increase in the explanatory power of the relative taxable capacity equation. This explanatory power, represented by the coefficient of determination \( (R^2) \), is still relatively low. This indicates that there are still some other important explanatory variables which contribute in determining the relative taxable capacity excluded from his study.

The study conducted for the International Monetary Fund (IMF) by Tait and Eichengreen (1978) dealt with the subject of relative taxable capacity and tax effort. The authors of this study criticized all previous studies because the explanatory power of the regression equation adopted by these studies was relatively low. Some of the earlier studies had suffered from special problems in the econometrics and regression equations such as heteroscedasticity.

These previous studies used the ordinary least squares (OLS) in estimating relative taxable capacity. This requires the causation to be one-way, but this was not realised in the previous econometric models. The independent variables affect tax revenues and vice versa. In order to overcome the above-mentioned problems, Tait and Eichengreen followed a new style in measuring relative taxable capacity and tax effort in the developing countries. In order to increase the explanatory power of the relative taxable capacity equations which were obtained in the previous studies, they replaced the denominator of the independent and dependent variables (GNP or GDP) by the population. Consequently, these independent and dependent variables included in the equation reflecting the per capita level of these variables\(^{24}\).

\(^{24}\) This study was restricted to considering the average of the individual’s contribution to taxes as a function of the individual average share in each of mining, exports and the GNP (Tait and Eichengreen 1978).
This replacement increased the explanatory power (the coefficient of determination) from around 50% in the earlier studies to 87% in the Tait and Eichengreen study. However, some new problems arose in this study, mainly to do with transferring data from the local currency to a uniform currency (such as the US$) and with the difficulty of dealing with the exchange rates of many currencies.

Tax revenues affect and have an effect on independent variables (bidirectional causality). In order to avoid the bias in estimations of ordinary least squares (OLS), Tait and Eichengreen used the two stage least squares regression (2SLS). This was done by using per capita income as a function in the rest of the independent variables that affected the relative taxable capacity in the first stage. Then the estimated values from the first stage to per capita GNP were used in addition to the other explanatory variables to estimate relative taxable capacity in the second stage. In order to address the static measurement of relative taxable capacity and tax effort on one hand, and to remove the problems of the regression analysis and econometric models on the other, the Tait and Eichengreen study developed two approaches to the measurement of relative taxable capacity: the standard tax elasticity (STE) and the standard tax rate (STR). Those two approaches were discussed in detail when the measurement of relative taxable capacity and tax effort were previously mentioned in this Chapter (see sub-sections 1.8.3 and 1.8.4).

Newlyn’s study (1985) represents one of the most important previous studies. The author criticized all the previous studies dealing with the relative taxable capacity and tax effort, specially the IMF studies. Newlyn criticized the traditional approach adopted by the earlier studies. He indicated that the methodology of these studies was suffering from one major defect which led to biased results and estimations. He thought that mis-specification of the tax ratio led to a significant measurement error in the calculation of the IMF results. The analysis of the effects of this defect, he said, has necessitated a disproportionate deviation leading to substantial measurement bias in comparisons over time and a cross countries.

The defects of the previous studies, as Newlyn sees them, can be summarized as
follows. Total tax revenues excluded social security contributions and local taxes when they account for less than 10% of total tax revenues. Also, they included indirect taxes paid by government on their own expenditures. In addition, these studies adopting the GNP at market prices included the proceeds of indirect taxes. Hence, he thinks that the GNP at market prices should be replaced by the GNP at factor costs (Newlyn 1983).

Therefore, the author proposed two alternative measurements to estimate the tax effort: firstly, the built-in elasticity (Ee) and buoyancy elasticity (Eb); secondly the tax effort measurement (TEM). The above alternatives were discussed in detail when the measurement of relative taxable capacity and tax effort were previously mentioned (see sub-section 1.8.6). Newlyn computed, in his study, the tax elasticity for four countries. He estimated the tax effort measurement (TEM) for one country only during the period 1969-1978, since the data for construction of TEM were generally not available. Clearly the implementation of the latter proposal (TEM) is not feasible for a researcher lacking the data.

Musgrave and Musgrave (1989) employed four independent variables in order to estimate relative taxable capacity. These variables were: per capita of the GNP, the ratio to the GDP of each exports, output of extracted industries (mining) sector, and output of the agriculture sector. They found that the relationship between relative taxable capacity and each independent variable is positive except that which is between the capacity and the share of agriculture in the GDP. Musgrave and Musgrave used cross-sectional data from a set of developing countries. The explanatory power of this model amounted to 50%. They showed that relative taxable capacity depends on the economic structure of each country. They also applied the "standard tax structure" to measure relative taxable capacity of selected states of the U.S.A. (12 states). This approach was mentioned in detail in sub-section 1.8.3. of this Chapter.

Roberti's study (1992) again represents one of the most recent studies. It covered 15 developed countries. The author criticized the traditional method for measuring the
tax ratio, indicating that the ratio of total tax revenues to the GDP represents the only meaningful indicator which can be used to gauge the extent of resource reallocation from private to public hands. Roberti criticized the previous studies, indicating that it is possible to have the same tax ratio for two countries or more, but for those countries to differ in their tax system, tax evasion, reform, exemptions, equity, efficiency, rate, basis and so on. This can be misleading in comparing tax policy among countries.

In order to overcome all of these problems as well as to improve the accuracy of the arithmetical tools which are currently used to measure the tax ratios, he followed a different technique in measuring the ratio or burden. This was done by finding out total tax revenues and their major components. Then, he worked out the ratio of each component to its base and the base of each type of taxes over the GDP as it is illustrated later. Then, the ratio of each term in the chain could be and was compared with the traditional method. The usefulness of doing this is to bridge the informational gap between the tax ratio and tax law by linking actual bases to tax laws and tax revenues to be charted. That is to say it will help understanding and evaluating the actual tax policy.

The justification for doing so is that, taxes are not imposed on GDP, but on specific bases such as income or consumption... etc. The author proposed to illustrate his method as a chain of bases for personal income tax to measure the tax ratio represented by the following equation:

\[
\frac{T}{GDP} = \frac{T}{H} \cdot \frac{H}{SH} \cdot \frac{SH}{SH^*} \cdot \frac{SH^*}{H} \cdot GDP
\]

Where:

- T: personal income tax.
- H: potential tax base.
- SH: income subject to tax.
- SH*: income in which taxes are actually levied.
- GDP: gross domestic product.

The first part of the right hand side equation demonstrates the average tax rate on
the potential handle; the second represents an index of the leaks which can probably occur in the potential tax base; the third measures the erosion of the announced tax handle; the fourth part demonstrates the proportion of the potential tax handle on which income taxes are actually imposed; the last part shows the ratio of the potential base to the GDP.

This study does not introduce any significant new contribution about the tax effort, the relative taxable capacity of any country or the methods of measurement of these two concepts. All that was done to introduce a way to compute the tax ratio for each major kind of taxes. This method was not entirely new. Tait and Eichengreen (1978) suggested a specific base for each tax instead of considering the GNP as a base for total tax revenues in order to measure the STR which was previously mentioned. It is well known that choosing a specific base for each tax is better than using the general and comprehensive base for total tax revenues or for their major components. However, the non-availability of data in regard to these bases for a big-size sample and the variation in tax system in each country included in the sample make it impossible to do so.

The most up-to-date study on this subject was conducted by Sarojini (1992). The study used cross sectional data for the 15 major states of India and covered two different periods; the first included 1970-73 while, the second covered the period 1980-1983. Three years average of the explanatory and the explained variables were computed to avoid the influence of fortuitous elements on these variables. Sarojini estimated the relative taxable capacity by regressing the tax ratio on two independent variables which represent the relative taxable capacity factors. In his study, two factors were adopted. The first was economic development and was represented by per capita state income. The second was the composition of the State Domestic Product and was represented by the ratio of the secondary sector income (including income from manufacturing, construction, electricity, gas and water supply) to the State Domestic Product. He assumed that the relationship between each independent variable and the dependent variable is positive. The empirical results showed that the coefficients of both independent variables during the two periods under study had the
correct sign and were significant. The exception was per capita income during the second period which was not significant (Sarojini 1992).

The first attempt to derive the Laffer Curve was prepared by Beenstock and Gosling at London Business School (Beenstock 1979). This study used annual time series data for the period 1946-77. It employed a single equation model to fit the Laffer Curve for the United Kingdom. Tax revenue, which represent the explained variable, included central government revenue from taxes in addition to national insurance contributions and local authority receipts. These revenues were computed in constant 1975 prices in millions of pounds.

All kinds of taxes were aggregated into a general index of tax rate which was computed by dividing tax revenue over the GDP. This index represented the independent variable. A time trend was added as an explanatory variable to reflect the trend rate of growth in the tax handle (Beenstock 1979). The aggregation makes it impossible to separate the effects of each tax on incentives. Beenstock and Gosling found that all the explanatory variables were statistically significant. The regression also confirmed the shape of the Laffer Curve. The main finding was that the Laffer Curve peak point for the United Kingdom is when aggregate tax rate equal 60% (Griffiths and Wall 1995).

1.12. Study Obstacles:-

Most of the empirical studies which have dealt with the world countries in general and the developing countries, in particular, have suffered from several obstacles which prevent these studies from achieving all their goals. The main constraints refer to the use of econometric models. Some of the obstacles are the following:

1. Data are often not available on some of the variables. There are several independent variables which are very important in determining relative taxable capacity which have nevertheless been excluded for lack of data. Examples are personal income, the distribution of national income and the income which
exceeds the subsistence level (Bahl 1971). The last variable (income which exceeds the subsistence level) helps in determining the starting point of tax (Sandford 1992). In addition the recently published data available cover previous periods. Recent years are often non-covered. Data available on some variables are often preliminary.

2. The obstacles resulting from using the econometric models, especially these studies using cross sectional data, are represented by the methodology in choosing the determinant factors of relative taxable capacity and the independent variables which represent these factors. Most models which used cross sectional data suffer from heteroscedasticity (Greene 1993). It is well known that one of the basic assumptions of the regression model is that the variance of the error terms is constant for all observations (Kmenta 1986). The absence of this assumption is called heteroscedasticity (Stewart 1991). The main consequence of this problem is that inefficient least squares estimators are obtained. (Maddala 1992, Stewart 1991).

Several suitable tests to detect heteroscedasticity have been developed. The most important among them are the Goldfeld and Quandt test and the Breusch and Pagan test (Kmenta 1986, Maddala 1992, Stewart 1991). These tests will be discussed in more detail in Chapter 4 (sub-section 4.4.2.1). Using OLS by adopting a weighted least squares is the solution to this problem. The current study (as well as previous studies relevant to this subject), to alleviate any possible heteroscedasticity problem, is going to divide the independent and the dependent variables by Gross National Product (GNP) or Gross Domestic Product (GDP) (Chapter 4) or number of population (Chapter 5).

1.13. Summary of the Chapter:-

This Chapter has dealt with the taxable capacity and tax effort concepts. It has dealt with the methods of measuring them, and with the factors which determine relative taxable capacity, and with the independent variables which represent these factors.
The relevant previous studies of this subject were reviewed. The introductory section introduced some basic concepts and the major areas which are covered by studies about taxes. It is convenient to summarize the most important findings that have been reached:

1. There were several definitions of relative taxable capacity, and these were reduced to one main definition. Relative taxable capacity is defined as the ratio that the government deducts from the GNP (or individuals) through taxes. It is derived by applying the tax rate averages. This can be done by using arithmetic or econometric models. The latter can be computed through applying regression equation analysis and finding the coefficient for each base or explanatory variable which represents the determinant factor of the relative taxable capacity. It is necessary to take into consideration the government need for tax revenues to finance its public expenditures and its willingness to impose and collect these revenues. No less relevant is the citizens' ability to pay taxes and shoulder their burdens.

2. There was broad consent through all studies that dealt with relative taxable capacity on three major determinant factors of this capacity. These factors are represented for the whole economy's relative taxable capacity by: firstly, the degree of development represented by per capita GNP, the share of the agricultural sector in the GDP, and the degree of monetisation measured by the ratio of money supply (M2) to the GNP; secondly, the composition of the GDP represented by the share of the mining, the manufacturing, or the wholesale & retail trade sectors in the GDP separately; finally, the degree of economic openness measured by the ratio of exports or imports or both of them to the GNP at current market prices. The individual's relative taxable capacity is also determined by the same factors which determine the whole economy's relative taxable capacity but they are represented by the same independent variables after replacing the denominator of each by the population size instead of the GNP or the GDP.
3. This Chapter reviewed and discussed six methods of measuring relative taxable capacity: the tax burden approach (TB), econometric models, the arithmetic approach, standard tax elasticity (STE), income tax elasticity (ITE), and tax effort measurement (TEM). Each of these approaches has its own advantages and disadvantages. This Ph.D thesis has adopted three of them to estimate relative taxable capacity for the Jordanian economy. The reasons were shown earlier. These approaches are: econometric models (Chapters 4 and 5), the arithmetic approach (Chapter 6) income tax elasticity (Chapter 7). The first approach has been divided in this study into two sub-approaches. The first is called the whole economy’s relative taxable capacity (Chapter 4). The second is called the individual’s relative taxable capacity (Chapter 5). However, the absolute taxable capacity, theoretically speaking, can be measured by the estimation of the Laffer Curve.
Chapter 2
Public Finance in Jordan

2.1. Introduction:

Public finance in Jordan consists of the central government, decentralised government agencies, public financial institutions, non-financial public enterprises and all municipalities. Coverage of the central government’s general budget extends to the current and capital operations of all ministries. The decentralised agencies such as the Jordanian universities operate with independent budgets. The Central Bank of Jordan (CBJ) and the Social Security Corporation are examples of publicly-financed institutions. The non-financial public enterprises are operationally autonomous. Jordan Electricity Authority and Water Authority of Jordan are examples of these enterprises. The municipalities operate through their own budgets. The main financial sources for them are: utility fees and property taxes. Although some of these institutions, such as the municipalities and Jordan Electricity Authority, receive financial support and loans from the central government, others such as the CBJ, transfer their net profits to the central government.

This Chapter reviews the public finance of the central government of Jordan in general and the development of taxation in particular. It deals with the most important characteristics and indicators of the Jordanian economy. In addition it gives a general idea about various aspects of the economy or related to the economy such as area and population in an introductory section. It also deals with the development of the general budget as well as the development of tax revenues. It reviews some indicators of these revenues such as the tax burden, share in domestic revenues, and the ratio of tax revenues to public expenditures in general and current expenditures during the period 1973-1995.

This period has been chosen for several reasons: Jordan adopted continuous development planning, starting from the Three-Year Development Plan of 1973-75.
in this period. Furthermore, it was chosen for its economic and relative political stability. There were no major wars in this period. Economically speaking, there were no major shocks in the economy until 1988 when the Jordanian Dinar was devalued by one-third of the original value. This period was also chosen because of the range of Arab and international economic development to which it bore witness. It was distinguished by economic boom and semi-full employment at the beginning. It was distinguished by economic stagnation and political instability in its last nine years. Therefore, this period can reflect the effects of economic cycles on macroeconomics variables and their reflections on tax revenues.

The methodology of this Chapter adopts the analytic method supported by figures and statistics relevant to this subject. Further explanation of these statistics and figures will appear in Chapter 7 when they are connected to the empirical results of that Chapter. It is worth saying that all tables, analysis and conclusions which appear in this Chapter are entirely original and are the researcher’s own work.

2.2. Introductory Section:

This section gives a brief review of the main attributes and indicators of the Jordanian economy. It gives a general idea about the country in addition to reviewing the major challenges that were and are facing Jordan. A summary Table is attached to this section to show the major economic indicators. References in this section give further information about each topic mentioned.

Jordan has a total area of 89.9 thousands Sq. Km, and a high rate of literacy\(^1\).

\(^1\) Jordan has a population of about 4.3 million in 1995 (see Table 1). This population has been increasing at an average annual rate of 3.8%. The rate of literacy in Jordan in 1993 is 84.4. This is the highest among the Arab countries. For further information about urban population, education and medical care see: International Monetary Fund. "Jordan: Recent Economic Developments", SM/93/31, (June 22, 1993), p.v. Jordan: Keys to the Kingdom, 1995, pp.101-103. Jordan: Ministry of Health, Annual Statistical Report for 1993, p.2.
## Table 2.1
Major Economic Indicators

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<tr>
<td><strong>Population:</strong></td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>- Population (in Thousands)</td>
<td>1675.1</td>
<td>1889.3</td>
<td>2307.0</td>
<td>2778.0</td>
<td>3144.0</td>
<td>3468.0</td>
<td>3844.0</td>
<td>4291.0</td>
</tr>
<tr>
<td><strong>Output and Prices:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- GNP at Current Market Prices</td>
<td>316.7</td>
<td>569.4</td>
<td>1526.8</td>
<td>2146.3</td>
<td>2180.7</td>
<td>2428.8</td>
<td>3306.8</td>
<td>4503.6</td>
</tr>
<tr>
<td>- GDP at Current Market Prices</td>
<td>310.1</td>
<td>547.4</td>
<td>1469.3</td>
<td>2163.6</td>
<td>2372.1</td>
<td>2668.3</td>
<td>3493.0</td>
<td>4420.8</td>
</tr>
<tr>
<td>- Real GDP Growth Rate (Annual)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>7.7</td>
<td>-13.5</td>
<td>1.7</td>
<td>11.2</td>
<td>6.4</td>
</tr>
<tr>
<td>- Ratio of Aggregate Consumption to GDP at Current Market Prices</td>
<td>120.5</td>
<td>123.0</td>
<td>115.0</td>
<td>104.0</td>
<td>93.2</td>
<td>102.7</td>
<td>103.6</td>
<td>85.0</td>
</tr>
<tr>
<td>- Per Capita GNP (JD) (US$)</td>
<td>189.1</td>
<td>301.4</td>
<td>661.8</td>
<td>772.6</td>
<td>693.6</td>
<td>700.3</td>
<td>860.2</td>
<td>1050.0</td>
</tr>
<tr>
<td>- Inflation Rate (Annual)</td>
<td>11.4</td>
<td>11.5</td>
<td>7.7</td>
<td>0.0</td>
<td>25.8</td>
<td>16.1</td>
<td>16.8</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>Money and Banking:</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>- Average JD Exchange Rate Against US$</td>
<td>3.049</td>
<td>3.012</td>
<td>3.026</td>
<td>2.900</td>
<td>1.740</td>
<td>1.507</td>
<td>1.471</td>
<td>1.427</td>
</tr>
<tr>
<td>- Money Supply</td>
<td>176.1</td>
<td>378.4</td>
<td>1179.9</td>
<td>2072.4</td>
<td>2971.1</td>
<td>3122.6</td>
<td>4193.0</td>
<td>5159.8</td>
</tr>
<tr>
<td><strong>Public Finance:</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Public Revenues</td>
<td>29.6</td>
<td>31.8</td>
<td>35.6</td>
<td>31.0</td>
<td>36.1</td>
<td>35.2</td>
<td>38.9</td>
<td>36.2</td>
</tr>
<tr>
<td>- Public Expenditures</td>
<td>38.5</td>
<td>48.0</td>
<td>44.0</td>
<td>45.4</td>
<td>46.5</td>
<td>42.0</td>
<td>38.6</td>
<td>38.1</td>
</tr>
<tr>
<td>- Outstanding External Public Debt</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>228.0</td>
<td>226.8</td>
<td>149.0</td>
<td>119.2</td>
</tr>
<tr>
<td>- Outstanding Internal Public Debt</td>
<td>15.9</td>
<td>16.3</td>
<td>15.8</td>
<td>19.2</td>
<td>41.9</td>
<td>38.9</td>
<td>29.8</td>
<td>20.9</td>
</tr>
<tr>
<td><strong>External Trade and Balance of Payments:</strong></td>
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<td></td>
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<tr>
<td>- Trade Balance</td>
<td>-38.3</td>
<td>-64.0</td>
<td>-56.3</td>
<td>-28.0</td>
<td>-25.1</td>
<td>-38.6</td>
<td>-41.8</td>
<td>-29.2</td>
</tr>
<tr>
<td>- Current Account Balance</td>
<td>1.7</td>
<td>4.1</td>
<td>-1.0</td>
<td>-0.8</td>
<td>4.5</td>
<td>-10.4</td>
<td>-16.3</td>
<td>-3.9</td>
</tr>
</tbody>
</table>

- This Table is entirely original. The sources of data are as follows:-
  - Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
- The figures which appear in this Table are rounded down to one decimal point.
  1- This balance represents total contracted loans (disbursed plus undisbursed) minus settlements.
According to the World Bank classification, it is a low middle income country. Its economy has limited natural resources, scarce arable land, a small domestic production base, and is strongly service-oriented. There has been a significant shift in the structural composition of the GDP in recent years, reflecting in particular the increasing importance of the manufacturing and construction sectors and the declining share of the trade and government service sectors. A large share of government expenditures is directed to the provision of public utilities and of infrastructural supports, namely education, transportation, and health. Jordanian workers have traditionally sought employment in neighbouring oil-producing and exporting countries.

The continuous flow of foreign revenues (Arab grants and external loans and remittances of Jordanians working abroad) enabled the country to achieve rapid economic growth and development during 1973-85. However, the instability of these revenues in general, and the Arab assistance in particular, together with the increase of external debt service obligations and commodity imports (not to forget the impact of the regional Gulf Crisis on the Jordanian economy), were the causes of only a moderate, sometimes a negative, economic growth rate during 1985-91. Rapid economic growth resumed in 1992 when Jordan adopted the second economic

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4 Fertilizer, cement, and petroleum products are the principal outputs of the manufacturing sector and are produced in joint-venture projects between public and private sector companies (see Jordan: Ministry of Industry and Trade, Directorate of Planning and Statistics, Annual Report for 1990, pp.25-40).
adjustment programme with the cooperation of the IMF. The plan covers the period 1992-98 (Table 2.1).

Notwithstanding the progress in restoring growth and reducing macroeconomic imbalances (both external and internal), Jordan has faced and continues to face major economic challenges. One of these is a high unemployment rate (18% in 1993)⁵, as a result of Jordanian returnees from Arab Gulf Countries (300,000 persons) in the aftermath of the regional crisis in August 1990. Another challenge is rising poverty resulting from the decline of purchasing power of nominal income after the devaluation of Jordan Dinar in 1989 by 34.7% in response to a permanent trade deficit. Furthermore, the fall in government domestic resources to finance public expenditures has caused a fiscal deficit in the central government budget. This deficit has become permanent. In addition to the increase of debts and their burden as a result of concessional terms (low interest rate and long grace period) of external borrowing in the 1970s and early 1980s, repayments have been delayed to late 1980s and early 1990s. Commercial terms on these loans have been applied since the mid 1980s.

Table 2.1 shows the major Jordanian economic indicators concerning the following areas: population, output and prices, money and banking, public finance, external trade and the balance of payments position. These sectors are represented by the most important economic variables, are selected to reflect the development of the economy during selected years in the period 1973-95. The years appearing in this Table until 1986 were selected to represent the first year of each economic development plan which was adopted by the government⁶. Meanwhile, 1989 represents the first year

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of the first medium adjustment programme'. It was followed by the Gulf Crisis in 1990 and its impact on the economy. Later, 1992 was chosen to represent the first year of the second medium adjustment programme. However, 1995 represents the last year which is involved in the study and for which preliminary data are available. This Table emphasises the above-mentioned characteristics of economy.

2.3. General Budget:

Many arguments are over the measurement of the budget deficit. These establish several measurements for the deficit. The first measurement is represented by the total government spending minus government revenues. This is the easiest way to measure the government budget deficit (Mankiw 1994, McDermott and Wescott 1996, Musgrave and Musgrave 1989). The current study will employ this approach to measure the budget deficit in Jordan during 1973-1995. This has been done because this method is easy to calculate and it reflects the government's position in terms of inflow and outflow of money.

The second measurement of the budget deficit can be viewed as the change in the government's overall indebtedness (Mankiw 1994). The government will finance the budget deficit by external and internal borrowing. This, therefore, will change the outstanding balance of each kind of borrowing. This measurement is also simple. The current thesis will show the outstanding balance of both external and internal borrowing in Jordan during the period under study (1973-95). This balance reflects the accumulation of the budget deficit (McDermott and Wescott 1996).

Deficit can also be measured by what is called "capital budgeting" (Mankiw 1994).

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This is the third measurement of the budget deficit. This can be done by subtracting the change in the government assets from the change in the government debt. The first two measurements neglect the government assets. To make it clear, the following example is given: if the government sells some of its own land to reduce its outstanding debt, according the second measurements, this would lower the budget deficit. If this is done to raise the government revenue rather than settle a debt, according to the first measurement, this would also lower the budget deficit. However, this, under capital budgeting, would not lower the deficit because there is a reduction by the same amount on both government debt and assets. This measurement is quite difficult to implement in practice.

Some economists argue that the above-mentioned measurements to the budget deficit is misleading because they exclude some government liabilities such as the pensions of government workers. The workers furnish the government by services today, but their pension is deferred till later on. This means, in other words, that workers provide a loan to the government (Mankiw 1994). This argument does not provide us with a measurement. Consequently it cannot be applied to Jordan.

This section tackles public finance in Jordan. It focuses on the central government. The central government general budget consists of two sides; public revenues and public expenditures. When the former is greater than the latter during a fiscal year, the budget position will be a surplus, i.e. government saving. However, when public expenditure exceeds public revenue there is then a deficit, i.e. government dissaving. Public spending can be financed by four sources: taxation, internal debt (borrowing from the public), external debt (borrowing from foreign resources), and printing money (Mankiw 1994). Public revenues in Jordan include domestic revenues (tax and non-tax revenues), loans repaid and financial assistance. Tax revenues will be discussed in detail in the following sections of this Chapter since they are the subject of the present thesis. Non-tax revenues include the yield of the postal services, telegraph, telephone. They also include profits of public institutions such as the Central Bank. Loans repaid represent repayments of loans which are made by public institutions and enterprises. The government supports these institutions by providing
them with loans in concessional terms. These institutions, in turn, repay these loans to the government. Financial assistance represents the aid which is received by the government from the Arab oil countries as well as developed countries as a part of enhancing economic growth and implementing the development plans.

On the other hand, public expenditures include both current and capital expenses. Current expenditures are items like defence and public security and recurring civil expenditures such as salaries, wages and allowances in addition to public debt service. Capital expenditures represent those expenses which are devoted to implementing the development plan (such as equipment, building and constructions). As previously mentioned, the budget deficit or government dissaving means public expenditures in excess of public revenues. This deficit is usually financed by external or internal borrowing or both. Instruments of internal debt in Jordan are represented by Treasury bills, Treasury bonds and advances provided by the Central Bank of Jordan to the government.

Table 2.2 shows that the central government public revenues (domestic revenues [tax and non-tax revenues], loans repaid and financial assistance) amounted to JD 91.8 million in 1973. They then increased gradually until they reached a peak in 1995 of JD 1672.7 million. This shows that these revenues have increased more than 18 fold between 1973 and 1995. In spite of this, the ratio of central government public revenues to the GDP at current market prices can be considered relatively stable (Figure 2.1). It reached its maximum and minimum levels in 1975 and 1984 -42.0% and 26.8% respectively- as a result of having doubled inter-government financial assistance in 1975 and the decline in aid to about half in 1984 (see Table 2.2). Meanwhile, the average of this ratio reached 34.6% for the whole period (1973-95).

Domestic revenues in Jordan (tax plus non-tax revenues) reached their lowest and highest levels during the first and the last years of the period under study (1973 and 1995). They amounted to JD 46.2 and 1440.0 million respectively. This shows that these revenues rose more than 31 times between these two years. These revenues increased gradually over the period (Table 2.2).
## Table 2.2
Public Revenues in Jordan during 1973-95

(Million JD)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax Revenues</th>
<th>Non-Tax Revenues</th>
<th>Domestic Revenues</th>
<th>Loans Repaid</th>
<th>Financial Assistance</th>
<th>Total Public Revenues</th>
<th>Ratio of Public Revenues to the GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>34.2000</td>
<td>12.0000</td>
<td>46.2000</td>
<td>0.00</td>
<td>45.6000</td>
<td>91.8000</td>
<td>29.6034</td>
</tr>
<tr>
<td>1974</td>
<td>43.6000</td>
<td>22.2000</td>
<td>65.8000</td>
<td>0.00</td>
<td>100.6000</td>
<td>183.2000</td>
<td>42.0280</td>
</tr>
<tr>
<td>1975</td>
<td>58.2000</td>
<td>24.4000</td>
<td>82.6000</td>
<td>0.00</td>
<td>66.2000</td>
<td>173.8000</td>
<td>31.7501</td>
</tr>
<tr>
<td>1976</td>
<td>89.1000</td>
<td>18.5000</td>
<td>107.6000</td>
<td>0.00</td>
<td>81.7000</td>
<td>240.2000</td>
<td>30.8225</td>
</tr>
<tr>
<td>1977</td>
<td>117.8000</td>
<td>24.5000</td>
<td>142.3000</td>
<td>0.00</td>
<td>122.2000</td>
<td>264.5000</td>
<td>39.1041</td>
</tr>
<tr>
<td>1978</td>
<td>123.3000</td>
<td>35.2000</td>
<td>158.5000</td>
<td>0.00</td>
<td>210.3000</td>
<td>398.2000</td>
<td>40.5912</td>
</tr>
<tr>
<td>1979</td>
<td>151.1000</td>
<td>36.8000</td>
<td>187.9000</td>
<td>0.00</td>
<td>209.3000</td>
<td>435.4000</td>
<td>36.8889</td>
</tr>
<tr>
<td>1980</td>
<td>174.6000</td>
<td>51.5000</td>
<td>226.1000</td>
<td>0.00</td>
<td>199.5000</td>
<td>561.7000</td>
<td>33.0198</td>
</tr>
<tr>
<td>1982</td>
<td>263.1000</td>
<td>99.1000</td>
<td>362.2000</td>
<td>199.5000</td>
<td>199.5000</td>
<td>561.7000</td>
<td>33.0198</td>
</tr>
<tr>
<td>1983</td>
<td>293.6000</td>
<td>107.0000</td>
<td>400.6000</td>
<td>2.3000</td>
<td>197.0000</td>
<td>599.9000</td>
<td>32.8047</td>
</tr>
<tr>
<td>1984</td>
<td>305.4000</td>
<td>109.6000</td>
<td>415.0000</td>
<td>9.6000</td>
<td>106.1000</td>
<td>530.7000</td>
<td>26.7841</td>
</tr>
<tr>
<td>1985</td>
<td>317.3000</td>
<td>123.5000</td>
<td>440.8000</td>
<td>15.7000</td>
<td>187.8000</td>
<td>647.1000</td>
<td>32.0315</td>
</tr>
<tr>
<td>1987</td>
<td>325.4000</td>
<td>206.1000</td>
<td>531.5000</td>
<td>17.7000</td>
<td>127.6000</td>
<td>676.8000</td>
<td>30.6438</td>
</tr>
<tr>
<td>1988</td>
<td>342.7000</td>
<td>201.7000</td>
<td>544.4000</td>
<td>21.5000</td>
<td>155.4000</td>
<td>721.3000</td>
<td>31.8539</td>
</tr>
<tr>
<td>1989</td>
<td>368.6000</td>
<td>196.8000</td>
<td>565.4000</td>
<td>28.4000</td>
<td>261.7000</td>
<td>855.5000</td>
<td>36.0651</td>
</tr>
<tr>
<td>1990</td>
<td>492.1000</td>
<td>251.9000</td>
<td>744.0000</td>
<td>29.9000</td>
<td>164.3000</td>
<td>938.2000</td>
<td>35.1610</td>
</tr>
<tr>
<td>1991</td>
<td>530.5000</td>
<td>298.3000</td>
<td>828.8000</td>
<td>58.0000</td>
<td>225.2000</td>
<td>1112.0</td>
<td>38.9478</td>
</tr>
<tr>
<td>1992</td>
<td>814.7000</td>
<td>354.2000</td>
<td>1168.9</td>
<td>52.4000</td>
<td>137.4000</td>
<td>1358.7</td>
<td>38.8978</td>
</tr>
<tr>
<td>1993</td>
<td>818.7000</td>
<td>372.8000</td>
<td>1191.5</td>
<td>51.5000</td>
<td>163.3000</td>
<td>1406.3</td>
<td>36.2215</td>
</tr>
<tr>
<td>1994</td>
<td>883.3000</td>
<td>423.1000</td>
<td>1306.4</td>
<td>55.4000</td>
<td>175.6000</td>
<td>1537.4</td>
<td>36.6869</td>
</tr>
<tr>
<td>1995</td>
<td>1003.0</td>
<td>437.0000</td>
<td>1440.0</td>
<td>59.0000</td>
<td>173.7000</td>
<td>1672.7</td>
<td>36.1994</td>
</tr>
</tbody>
</table>

- This Table is entirely original. The sources of data are:
  - Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.

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Table 2.2 indicates that the proceeds of loans repaid are relatively low and have no sensible magnitude until 1981. This was because government loans to public institutions were in concessional terms. This gave them a long grace period to start paying which delayed repayments to the 1980s. Loans repaid averaged JD 18.4 million during 1973-95.

Financial assistance, which resulted from the inflow of Arab financial aid following the Baghdad and Amman Conferences held in 1978 and 1980 respectively, has been distinguished by instability during the period under the study (1973-95). It fluctuated to register its minimum level at the beginning of the period (1973) amounting to JD 45.6 million. It recorded its highest level in 1989 amounting to JD 261.7 million. It then fell below this level during the rest of the period (Table 2.2). It is worth mentioning that the average annual inflow of assistance during the whole period amounted to JD 153.0 million.

Table 2.3 shows that current expenditures have increased during the period 1973-95 more than 15-fold. They constituted, on average, 65.4% of public expenditures. However, capital spending has increased about 13 fold when the proceeds are compared between terminal years. Capital expenditures formed 34.6% of public expenditures. The ratio of the latter (public expenditures) to the GDP at current market prices amounted to 36.4% in 1984 as a lowest percentage. This was the outcome of the relatively stable public expenditures compared with the growth rate of the GDP. The ratio of public expenditures to the GDP amounted to 52.6% as a maximum in 1979 (see Figure 2.1). The target of current spending, reaching a high growth rate (50.9%) caused this result. This ratio has averaged 43.2% during the whole period (1973-95).

Over the years, the government’s efforts at improving public utilities and services, together with defence expenditure requirements and operations aimed at stabilising the prices of specific basic goods and the maintenance of private consumption, have resulted in a large budget deficit during each year of the whole period (1973-95). Since the mid 1980s, Jordan’s external environment turned markedly less favourable
Table 2.3

Public Expenditures in Jordan during 1973-95

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Expenditures</th>
<th>Capital Expenditures</th>
<th>Total Public Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Million JD</td>
<td>% of Public Expenditures</td>
<td>Million JD</td>
</tr>
<tr>
<td>1973</td>
<td>78.6000</td>
<td>65.7741</td>
<td>40.9000</td>
</tr>
<tr>
<td>1974</td>
<td>103.6000</td>
<td>70.6685</td>
<td>43.0000</td>
</tr>
<tr>
<td>1975</td>
<td>125.7000</td>
<td>61.3470</td>
<td>79.2000</td>
</tr>
<tr>
<td>1976</td>
<td>185.9000</td>
<td>70.8190</td>
<td>76.6000</td>
</tr>
<tr>
<td>1977</td>
<td>195.6000</td>
<td>57.8869</td>
<td>142.3000</td>
</tr>
<tr>
<td>1978</td>
<td>212.9000</td>
<td>58.8935</td>
<td>148.6000</td>
</tr>
<tr>
<td>1979</td>
<td>321.3000</td>
<td>62.3157</td>
<td>194.3000</td>
</tr>
<tr>
<td>1980</td>
<td>336.1000</td>
<td>59.6768</td>
<td>227.1000</td>
</tr>
<tr>
<td>1981</td>
<td>391.5000</td>
<td>60.5007</td>
<td>255.6000</td>
</tr>
<tr>
<td>1982</td>
<td>443.0000</td>
<td>63.8697</td>
<td>250.6000</td>
</tr>
<tr>
<td>1983</td>
<td>453.7000</td>
<td>64.3272</td>
<td>251.6000</td>
</tr>
<tr>
<td>1984</td>
<td>488.1000</td>
<td>67.7164</td>
<td>232.7000</td>
</tr>
<tr>
<td>1986</td>
<td>570.5000</td>
<td>58.1372</td>
<td>410.8000</td>
</tr>
<tr>
<td>1988</td>
<td>669.6000</td>
<td>63.5294</td>
<td>384.4000</td>
</tr>
<tr>
<td>1989</td>
<td>749.7000</td>
<td>68.0123</td>
<td>352.6000</td>
</tr>
<tr>
<td>1990</td>
<td>841.4000</td>
<td>75.1183</td>
<td>278.7000</td>
</tr>
<tr>
<td>1991</td>
<td>904.0000</td>
<td>73.2399</td>
<td>330.3000</td>
</tr>
<tr>
<td>1992</td>
<td>929.5000</td>
<td>68.9182</td>
<td>419.2000</td>
</tr>
<tr>
<td>1993</td>
<td>1044.3</td>
<td>63.3754</td>
<td>603.5000</td>
</tr>
<tr>
<td>1994</td>
<td>1115.2</td>
<td>70.5689</td>
<td>465.1000</td>
</tr>
<tr>
<td>1995</td>
<td>1225.2</td>
<td>69.6611</td>
<td>533.6000</td>
</tr>
</tbody>
</table>

- This Table is entirely original. The sources of data are:-
  - Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
as the country had to cope, in particular, with the consequences of prolonged regional recession. The adverse effects of that recession on the Jordanian economy were transmitted primarily through a reduction in flows of official and private transfers. The depth and persistence of the recessionary conditions in the region were on such a scale as to cause a considerable slow-down in economic growth in Jordan (see Table 2.1).

The initial government response was to continue the momentum of economic activity by maintaining expansionary fiscal policies which led to the widening of the overall budget deficit, increased internal and external indebtedness, thereby increasing the pressure on the balance of payments and the exchange rate, with the expectation that aid inflows and remittances will recover their trends. Unfortunately, such expectations did not fully materialise and the Jordanian economy came under increased strain. This was made evermore stressful by an unsettled political and economic climate in the region. This complicated the task of economic management and adversely affected the Jordanian economy. This forced the government in late 1988 and early 1989 to devaluate the Jordan Dinar by about one-third. The government also requested technical assistance from the International Monetary Fund (IMF) to help in managing the economy. The government in co-operation with the IMF, adopted an economic adjustment programme covering the period 1989-93.

Table 2.4 brings into relief the actual revenues generated in the domestic economy. It demonstrates that the overall central government budget deficit (excluding grants) has ranged between a minimum of 3.6% of the GDP at current market prices in 1992 and a maximum of 33.4% in 1979. This was due mainly to the increase of current spending by about 50% in 1979 and to achieving a remarkable growth in the GDP at current market prices by 22.3% in 1992. The better budgetary performance in 1992 was also attributed to the containment of current outlay (significant reduction of food subsidies), elimination of extrabudgetary expenditures (extra defence and military spending), cuts in the unproductive public expenditures (not to fill all posts created in the budget), an acceleration in revenue collection (simplifying the tax structure), owing in part of the discretionary measures introduced in the context of the 1992 budget (widening the tax
Table 2.4  
Budget Deficit in Jordan during 1973-95  
(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Excluding Grants</th>
<th>Including Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Million JD</td>
<td>% of the GDP</td>
</tr>
<tr>
<td>1973</td>
<td>73.3000</td>
<td>23.6375</td>
</tr>
<tr>
<td>1974</td>
<td>80.7000</td>
<td>20.9230</td>
</tr>
<tr>
<td>1975</td>
<td>122.3000</td>
<td>28.0569</td>
</tr>
<tr>
<td>1976</td>
<td>154.9000</td>
<td>28.2974</td>
</tr>
<tr>
<td>1977</td>
<td>195.6000</td>
<td>28.9178</td>
</tr>
<tr>
<td>1978</td>
<td>203.0000</td>
<td>26.0490</td>
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<td>1979</td>
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</tr>
<tr>
<td>1980</td>
<td>337.1000</td>
<td>28.5605</td>
</tr>
<tr>
<td>1981</td>
<td>330.7000</td>
<td>22.5073</td>
</tr>
<tr>
<td>1982</td>
<td>331.4000</td>
<td>19.4815</td>
</tr>
<tr>
<td>1983</td>
<td>302.4000</td>
<td>16.5363</td>
</tr>
<tr>
<td>1985</td>
<td>346.4000</td>
<td>17.1468</td>
</tr>
<tr>
<td>1986</td>
<td>454.1000</td>
<td>20.9882</td>
</tr>
<tr>
<td>1987</td>
<td>416.7000</td>
<td>18.8672</td>
</tr>
<tr>
<td>1988</td>
<td>488.1000</td>
<td>21.5554</td>
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<td>404.8000</td>
<td>10.6208</td>
</tr>
<tr>
<td>1994</td>
<td>218.5000</td>
<td>5.2141</td>
</tr>
<tr>
<td>1995</td>
<td>259.8000</td>
<td>5.6224</td>
</tr>
</tbody>
</table>

*This Table is entirely original. The sources of data are:*
- Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
*Figures in parentheses represent surplus.*
base), and in part to revenues from certain non-recurring sources which were represented by customs duties collected on cars of returnees from the Arab Gulf Countries after the Crisis (August 1990) (CBJ Annual Report 1992). The ratio of the overall budget deficit (excluding grants) to the GDP averaged 19.2% during the period 1973-95.

Adding foreign grants to public revenues to calculate the overall budget deficit (including grants) shows that the position of the general budget was recording a deficit during every year of the period except 1992 (Figure 2.1). During this year the general budget for the first time achieved a surplus of JD 10.0 million or 0.3% of the GDP. In other words, Jordan achieved a balanced budget during this year. The reasons for the balance have been previously mentioned. When customs duties collected on cars of returnees, which amounted to about 2% of the GDP, are excluded from public revenues, this surplus will swing to a deficit of 1.7% of the GDP. The ratio of the budget deficit (including grants) to the GDP averaged 8.6% during the whole period (1973-95). This reflects the heavy debt service burden, large defence and national security expenditures, investment in the basic infrastructure needed to match Jordan’s population growth, and price subsidies to protect poor and needy people.

As shown in Jordan, the government budget has been suffering from a permanent deficit since the beginning of the studied period (1973). The budget deficit has a negative impact on macroeconomic variables, for example Mankiw (1994) showed, as stated in Chapter 1 of the current study, that this deficit leads to lower investment and saving. However, the budget deficit can help stabilise the economy over a cycle (Mankiw 1994). The tax revenues in Jordan have achieved a fall in their growth rate during the recession (1984-89) (see Table 2.6). This results in obtaining a high budget deficit during this period. These automatic responses helped alleviate deepening recession. To achieve a balanced budget, the government should have reduced expenditures and raised taxes. This could aggravate the economic situation and depress aggregate demand.

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The budget deficit in Jordan may also be viewed to reduce the distortion of taxes on incentives. The high tax rate, to achieve a balanced budget, discourages economic activities (Griffiths and Wall 1995) and increases the excess burden (Cullis and Jones 1992, Musgrave and Musgrave 1989). This was shown when the Laffer Curve and the efficiency principle were discussed in Chapter 1. Therefore, keeping the tax rate relatively stable rather than making it high in years and low in others is better for the economy. This policy is called "tax smoothing" and was discussed in Chapter 1. As stated before, to keep the tax rate smooth, a deficit is necessary during recessions and wars. This is what happened in Jordan. The government has been spending since the country obtained independence in 1946 about quarter of its public expenditures on defence and military spending. This results in running a budget deficit. This may be shown to be in line with the tax smoothing theory as previously discussed. This is also consistent with Barro’s studies (1979 and 1987) and Horrigan’s study (Ingberman and Inman 1988) (see Chapter 1, sub-section 1.3.6 for more detail).

We may look at the budget deficit of Jordan from the point of view of shifting the tax burden from current to future generations. The past and the current generations were prepared to fight a war to maintain freedom (Mankiw 1994). Future generations benefit from this and they are free riders. To make them pay some of the costs of the military expenditures over the past five decades, the current generation financed these expenditures with a budget deficit. This deficit is reflected in internal and external borrowing, as will be shown later on. This debt will be settled in the future by raising taxes on the next generations or cutting expenditures.

The above-mentioned considerations altogether were the main reasons behind running a budget deficit. These lead economists to reject the rule of the balanced budget (Mankiw 1994, Musgrave and Musgrave 1989). The outstanding balance of the debt (see Table 2.5) will force the government to choose between cutting spending and increasing taxes. Therefore, the subject of the current study focuses on investigating whether there is a possibility to increase tax revenues or not is a timely research topic.

The budget deficit of the central government during the period under study
Table 2.5  
Public Debt in Jordan during 1973-95  
(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Outstanding Balance of External Public Debt</th>
<th>Outstanding Balance of Internal Public Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Million JD % of the GDP</td>
<td>Million JD % of the GDP</td>
</tr>
<tr>
<td>1973</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1974</td>
<td>NA</td>
<td>NA</td>
</tr>
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<td>1975</td>
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<td>6052.5</td>
<td>226.8298</td>
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<td>5516.8</td>
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<td>1992</td>
<td>5203.0</td>
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</tr>
<tr>
<td>1993</td>
<td>4841.6</td>
<td>127.0294</td>
</tr>
<tr>
<td>1994</td>
<td>5260.3</td>
<td>125.5262</td>
</tr>
<tr>
<td>1995</td>
<td>5508.1</td>
<td>119.2023</td>
</tr>
</tbody>
</table>

- This Table is entirely original. The sources of data are:
  - Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.

- Data are not available for external public debt until 1988.
1992 which achieved a surplus- was financed by external and internal borrowing. Table 2.5 demonstrates the development of these loans. There is no available data about the outstanding balance of external debt until 1988. Table 2.5 also shows the ratio of the outstanding balance of each kind of borrowing to the GDP. It shows that, as a result of a high recorded budget deficit during the period under study, the outstanding balance of external debt exceeded the GDP every year under study where available data exist. Jordan’s external debt increased rapidly during the 1980s. This reflected an increased reliance on foreign borrowing on commercial terms to finance external imbalances associated with the government’s expansionary macroeconomics stance. Part of Jordan’s external debt is on concessional terms, but a significant fraction of it remains on commercial terms. The sources of foreign borrowing have been diversified in recent years.

A prudent debt management has been followed in Jordan since 1989, the first year of the economic adjustment programme covering the period 1989-93. The programme discouraged the incurring of any new non-concessional and short term debt. It encouraged the securing of debt and debt relief from bilateral official creditors. Overall, it helped improve the debt and debt service profile, succeeding in reducing the level of external debt to 125.5% and 119.2% of the GDP by end of 1994 and 1995 respectively. The peak was 228.0% at the end of 1989 (Table 2.5 and Figure 2.2). This also reflects a heavy burden of the external debt service. For every unit of repayment, there may be an additional element of tax (Barro 1974, Dornbusch and Fischer 1994, Mankiw 1994). This may mean more taxes in the future.

On the other hand, the outstanding balance of internal public debt amounted to JD 49.4 million in 1973 registering its lowest level. Thereafter, it increased gradually until it reached its highest level in 1994, amounting to JD 1181.3 million (Table 2.5). The ratio of this balance to the GDP was relatively stable until 1987 when it jumped from 19.2% in 1986 to 28.3% in 1987 and achieved a further increase in 1988 when amounted to 40.7% (see Table 2.5 and Figure 2.2). This was due to the increase of the balance from JD 414.9 to 624.4 and to 921.8 million in these three years respectively (Table 2.5). The unprecedented increase of internal public debt during these two years
Figure 2.1: The ratio of total public revenues (RTPR), total public expenditures (RTX) and budget deficit (including grants) (RBDA) to the GDP.

Figure 2.2: The ratio of the outstanding balance of external (REXTD) and internal (RINTD) public debt to the GDP.
was due to the government budget deficit which was financed partially by internal borrowing. Of particular importance was the creation of new money through extraordinary advances offered by the Central Bank of Jordan (CBJ). The creation of money (printing money) is an alternative to explicit tax. This is called the inflation tax (Dornbusch and Fischer 1994, Mankiw 1994). The holders of money are those who pay this tax because of less valuable of money (less purchasing power for the same amount of money) (Mankiw 1994). The extraordinary advances in 1987 and 1988 rose in a way that had never been seen before. It is worth mentioning that the ratio of this balance to the GDP has averaged 23.0\% during the whole period (1973-95).

The government believes that both restructuring the budget and reducing the budget deficit are of vital importance. Accordingly, the government has taken, and intends to continue to take, decisive steps to reform the structure of revenue, to tighten control on expenditure, and to mobilise real resources to reduce in the medium term the dependence of the budget on internal and external borrowing.

2.4. Tax Revenues:-

This Chapter adopted the classification of the Central Bank of Jordan for tax revenues and their components\(^9\). This was done because this classification is very clear. It is based on the world standard to classify them as will be mentioned in Chapter 3. Table

\(^9\) There are several classifications for tax revenues, the most important of them is the one followed by the Ministry of Finance in preparing general budget and final accounts. However, this classification excludes the yield of both fees and licences from tax revenues. The same classification is followed in the periodical consultations carried out by the mission of International Monetary Fund with the Jordanian authorities. The Department of Statistics adopts other classifications for tax revenues and their divisions for purpose of calculating national income and other national accounts. There is also another classification adopted by the International Monetary Fund in preparing its annual publication "Government Finance Statistics (GFS)" which in respect to the yield of tax revenues pertaining to Jordan is approximate to the classification of the Central Bank of Jordan (CBJ). The only available source of tax revenues data which will be collected to measure the taxable capacity for a sample of developing countries will be the GFS. Therefore, the classification of the CBJ has been adopted in this Chapter.
2.6 shows that tax revenues have achieved a continuous increase during the period 1973-95 except in 1986 when they demonstrated a slight retreat. They rose nearly 29 fold if the proceeds are compared between the first and the last years of the period under consideration. This is due to the rapid growth in the GNP which is the comprehensive base for taxes. It also reflects the developments which have taken place in the structure of the GNP as well as the diversification of economic activities which are also a base for taxation. In addition, tax revenues pick up the high propensity to consume in Jordan which, in turn, has increased imports of commodities. Furthermore, increasing per capita GNP, as a result of a growth average in the GNP, has caused an increase in the individual’s ability to pay taxes. This is besides the tax reform which has taken place in Jordan. This reform took the form of imposing several taxes and amending the rates of others in both directions (increasing and decreasing). The aim was to make a fiscal contribution to economic development.

The tax revenue growth rate has averaged 17.8% during the period of study (1973-95). The highest growth rate was 53.6% in 1992. The lowest growth-rate was minus 2.6% -decline- in 1986 (Table 2.6). This has already been explained. Tax revenues have formed 71.0% of domestic revenues during the same period (1973-95). The general direction of the relative importance of tax revenues in domestic revenues was downward (see Figure 2.3). This supports the contention that the contribution of tax revenues to total domestic revenues has shown a slow downward trend over time against the reverse direction of that of non-tax revenues. The pattern has been especially marked since 1986 because non-tax revenues have included the oil surplus operations revenues as a result of the world oil price decline.

---

10 Tax revenues realized a progressive increasing in their yield during the period 1973-93 excluding the year 1986 when the tax revenues recorded a slight decline, which is due to the impact of economic recession on Jordan, and the adoption of the cash basis instead of the accrual basis by the Ministry of Finance in preparing the final accounts since that year. As a result of the high amounts of taxes not yet paid, this led to the decrease of tax revenues yield during 1986.

11 The government keeps the domestic price of oil for consumers in Jordan constant when the world price goes down. This creates a surplus represented by the difference between the world oil price and the domestic price. This surplus goes to the treasury by the end of each fiscal year.
Table 2.6
Tax Revenues in Jordan during 1973-1995

(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax Revenues Million JD</th>
<th>Tax Growth Rate</th>
<th>% of Domestic Revenues</th>
<th>% of Current Expenditures</th>
<th>% of Public Expenditures</th>
<th>Tax Burden¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>34.2000</td>
<td>23.0216</td>
<td>74.0260</td>
<td>43.5115</td>
<td>28.6192</td>
<td>11.7364</td>
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<td>1974</td>
<td>43.6000</td>
<td>27.4854</td>
<td>66.2614</td>
<td>42.0849</td>
<td>29.7408</td>
<td>12.2266</td>
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<tr>
<td>1976</td>
<td>89.1000</td>
<td>53.0928</td>
<td>82.8067</td>
<td>47.9290</td>
<td>33.9429</td>
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<td>1977</td>
<td>117.8000</td>
<td>32.2110</td>
<td>82.7829</td>
<td>60.2249</td>
<td>34.8624</td>
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<td>1978</td>
<td>123.3000</td>
<td>4.6689</td>
<td>77.7918</td>
<td>57.9145</td>
<td>34.1079</td>
<td>17.5316</td>
</tr>
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<td>1979</td>
<td>151.1000</td>
<td>22.5466</td>
<td>80.4151</td>
<td>47.0277</td>
<td>29.3057</td>
<td>16.6465</td>
</tr>
<tr>
<td>1980</td>
<td>174.6000</td>
<td>15.5526</td>
<td>77.2225</td>
<td>51.9488</td>
<td>31.0014</td>
<td>16.0951</td>
</tr>
<tr>
<td>1981</td>
<td>233.0000</td>
<td>33.4479</td>
<td>75.3558</td>
<td>59.5147</td>
<td>36.0068</td>
<td>17.0496</td>
</tr>
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<td>1983</td>
<td>293.6000</td>
<td>11.5926</td>
<td>73.2901</td>
<td>64.7124</td>
<td>41.6277</td>
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</tr>
<tr>
<td>1984</td>
<td>305.4000</td>
<td>4.0191</td>
<td>73.5904</td>
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<td>17.1785</td>
</tr>
<tr>
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<td>3.8965</td>
<td>71.9828</td>
<td>58.4885</td>
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<td>325.4000</td>
<td>5.2393</td>
<td>61.2230</td>
<td>53.9904</td>
<td>33.6888</td>
<td>17.8028</td>
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<tr>
<td>1988</td>
<td>342.7000</td>
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<td>62.9500</td>
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<td>1989</td>
<td>368.6000</td>
<td>7.5576</td>
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<td>49.1663</td>
<td>33.4392</td>
<td>19.2159</td>
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<td>58.4859</td>
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<td>1992</td>
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<td>60.4063</td>
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<td>1993</td>
<td>818.7000</td>
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<td>68.7117</td>
<td>78.3970</td>
<td>49.6844</td>
<td>26.1015</td>
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<tr>
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<td>1003.0</td>
<td>13.5515</td>
<td>69.6528</td>
<td>81.8642</td>
<td>57.0275</td>
<td>26.9110</td>
</tr>
</tbody>
</table>

¹ The tax burden is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes).

This Table is entirely original. The sources of data are:
- Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
Regarding the ratio of tax revenues to current expenditures, it has averaged 58.9% during 1973-95 (Table 2.6). This ratio is relatively low, but trend has been upward, especially during the last four years of the period under study (1992-95). The reason for the trend rise has been increasing tax revenues by 53.6% in 1992 as explained earlier. Taxes maintained their level during 1993. They then achieved a considerable growth rate in 1994 and 1995. Table 2.6 shows that the ratio of tax revenues to total government expenditures was just under two-fifths. This ratio has averaged 38.6% during the whole period of the study. The years 1975 and 1992 registered the minimum and the maximum of this ratio respectively (see Table 2.6). Each of 1974 and 1992 has also registered the lowest and the highest ratio of taxation to current government expenditures successively during the period of study 1973-95 (Table 2.6 and Figure 2.3). This is attributed to the developments which have taken place in taxation as well as current and capital expenditures (Tables 2.3 and 2.6).

The development of tax revenues has meant an increasing burden of tax in Jordan. This burden is measured by the ratio of tax revenues (excluding social security contributions) to the GNP at current factor cost (GNP minus net indirect taxes). The current study excluded social security contributions from the numerator of the tax burden identity and adopted the GNP at current factor cost instead of the GNP at current market prices as a denominator of this identity. The reasons will be explained in detail in Chapter 3, section 3 since they are directly related to that Chapter. The average of tax burden in Jordan has amounted during the period 1973-95 to 19.2%. The beginning of the period (1973) and the year 1992, recorded the lowest and the highest of this burden respectively (Table 2.6 and Figure 2.3). The increase achieved in the tax burden during 1992 came, for the main part, as a result of including tax revenue of about 2% of the GNP as non-current revenues represent customs duties collected on cars of the Jordanian returnees from the Arab Gulf Countries aftermath of the regional crisis in August 1990.

12 The reason of the low ratio of the coverage of tax revenues to current expenditure is attributed to the relatively low yield of these revenues on one hand, and to the rise of current expenditure as a result of the fact that it included the defence expenses which are considered to be comparatively high on the other hand.
2.5. Income & Profit Taxes:

Personal income tax is progressive. Exemptions and deductions depend on factors such as the number of dependents and the level of income. Therefore, they take into consideration the private situations of taxpayers and their ability to pay. Progressive tax may appear fair and appropriate because it is based on the ability-to-pay principle (equity) (Cullis and Jones 1992). However, this kind of tax is not efficient. In other words, there is an excess burden for imposing progressive tax. This is because it affects the choice of individuals between work and leisure (see Chapter 1, section 3 for further detail about efficiency and excess burden [tax distortion]).

Table 2.7 indicates that income & profit taxes rose more than 40 fold during 1973-1995. This is due to the relatively low proceeds at the beginning of the period. It is also due both to the expansion of the tax base and to the imposition of new taxes. Note also the increase in per capita GNP which represents economic development and reflects the individual's ability to pay taxes. Income & profit taxes have achieved a considerable decrease only during the period 1986-88 and 1991 (see Table 2.7 and Figure 2.4). This is attributed to the adoption of the "Cash Basis" by the Ministry of Finance instead

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13 To be acquainted with the legislation aspect of income tax and its development in Jordan, see Hazaimeh (1983). Income tax law No. 57 for the year 1985, and its modifications is the law which is valid now. For more details concerning the law and categories of different taxes see: Jordan Official Gazette, No.3343, 1985. Reference can also be made to tax categories in Saba & Co (1987). The modification approved by the cabinet on 20/12/1988 is considered to be the most important modification made on income tax in Jordan. The most important matter which was made in that modification was subjecting companies' profits to a fixed tax rate, which are the highest limits that were previously imposed on them, instead of stepping up taxes in a progressive way, and the decrease of ratio of exemption given to the rents accrued to the proprietors for renting them in the capital governorate and other areas in the Kingdom (see Jordan Official Gazette, No.3601, 1989). Income & profit tax proceeds were affected by all these modifications.

14 Cash Basis: according to this accounting basis, revenues include those actually received during the fiscal year, and expenses include those actually paid during that year whether these revenues or expenses belong to the same fiscal year or previous period or following period to that year.
of the "Accrual Basis"\textsuperscript{15} in the accounting systems since 1986. In addition to applying the new law of income tax in 1985 (this grants generous exemptions and deductions), further implication result. The decrease of income & profit tax proceeds during 1991 was due to the economic situation of Jordan and the region and its reflections on tax revenues in the aftermath the Gulf Crisis (August 1990) (Table 2.7). However, the growth rate of income & profit taxes during 1990 registered its highest level during the whole period amounting to 121.8\%. This was due to implementing the new modification of the tax law which aimed at generating more revenues as previously mentioned. The average growth rates of income & profit taxes registered 21.4\% during the period 1973-95.

The ratio of income & profit taxes to total tax revenues has averaged, during the same period, 15.0\% (see Table 2.7). This reflects the narrow tax base. The availability of the base is related to the economic structure. The administration of these taxes is a very difficult matter because employees work in small establishments. Accounting practices attaining minimal standards are essential in order to impose these taxes on firms. This is not available in Jordan in an adequate way for most establishments. These considerations have affected the ratio of income & profit tax proceeds to GNP at current factor prices (GNP minus net indirect taxes). This ratio averaged during the period 1973-95 about 3\% (see Table 2.7). This ratio is relatively low.

2.6. Customs Duties:-

Customs duties in Jordan are imposed (at different rates) on goods imported from abroad. This tax exempts basic commodities and government imports. In addition to low rates, sometimes full exemption is granted to the essential raw materials required for domestic industries. A high rate is imposed for luxury goods and goods which have local substitution alternatives. Therefore, customs duty proceeds depend both on the quantity

\textsuperscript{15} Accrual Basis: according to this approach, revenues are estimated on the basis of the accrual revenues due during the fiscal year, and expenses are estimated on the basis of the expenses payable during that year, regardless of the time when these revenues were received or will be received or the expenses were paid or will be paid.
<table>
<thead>
<tr>
<th>Year</th>
<th>Million JD</th>
<th>Growth Rate</th>
<th>% of Tax Revenues</th>
<th>Tax Burden</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>3.8000</td>
<td>18.7500</td>
<td>11.1111</td>
<td>1.3040</td>
</tr>
<tr>
<td>1974</td>
<td>5.4000</td>
<td>42.1053</td>
<td>12.3853</td>
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</tr>
<tr>
<td>1975</td>
<td>9.2000</td>
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<td>10.5499</td>
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<td>3.0600</td>
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<td>121.7899</td>
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<td>4.1856</td>
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</table>

This Table is entirely original. The sources of data are as follows:
- Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.

1. The tax burden is measured by dividing the proceeds of income and profit taxes by the GNP at current factor cost (GNP minus net indirect taxes).
Figure 2.3: The tax burden (TB) and the ratio of tax revenues to domestic revenues (RTRDOM) and to current expenditures (RTRCX).

Figure 2.4: The development of income & profit taxes (INT) and their ratio to total tax revenues (RINT).
of imported commodities\textsuperscript{16} subject to tax and the rates imposed on each commodity\textsuperscript{17}. These two factors are directly connected with import demand elasticity.

Customs duties in general and in Jordan in particular, aim to fulfil several goals. They aim, in addition to being a good source of public finance, at protecting domestic industries, and improving their economic viability. It is worth mentioning that it is important to eliminate the protection of domestic industries after a reasonable period of time in order to make sure that these industries became capable of producing good quality and adequate quantity at competitive prices. This is the "infant industries argument". Imposing customs duties aim also to restrict consumption of imports in order to reduce the trade deficit. They aim to maintain the foreign reserves position at a healthy level, in addition to participating in redistributing income as a consequence of imposing different rates according to the kind of commodities\textsuperscript{18}.

Customs duties in Jordan are of two kinds: specific and \textit{ad valorem}. Specific taxes are imposed as a certain amount levied on units of goods, whether that unit is weight, size, or length (Sloman 1995). However, \textit{ad valorem} taxes are imposed as a percentage of the goods' value (Griffiths and Wall 1995). This percentage may be a common one for all goods or it may vary depending on the nature of the commodity. Most of these taxes are imposed at different rates according to the commodity kind and the importer such as the government as shown earlier.

Table 2.8 shows that customs duty proceeds have a high relative importance in tax

\textsuperscript{16} Importing a number of some selected items of luxury goods was banned as of 6/11/1988 till the end of 1989. The most important of these goods are: cars, television sets, refrigerators, furniture and air conditioners (see Jordan Official Gazette, No.3582, 1988).

\textsuperscript{17} It is worth saying that there are other factors which play an outstanding part in determining customs duties yield. The exchange rate is considered to be the most important one of these factors, specially in \textit{ad valorem} taxes which are imposed at a certain ratio of the value of goods.

\textsuperscript{18} For further information about customs duties, their economic indications and effects, see: Al-Abdalla (1984).
### Table 2.8

**Customs Duties in Jordan during 1973-95**

(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Million JD</th>
<th>Growth Rate</th>
<th>% of Tax Revenues</th>
<th>% of Imports</th>
</tr>
</thead>
<tbody>
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<td>1974</td>
<td>16.8000</td>
<td>37.7049</td>
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<td>91.3876</td>
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<td>10.9437</td>
</tr>
<tr>
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<td>118.0000</td>
<td>-2.1559</td>
<td>38.6379</td>
<td>11.0363</td>
</tr>
<tr>
<td>1985</td>
<td>118.0000</td>
<td>0.00</td>
<td>37.1888</td>
<td>11.0023</td>
</tr>
<tr>
<td>1986</td>
<td>112.0000</td>
<td>-5.0847</td>
<td>36.2225</td>
<td>13.2107</td>
</tr>
<tr>
<td>1987</td>
<td>108.5000</td>
<td>-3.1250</td>
<td>33.3436</td>
<td>11.8891</td>
</tr>
<tr>
<td>1988</td>
<td>117.4000</td>
<td>8.2028</td>
<td>34.2574</td>
<td>11.5098</td>
</tr>
<tr>
<td>1989</td>
<td>103.9000</td>
<td>-11.4991</td>
<td>28.1877</td>
<td>8.4962</td>
</tr>
<tr>
<td>1990</td>
<td>116.7000</td>
<td>12.3195</td>
<td>23.7147</td>
<td>6.8059</td>
</tr>
<tr>
<td>1991</td>
<td>136.1000</td>
<td>16.6238</td>
<td>25.6550</td>
<td>7.7119</td>
</tr>
<tr>
<td>1992</td>
<td>286.4000</td>
<td>110.4335</td>
<td>35.1540</td>
<td>12.5011</td>
</tr>
<tr>
<td>1993</td>
<td>237.7000</td>
<td>-17.0042</td>
<td>29.0338</td>
<td>9.7024</td>
</tr>
<tr>
<td>1994</td>
<td>222.4000</td>
<td>-6.4367</td>
<td>25.1783</td>
<td>9.4333</td>
</tr>
<tr>
<td>1995</td>
<td>219.0000</td>
<td>-1.5288</td>
<td>21.8345</td>
<td>8.4615</td>
</tr>
</tbody>
</table>

*This Table is entirely original. The sources of data are:*

- Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
revenues. Their share was about one-third of tax revenues during 1973-95. This is the highest share among all taxes. This made customs duty proceeds occupy the top position in tax revenues in Jordan during 1973-93. Jordan is a country with a high degree of economic openness. This ensures a solid tax base. This also makes it easy to tax imports because they pass through ports. The developments of customs duties (Figure 2.5) are reflected in their ratio to the merchandise imports which represents the base of these duties. This ratio averaged 10.6% during the period 1973-95. It is clear that this gives a relative indication about the rate of customs duties (see Table 2.8).

2.7. General Sales Tax (Previously Called Consumption Tax [Excise Duties]):-

Consumption tax 19 is imposed on domestic products as a result of protecting them from foreign competitiveness 20 through prohibiting imports or increasing the rates of customs duties to high levels on imported commodities which have domestically-produced alternatives. This tax aims to compensate the treasury for customs duties that are not collected. It aims also to restrict total consumption (i.e. increase total savings) by increasing domestic prices. This tax was replaced in June 1994 by the General Sales Tax (GST). The GST was imposed on all imports, all manufactured goods, and some services. It expands the base to include several items which were previously exempted. The GST is imposed at a unified rate (10%) (see Chapter 7, sub-section 7.4.5 for more detail).

The proceeds of this tax have expanded during the whole period under study (1973-95) (Figure 2.5). Table 2.9 demonstrates that this tax had increased more than 35 fold by the end of the period as compared with 1973. This is due to the increase of domestic products which are taxable and to the rise in the rates of this tax on protected domestic 

19 Consumption tax law was issued on 6/11/1988. This law collected and organized the previously excise duties imposed on local production and made them one law to facilitate applying and dealing with them (see Jordan Official Gazette, No.3582, 1988).

20 Several imported goods that are similar to domestic products which are subjected to tax laws and excise duties regulations are subject to fees that equal to fees imposed on similar goods of domestic production. All of imported goods similar to locally produced goods were included under this fee as of 17/9/1988 (Jordan Official Gazette, No.3573. 1988).
### Table 2.9
General Sales Tax in Jordan during 1973-95

(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Million JD</th>
<th>Growth Rate</th>
<th>% of Tax Revenues</th>
<th>% of Manufacturing Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>7.8000</td>
<td>0.0000</td>
<td>22.8070</td>
<td>21.6667</td>
</tr>
<tr>
<td>1974</td>
<td>9.0000</td>
<td>15.3846</td>
<td>20.6422</td>
<td>33.5821</td>
</tr>
<tr>
<td>1975</td>
<td>10.7000</td>
<td>18.8889</td>
<td>18.3849</td>
<td>31.4706</td>
</tr>
<tr>
<td>1977</td>
<td>9.9000</td>
<td>8.7912</td>
<td>8.4041</td>
<td>15.7393</td>
</tr>
<tr>
<td>1978</td>
<td>7.0000</td>
<td>-29.2929</td>
<td>5.6772</td>
<td>10.0719</td>
</tr>
<tr>
<td>1979</td>
<td>10.6000</td>
<td>51.4286</td>
<td>7.0152</td>
<td>8.9151</td>
</tr>
<tr>
<td>1982</td>
<td>24.1000</td>
<td>42.6036</td>
<td>9.1600</td>
<td>11.3358</td>
</tr>
<tr>
<td>1983</td>
<td>35.3000</td>
<td>46.4730</td>
<td>12.0232</td>
<td>17.2785</td>
</tr>
<tr>
<td>1984</td>
<td>37.2000</td>
<td>5.3824</td>
<td>12.1807</td>
<td>15.0668</td>
</tr>
<tr>
<td>1985</td>
<td>45.8000</td>
<td>23.1183</td>
<td>14.4343</td>
<td>22.2980</td>
</tr>
<tr>
<td>1986</td>
<td>51.6000</td>
<td>12.6638</td>
<td>16.6882</td>
<td>26.6117</td>
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<tr>
<td>1987</td>
<td>58.3000</td>
<td>12.9845</td>
<td>17.9164</td>
<td>27.2940</td>
</tr>
<tr>
<td>1988</td>
<td>61.1000</td>
<td>4.8027</td>
<td>17.8290</td>
<td>31.0152</td>
</tr>
<tr>
<td>1989</td>
<td>77.5000</td>
<td>26.8412</td>
<td>21.0255</td>
<td>30.4280</td>
</tr>
<tr>
<td>1990</td>
<td>90.4000</td>
<td>16.6452</td>
<td>18.3702</td>
<td>26.1801</td>
</tr>
<tr>
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<td>96.1000</td>
<td>6.3053</td>
<td>18.1150</td>
<td>27.9604</td>
</tr>
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<td>138.1000</td>
<td>43.7045</td>
<td>16.9510</td>
<td>33.9897</td>
</tr>
<tr>
<td>1994</td>
<td>222.5000</td>
<td>27.6535</td>
<td>25.1896</td>
<td>45.1593</td>
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<td>1995</td>
<td>280.0000</td>
<td>25.8427</td>
<td>27.9163</td>
<td>53.5680</td>
</tr>
</tbody>
</table>

* This Table is entirely original. The sources of data are:-
  - Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
industries. Taxes were levied and/or rates raised to compensate for the fall in the customs duty revenues as a result of government policies in encouraging domestic industries.

The growth rate of this tax has averaged 18.4% during the whole period. Its proceeds formed an average of 15.5% of tax revenues (Table 2.9). The developments of the GST have been reflected in its ratio to the value added of the manufacturing sector in Jordan which represented its base. This ratio has averaged 24.7% during 1973-1995 (Table 2.9). It is obvious that this gives a relative indication about the rate of this tax.

2.8. Fees:-

Fees represent one of the main components of taxes in Jordan. They are imposed for services or utility offered by the government. There are some differences and common factors between fees and taxes, but, in general, dealing with fees as taxes in Jordan reflects the real situation. This is done for fees as well as licenses because both of them are a deliberate revenue-raising element. Some fees that are imposed in Jordan are: land registration fees, court fees, work permit fees and passport fees.

Table 2.10 shows that the proceeds of fees at the end of the period were about 38 times greater as compared with the revenues of 1973 (see Figure 2.6). This reflects the expansion of the fee base which has included economic activity and commercial

21 Consumption tax is also imposed on imported goods similar to domestic produced goods.

22 Work permit fees given to Arab and foreign workers who work in Jordan excluding those who are working in agricultural sector and nursing sector were increased as of 6/11/1988 as follows: JD 100 on Arab workers (while it was JD 30 in the past), JD 300 for non-Arab (while it was JD 150 in the past) (Jordan Official Gazette, No.3582, 1988).

### Table 2.10

Fees, Licenses, and Other Taxes in Jordan during 1973-95

(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fees Revenue Million</th>
<th>License Revenue Million</th>
<th>Other Taxes Revenue Million</th>
<th>Fees Revenue Million Growth Rate</th>
<th>License Revenue Million Growth Rate</th>
<th>Other Taxes Revenue Million Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>3.9</td>
<td>3.9</td>
<td>2.5</td>
<td>44.4</td>
<td>50.0</td>
<td>25.0</td>
</tr>
<tr>
<td>1974</td>
<td>4.1</td>
<td>5.0</td>
<td>3.3</td>
<td>5.1</td>
<td>28.2</td>
<td>32.0</td>
</tr>
<tr>
<td>1975</td>
<td>7.7</td>
<td>5.9</td>
<td>3.8</td>
<td>87.8</td>
<td>18.0</td>
<td>15.2</td>
</tr>
<tr>
<td>1976</td>
<td>12.6</td>
<td>10.6</td>
<td>7.3</td>
<td>63.6</td>
<td>79.7</td>
<td>92.1</td>
</tr>
<tr>
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<td>-34.1</td>
<td>23.6</td>
<td>21.9</td>
</tr>
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<td>1978</td>
<td>13.4</td>
<td>13.2</td>
<td>10.3</td>
<td>61.4</td>
<td>1.5</td>
<td>9.0</td>
</tr>
<tr>
<td>1979</td>
<td>17.1</td>
<td>15.6</td>
<td>13.4</td>
<td>27.6</td>
<td>17.3</td>
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<td>18.3</td>
<td>14.6</td>
<td>21.2</td>
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</tr>
<tr>
<td>1981</td>
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<td>-1.6</td>
<td>12.3</td>
</tr>
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<td>25.7</td>
<td>23.9</td>
<td>10.5</td>
<td>3.6</td>
<td>8.1</td>
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<tr>
<td>1984</td>
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<td>28.7</td>
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<td>14.6</td>
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<td>9.0</td>
</tr>
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<td>28.3</td>
<td>28.4</td>
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<td>-1.4</td>
<td>9.0</td>
</tr>
<tr>
<td>1986</td>
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<td>-7.0</td>
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<tr>
<td>1987</td>
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<td>21.3</td>
<td>10.0</td>
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<td>1990</td>
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</tr>
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<td>83.4</td>
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<td>76.5</td>
<td>16.0</td>
<td>25.6</td>
<td>21.8</td>
</tr>
<tr>
<td>1992</td>
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<td>70.5</td>
<td>105.3</td>
<td>25.8</td>
<td>54.6</td>
<td>37.6</td>
</tr>
<tr>
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<td>112.6</td>
<td>8.0</td>
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</tr>
<tr>
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<td>112.9</td>
<td>10.8</td>
<td>2.3</td>
<td>0.3</td>
</tr>
<tr>
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<td>147.3</td>
<td>69.2</td>
<td>131.5</td>
<td>17.4</td>
<td>9.1</td>
<td>16.5</td>
</tr>
</tbody>
</table>

* This Table is entirely original. The sources of data are:
  - Central Bank of Jordan, Department of Research and Studies, Annual Report, Different Issues.
  - The computed figures which appear in this Table are rounded down to one decimal point.

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Figure 2.5: The development of customs duties (CD) and General Sales Tax (GST).

Figure 2.6: The development of fees (F), licenses (L) and other taxes (OTHER).
transactions that are all subject to fees. The growth rate of fee proceeds during the whole period (1973-95) averaged 22.2%. The relative importance of them in tax revenues reached during the same period, on average, 13.4%.

2.9. Licenses:-

A license is a monetary amount collected by the government for granting a person a privilege. One example is the license to practice a certain career, occupation or profession. The system of licenses achieves a set of goals. In addition to the fact that these fees represent a financial source for the Treasury, licensing restricts some allowed activities and prohibits other illegal projects and activities. Therefore, it controls some activities for social or other considerations. Further examples of these licences are: driving licenses import licenses, and gun licenses (Malki 1978).

Table 2.10 shows that license collection revenues rose about 18 fold by 1995 as compared with 1973 (Figure 2.6). The expansion of the activities on which these licenses are imposed and the extension of licenses to new types of activity -the result of the government interference in economic activity for economic, social and developmental reasons- were the main causes of this rise. License proceeds during 1973-1995 registered an average growth rate of 17.0% yearly. They registered an average of 9.6% of tax revenues (Table 2.10).

2.10. Other Taxes:-

Other taxes include taxes on departure, property-sale, air travel tickets, hotels & restaurants sales, civil defence and Additional Tax. Additional Tax\textsuperscript{24} is imposed in

\textsuperscript{24} Additional tax was imposed pursuant to law No.28 for the year 1969. This law was subject to a number of modifications, and the last of them was the temporary law No.35 for the year 1988, according to which the above mentioned percentage was imposed. Furthermore, two new taxes were imposed according to this modified law: the first was the tax on sales bills of hotels and restaurants of four stars category and above. by 10% of the value of these bills; and the second was the tax on travel tickets at 3% of a ticket value. These two taxes were added to additional tax, but the law of general budget for the year 1989
Jordan at a rate of 1.0% on taxable imported commodities and at of 2.0% on tax-exempted imported goods. This tax was imposed to cope with the government's willingness to increase tax revenues and to restrict the trends of imports. Other taxes have witnessed a great quantitative progress during the period of study particularly during 1987-92 (Table 2.10 and Figure 2.6). This is the outcome of the development and amendment which occurred in the legislation. The changes affected the rates of some taxes and the imposition of new taxes to meet the requirements of economic situations. Independently of the policy, there was an expansion of the tax base. The proceeds of other taxes at the beginning of the period reached JD 2.5 million then started to grow until they reached a peak of JD 131.5 million at the end of the period under the study (1995). The growth rate of other taxes has averaged 21.5% during the period 1973-95. This is mainly the outcome of the growth in proceeds in 1976. When this extreme value is excluded, the average decreased to 18.3%. Table 2.10 indicates that these taxes participated during the whole period (1973-95) by 9.9% of total tax revenues. This shows that other taxes have low relative importance in total tax revenues.

2.11. Summary of the Chapter:-

This Chapter has reviewed the developments in the budget deficit as well as the development of tax revenues in Jordan during the period 1973-95. It has looked at their relative importance in domestic revenues and the ratio of these revenues to listed the yield of both separately among other taxes. Consequently, making the addition of these two taxes to other taxes, not to additional tax, a normal matter (Jordan Official Gazette, No. 3582, 1988).

25 These include departure tax. Departure tax of Jordanian citizens and Jordanian nationals residing in other Arab countries and foreigners was raised by different amounts as of 6/11/1988. This modification was in compliance with the policy of the government aiming at increasing the dependence on domestic revenues (see Jordan Official Gazette, No. 3582, 1988).
current public expenditures and total public expenditures. It has also reviewed tax revenue components and their relative importance in tax revenues as well as domestic revenues during the period under study. The period included seven years in the 1970s, and the 1980s and six years of the recent decade. The tax burden and tax base for the components of the tax revenues in Jordan were discussed. The developments of the tax system in Jordan were also reviewed briefly. The summary of this Chapter can be abstracted in the following:

1. Central government public expenditure averaged JD 820.8 million or 43.2% of the GDP during 1973-95. However, public revenues averaged JD 683.6 million or 34.6% of the GDP during the same period. This shows that the general budget has been suffering from a permanent deficit for the whole period under study. The ratio of this deficit (including foreign grants)\(^{26}\) to the GDP during the same period has averaged 8.6%. Meanwhile, when foreign grants were excluded from public revenues to establish actual revenues generated by the economy, this ratio\(^{27}\) jumped to more than double (19.2%) during the same period. The previous percentages clearly indicate that public revenues failed to cover public expenditures. Consequently, the budget deficit has been financed by external and internal borrowing. The average of the outstanding balance of external and internal loan ratios to the GDP during 1973-95 was 167.3% and 23.0% respectively. This reflects a heavy public debt service burden.

2. Tax revenues have registered, on average, 71.0% of domestic revenues during 1973-95. These revenues covered an average rate 58.9% of current expenditures and 38.6% of public expenditures in Jordan. Meanwhile,

\(^{26}\) Deficit (including foreign grants) is measured by the following: budget deficit = total government public expenditures - total public revenues. Total public revenues include foreign grants.

\(^{27}\) Deficit (excluding foreign grants) is measured by the following: budget deficit = total government public expenditures - total public revenues. Foreign grants are excluded from total public revenues.
domestic revenues have covered an average rate 83.0% and 54.4% of current and public expenditures during the same period respectively.

3. The tax burden in Jordan, measured by the ratio of tax revenues (excluding social security contributions) to the GNP at current factor cost (GNP minus net indirect taxes), is relatively stable. It started to increase after 1989 as a result of adopting the economic adjustment programme with the cooperation of the IMF. This programme aims at the reduction of external and internal imbalances gradually, particularly the budget deficit, by means of increasing tax revenues and controlling public expenditures. The average of this burden during the same period (1973-95) reached 19.2%.

4. Customs duties have got the first position with their relative importance in tax revenues. They formed on average around two-fifths of these revenues (36.6%) during the period 1973-95. It was followed by the proceeds of the GST which registered an average of 15.5% of total tax revenues. It was itself followed in the importance by income & profit taxes (15.0% of tax revenues), fees (13.4% of tax revenues), other taxes (9.9%) and finally licenses (9.6% of total tax revenues).

5. The relative importance of the components of tax revenues in Jordan for the period 1973-95 reflects the economic structure and the tax system. The economic structure reflects the availability of tax bases. Jordan, as shown earlier, is a country with a high degree of economic openness. Openness represents a good tax base for customs duties. This explains why the proceeds of customs duties rank first among the components of total tax revenues. Jordan is also a country with a small domestic production base. This affects adversely the domestic taxes on goods and services. The proceeds of income & profit taxes are relatively low. Two reasons lie behind this. First, Jordan is a country with a low median income. Second, the absence of satisfactory accounting practices in most small firms makes it difficult to impose profit taxes on these firms.
Chapter 3
Tax Revenues in the Developing Countries

3.1. Introduction:-

The governments of the developing countries resort, in an increasing rate, to borrowing from internal as well as external sources to execute their development plans because they have a shortage of available resources. This causes a great problem later represented by servicing their debts. This problem is reflected in much more reliance upon the financial resources generated from within the developing countries particularly through tax revenues.

This Chapter briefly reviews the general basic characteristics of the thirty-four developing countries which have been chosen to be the subject of the study. These attributes will be connected with the tax revenues proceeds. This Chapter also shows the tax revenues, their major components, their relative importance and the tax burden for the same sample of developing countries. Furthermore, it gives more details about the coverage of the study, source of data and data collection in a separate section. It considers why and whether the social security contributions and net indirect tax proceeds are and should be excluded from the tax burden.

The main aim of this Chapter is to introduce the basic elements for the following three chapters. Before going further, it is useful to formulate some general propositions about the attributes as well as the tax system of the developing countries in the study. These characteristics are directly related to the measuring of the relative taxable capacity of the whole economy as well as the measuring of the individual’s relative taxable capacity (Chapters 4 and 5). The developments of tax revenues and their components are also related directly to the arithmetic approach (Chapter 6).
The methodology of this Chapter was theoretical arguments supported by figures and statistics. The explanation of the statistics and figures will appear in the following three chapters when they are connected to the empirical results. Jordan will be given more attention because it is the main focus of this study. It is worth mentioning that all data, tables, figures, analysis and conclusions which appear in this Chapter are entirely original and are the researcher’s own work.

3.2. Coverage of the Study and Source of Data:-

This section looks at the developing countries which will be the subject of this Chapter and the following three. It also demonstrates the period of the study and more details about the variables and their descriptions, the process of data collection and the sources of data. This study uses, for the first time, pooled data which combine both cross-sectional and time series data for the developing countries to estimate the econometric models. The data were collected for a period of four years from 1986 until 1989. The study does not extend beyond 1989 (the last year data are available for the countries subject to the study). An average of four years for every variable is computed for this Chapter and Chapter 6 so as to decrease the impact of fluctuations such as natural disasters or unfavourable climatic conditions. However, pooled data are used in order to obtain better estimators for the econometric models adopted in Chapters 4 and 5.

The developing countries included in this study number thirty-four including Jordan. Several considerations have been taken in choosing the sample. These considerations are:

1- Political stability of the countries.
2- Distribution of the sample countries over different geographical regions.
3- Not including a massive tax burden or individual’s contribution to tax revenues (massive outlier).
4- Availability of data in regard to the studied period, particularly the last year.

Table 2 shows the thirty-four developing countries which are the subject of the study.
The initial sample of the developing countries numbers forty-eight. Most of the data are collected for all the initial sample. Fourteen developing countries among the initial sample are excluded for some or all of the above-mentioned considerations. Lebanon, Iraq and Iran are excluded owing to the unusual conditions prevailing in those countries. Israel is excluded since there is only one figure for two sectors (the mining and the manufacturing sectors). Several other developing countries are excluded (such as Guyana, Tanzania, Burkina Faso, Burma, Panama, Sri Lanka and Bangladesh) due to non-availability of data in regard to the studied period. Barbados, Botswana, and Singapore are excluded because of the high tax burden measured by the ratio of tax revenues to the GNP at current factor cost (GNP minus net indirect taxes) or to the number of population. This brings the sample number down to thirty-four developing countries.

The number of variables for which the raw data are collected for each year and for every country of the selected sample amounts to twenty. The current study has 34 developing countries and 20 variables. This is a list of the variables and their descriptions:

A: the value added of the agricultural sector.
N: the value added of the mining sector.
MAN: the value added of the manufacturing sector.
W: the value added of the wholesale & retail trade sector.
INDN: the proceeds from net indirect taxes.
GDP: the Gross Domestic Product at current market prices.
AE: the exchange rate at the end of period for each developing country’s local currency against the US $.
RF: the annual average exchange rate for each developing country’s local currency against the US $.
M2: the money supply (money plus quasi money).
X: the value of merchandise exports (Free On Board [FOB]).
M: the value of merchandise imports (Cost, Insurance and Freight [CIF]).
GNP: the Gross National Product at current market prices.
POP: the population number in each country.
TR: the proceeds from tax revenues.
INT: the proceeds from tax on income, profits & capital gains.
SO: the proceeds from the social security contributions.
WORP: the proceeds from taxes on payroll & work force and property taxes.
DOM: the proceeds from domestic taxes on goods and services.
EXT: the proceeds from taxes on international trade.
OTHER: the proceeds from the other taxes.

A simple calculation shows that the number of observations which are collected from different sources amounts to about 3000 observations. This figure rises to about 4000 observations when the excluded developing countries are taken into account. The data collection was done by hand and then all data were read on to the computer using the Microfit package which is available in the computer laboratory at the University of Surrey.

All data are obtained from publications issued by the International Monetary Fund (IMF) and the United Nations Organisation (UN). This has been done to secure a unified standard for the coverage of data for all the developing countries subject to study. The following variables: A, N, MAN, W, INDN and GDP are obtained for each country separately from the United Nations Organization Publication which is related to the national accounts of the world’s countries:-

- UN, National Accounts Statistics Yearbook: Main Aggregates and Detailed Tables, 1986-92 issues, Table (1.3) "Cost Component of the Gross Domestic Product" and Table (1.10) "Gross Domestic Product by Kind of Activity. in Current Prices".

The following variables: AE, RF, M2, X, M, GNP and POP are obtained for each country separately from:-

The rest of the variables which are represented by: TR, INT, SO, WORP, DOM, EXT, and OTHER are obtained for each country separately from:

- IMF, Government Finance Statistics Yearbook (GFS), 1987-95 issues, Table (A) "Revenue and Grants".

All the abbreviations are as mentioned before.

3.3. Exclusion of Social Security Contributions from Tax Revenues and Net Indirect Taxes from the GNP :-

This section is directed towards explaining why this study excluded social security contributions from tax revenues and also excluded net indirect tax proceeds from the GNP to measure the tax burden (TRA) of the developing countries in the current study. This matter will be the base for measuring the relative taxable capacity which appears in the following three chapters. This burden is measured by dividing total tax revenues (TR) (excluding social security contributions) in a certain year by GNP at current factor cost (excluding net indirect taxes) during the same year. The exclusion of social security contributions from the numerator of the tax burden identity is a common factor between this study and previous studies (see for examples Chelliah, Baas, and Kelly 1975, Sarojini 1992, Tait and Eichengreen 1978). However, this study, for the first time, excludes net indirect taxes from the

2 It is assumed in this study as well as all previous studies that the proceeds of tax revenues during a certain year are considered to be the tax revenues accrued during that year. This means that there is no lapse of time between the taxable event and the tax collection connected with that event. In other words, it is assumed that the accrual taxes are collected during the same year, knowing that there is a collection gap between the time the taxes are due and the time they are collected (Sandford 1992). The most important among these is tax on income, profits and capital gains. This has been done due to the low relative importance of such taxes and the high relative importance of taxes which have no collection gap between the time when the liability for that tax payment is created and the time when the tax payment is actually made (Tanzi 1977a). In addition to the difficulties which combine determining each year's proceeds separately according to this.
denominator of the tax burden identity used to estimate the relative taxable capacity for the developing countries. The reasons for the exclusion are given in the following two sub-sections.

3.3.1. Exclusion Social Security Contributions from Tax Revenues:-

The tax revenues of the developing countries include all taxes and fees according to the international classification followed in the Government Finance Statistics (GFS) issued by the International Monetary Fund. Social security contributions are excluded from tax revenues for several reasons:-

1- Firstly, there is no theoretical agreement whether these contributions may be considered as a type of tax or insurance instalment (Datta 1977). Contributions of the employers to social security represent a kind of tax, whether those employers bear the burden of these contributions or transfer their burden forward by raising product prices or backwards by paying lower salaries and wages to workers (Musgrave and Musgrave 1989). Meanwhile the contributions of workers themselves are considered to be insurance instalments for them. The purchase of insurance yields final satisfaction. Such a purchase is not a tax.

2- Secondly, there is much difficulty in separating the contributions of the employers and those of the employees in the social security systems that exist in the developing countries under study.

3- Thirdly, there is no satisfactory way of allowing for the difference between the social security system in a country and that in another in regard to the stage of development it has reached. The length of the period a country applies this system is very important (Messere and Owens 1985). Net contributions (contribution minus payments) are very high (no pension payments) during the early period of implementing the social security system. Then, they (net contributions) decrease gradually over time.
4- Fourthly, there is a great difficulty in isolating the contribution of the private sector in the social security from the contribution of the public sector (Lotz and Morss 1969).

5- Finally, there are no data on the net contributions in the social security which is represented by the contributions minus pension payments for all the developing countries in question (Chelliah 1971, IMF, Government Finance Statistics Yearbook [GFS], 1995). The current study used the data of social security contributions for the developing countries in the sample. These data are available from the IMF publications. However, the data for pension payments for the same sample are not available from the same sources. IMF data must be used to have a common standard of comparison.

All of the above-mentioned reasons can be included within one framework which is the non-availability of sufficient data for all of the countries that are known to have social security systems (Abu-Hammour 1989, Tait and Eichengreen 1978).

3.3.2. Exclusion of Net Indirect Taxes from the GNP:-

The intuition behind excluding net indirect taxes from the GNP is that significant measurement error have obtained in the calculations of previous studies. This results from mis-specification of the tax burden and leads to substantial measurement bias in comparisons over time and a cross countries. These studies adopt Gross National Product (GNP) at current market prices which includes the proceeds of indirect taxes. Consequently, this process reduces the tax burden. The more the net indirect taxes included in the GNP, the less the tax burden will appear. In other words, the actual tax burden is measured by the ratio of total tax revenues to the tax base. This base should not include the proceeds of indirect taxes. Including indirect taxes in the base (GNP) therefore leads to the above mentioned error. Thus, the exclusion of net indirect taxes by replacing the GNP at current market prices by the GNP at current factor costs is essential to compute the actual tax burden.
To show how the inclusion of net indirect taxes in the GNP leads to the above-mentioned error in calculating the tax burden, it will be helpful to take the following hypothetical example. It is assumed that there are two countries A and B which have the same tax revenue proceeds and GNP, but they differ in their net indirect taxes. Previous studies calculate the tax burden by dividing the TR over the GNP (including the proceeds of net indirect taxes). Therefore, the same tax burden for these two countries is obtained. However, the method which has been adopted in the current study gives a different tax burden for the same two countries by excluding the proceeds of net indirect taxes from the GNP which represents the denominator of the tax burden identity. This reflects the real tax burden for each. The difference between this burden depends on net indirect tax proceeds. In other words, the more the net indirect tax proceeds are included in the GNP, the higher the tax burden that can be obtained. This example can be summarised in Table 3.1. This Table was computed by the author to illustrate the argument in this thesis.

Table 3.1
Tax Burden Comparison
(Hypothetical Example)

<table>
<thead>
<tr>
<th></th>
<th>Country</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Total Tax Revenues (TR)</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Gross National Product (GNP)</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Net Indirect Tax Proceeds</td>
<td>250</td>
<td>50</td>
</tr>
<tr>
<td>Tax Burden (as computed by previous studies)</td>
<td>30.0%</td>
<td>30.0%</td>
</tr>
<tr>
<td>Tax Burden (as computed by this study)</td>
<td>40.0%</td>
<td>31.6%</td>
</tr>
</tbody>
</table>

3.4. The Economic Structure of the Developing Countries:

This section reviews the main attributes of the developing countries in this study. These characteristics are directly related to the approach of this work. It is worth
saying that there is a relationship between each attribute and tax revenues. Each of these relationships will be shown in this section supported by figures and graphs. These results will also be connected with the theoretical framework and the empirical results of the relevant previous studies which were mentioned in Chapter 1. These relationships will be tested empirically by computing the simple correlation between each and tax revenues. This is done in Chapter 4. These attributes are represented by the degree of both economic openness and monetisation as well as the share of four sectors in the GDP of these countries.

The Gross Product whether National or Domestic is considered as the comprehensive base for the tax revenues in the developing countries. As a result of the direct relationship between the tax revenues on one hand and the Gross Product and other major economic indicators on the other, the composition of the Gross Domestic Product (GDP) and the degree of both economic openness and monetisation will be discussed in this section in more detail.

Table 3.2 shows the most important characteristics which concern the composition of the GDP and some other major economic indicators for the developing countries under study during the period 1986-89. These attributes express the economic structure of the developing countries in the study. These characteristics are closely related to tax revenue proceeds. They are the subject of the following three chapters which measure relative taxable capacity. This Table shows that the developing countries are characterised by the high relative importance of the agricultural sector in the GDP. The average importance of the agricultural sector for the developing countries selected for study during the period 1986-89 amounted to 19.2%.

Argentina and Nepal respectively demonstrate the minimum and the maximum relative importance of the agricultural sector in the GDP during the period (see Table 3.2). It is worth mentioning that the share of the agricultural sector in the GDP in Jordan was less than one-third of the average share for the developing countries during the same period (see Table 3.2). This fact will be connected to the empirical results of the next Chapter.
As a result of ordering the developing countries in an ascending order according to their tax burden during the period, Table 3.2 shows that the countries which have a relatively high tax burden are characterised by low relative importance of the agricultural sector in the GDP. The proposition can be reversed: the developing countries which are characterised by a high relative importance of the agriculture are characterised by a low level of the tax burden (see Figure 3.1). This means that there is an inverse relationship between the tax burden in the developing countries and the share of the agricultural sector in the GDP.

This negative relationship can be seen clearly in the simple correlation matrix for all the variables of the first approach. The matrix will appear in Chapter 4 of this study (see Table 4.1 in Chapter 4). The previous inverse relationship may be attributed to the governments of the developing countries which have no willingness to impose taxes on this sector. Note also the difficulty of collecting these taxes if they were imposed as well as the inability of the farmers to pay taxes because of their low level of earned income from this sector. This theoretical relationship which is consistent with the practical one, is already mentioned in Chapter 1 (section 9).

The developing countries are also distinguished by the low level of the mining sector's relative importance in the GDP. The average importance of this sector reached 10.8% during the period 1986-89. The minimum and the maximum relative importance of the mining sector in the GDP during the same period are occupied by Argentina and Ghana respectively (see Table 3.2). It is clear that the share of the mining sector in the GDP in Jordan is lower than half of the average share of this sector in the developing countries during the same period (see Table 3.2).

As a trend, there is a positive relationship between the relative importance of the mining sector and the tax burden in the developing countries under study. This is due to the ease of imposing taxes on this sector and its ability to shoulder the burden as

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3 Tax burden is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same period.
### Table 3.2

Some Selected Economic Indicators for the Developing Countries during the Period 1986-89

(Percentages)

<table>
<thead>
<tr>
<th>Country</th>
<th>Value Added Ratio to the GDP</th>
<th>The Degree of Economic Monetisation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agriculture Sector</td>
<td>Mining Sector</td>
</tr>
<tr>
<td>1. Paraguay</td>
<td>31.5602</td>
<td>11.2294</td>
</tr>
<tr>
<td>4. Ghana</td>
<td>44.3812</td>
<td>22.7634</td>
</tr>
<tr>
<td>8. India</td>
<td>30.8431</td>
<td>11.4505</td>
</tr>
<tr>
<td>13. Turkey</td>
<td>15.2332</td>
<td>8.3722</td>
</tr>
<tr>
<td>20. Thailand</td>
<td>15.9607</td>
<td>7.0874</td>
</tr>
<tr>
<td>21. Cyprus</td>
<td>7.2416</td>
<td>3.3460</td>
</tr>
<tr>
<td></td>
<td>College</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>College</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Liberia</td>
<td>34.9430</td>
<td>17.5033</td>
</tr>
<tr>
<td>29. Fiji</td>
<td>18.9819</td>
<td>9.2388</td>
</tr>
<tr>
<td>30. Zambia</td>
<td>13.3324</td>
<td>17.3566</td>
</tr>
<tr>
<td>32. Mauritius</td>
<td>11.6762</td>
<td>3.5794</td>
</tr>
<tr>
<td>34. Peru</td>
<td>9.3534</td>
<td>15.3075</td>
</tr>
</tbody>
</table>

- This Table is entirely original.
- The sources of data are as given in section 2 of this Chapter.
- The descriptions and computations of the figures which appear in this Table are as shown in section 3 of Chapter 4.
- The developing countries are sorted in an ascending order according to their tax burden during the same period.
- The degree of economic openness is measured by the ratio of the merchandise exports plus imports to the GNP.
- The degree of monetisation is measured by the ratio of the money supply (money plus quasi money \([M2]\)) to the GNP.
well as the monetary surpluses realised in this sector which can be deducted by taxes (see Table 3.1 and Figure 3.1). The theoretical relationship which is in line with the empirical one was already explained in detail in Chapter 1 (section 9). The simple correlation matrix for all the variables in the first approach to measuring the relative taxable capacity for the whole economy will appear in Chapter 4. It confirms this positive relationship (see Table 4.1 in Chapter 4).

On the other hand, the average share of the manufacturing sector in the GDP for the developing countries reached 18.0% during the same period (1986-89). The maximum and the minimum relative importance of this sector in the GDP during the same period are occupied by Korea and Nepal respectively (see Table 3.2). It is worth saying that the share of the manufacturing sector in the GDP in Jordan is lower than the average share of this sector in the developing countries sampled during the period under study (9.7%) (see Table 3.2).

As a trend, there is an inverse relationship between the tax burden and the relative importance of this sector. This relationship seems to be very clear when having a look at Figure 3.2 or looking at Table 4.1 in Chapter 4 which shows the simple correlation between these two variables. This relationship, which is consistent with the theoretical framework, is due to the economic policies which have been adopted in the developing countries to encourage the industrial sector by granting it generous exemptions (further explanations are given in Chapter 1, section 9).

The average share of the GDP from the wholesale & retail trade sector for the developing countries under study during the period 1986-89 is not far from that of the manufacturing sector. This average amounted to 16.7%. Nepal and El Salvador occupied the lowest and the highest values among the thirty-four developing countries respectively (see Table 3.2). It is worth mentioning that the relative importance of this sector in Jordan has gone below the prevailing average in the developing countries during the same period (11.2%) (see Table 3.2).

On the other hand, we observe that there is an inverse relationship between the
average share of this sector in the GDP and the prevailing tax burden in the developing countries under study. This relationship becomes very clear when Figure 3.2 is examined. This relationship which was shown theoretically in Chapter 1, section 9, will be proved empirically by computing the simple correlation between these two variables as shown in Table 4.1 of Chapter 4.

The high degree of economic openness is considered to be one of the important characteristics of the developing countries. This degree is measured by the ratio of the merchandise exports plus imports to the GNP at current market prices. There are several reasons behind measuring openness by this identity. All these were mentioned previously in Chapter 1 (see sub-section 9.3). It amounted during the period 1986-89 to 44.6%. The maximum value is occupied by Malaysia (see Table 3.2). The degree of economic openness in Jordan has registered a ratio above the prevailing average in the developing countries during the same period (65.0%) (see Table 3.2). This will be given further explanation in the following three chapters. Figure 3.3 shows that there is a positive relationship between the tax burden and the degree of economic openness. This will be confirmed by calculating the simple correlation between these two variables in Chapter 4 because it is directly related to its subject. Furthermore, it is worth saying that this relationship is consistent with the theoretical framework which was mentioned in Chapter 1.

The degree of monetisation, measured by the ratio of the money supply (money plus quasi money [M2]) to the GNP, is considered to be relatively low in the developing countries. Further explanations were given in the literature review in Chapter 1. The average of this importance for the developing countries under study during the period 1986-89 amounted to 42.6%. It is worth mentioning that Jordan occupied the highest figure of the relative importance of the degree of monetisation.

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4 The degree of monetisation in the economy is measured by the ratio of the money supply (money plus quasi money [M2]) to the GNP at current market prices. It is also known as the money multiplier. Besides it represents the result of one over the velocity of money. The degree of monetisation is also measured by the ratio of the money supply (M2) to the population as will be seen in Chapter 5.
Figure 3.1: The average of the tax burden (TRA) and the share of each of the agriculture (AA) and the mining (NA) sectors in the GDP for the developing countries during the period 1986-89.

Figure 3.2: The average of the tax burden (TRA) and the share of each of the manufacturing (MANA) and the wholesale & retail trade (WA) sectors in the GDP for the developing countries during the period 1986-89.
Figure 3.3: The average of the tax burden (TRA) and the degree of both the economic openness (FA) and monetisation (M2A) for the developing countries during the period 1986-89.
among the thirty-four developing countries during the same period (125.9%). This will be given more attention and explanation in the following two chapters because it is directly related to their subject.

As a result of ranking the developing countries in an ascending order according to the prevailing tax burden in these countries during the period under study, and as a trend over time, we see that the relationship between the degree of monetisation and the tax burden in the developing countries is positive (see Table 3.2 and Figure 3.3). The theoretical relationship was already considered in detail in Chapter 1 and is consistent with this context.

Consequently, it is observed that all these relationships are consistent with the theoretical framework as well as the earlier studies which were mentioned in Chapter 1 (sections 9, 10 and 11). This assures that the level of the tax burden in the developing countries is directly related to the composition of the GDP and its sectoral distribution, and to the degree of monetisation and economic openness in each. In Chapter 2 (section 2) it is said that the Jordanian economy has limited natural resources, scarce arable land, a small domestic production base, and is strongly service-oriented. In this section all these characteristics are supported by figures about each.

### 3.5. Tax Burden in the Developing Countries:

This section gives special attention to the tax burden of the thirty-four developing countries. This burden represents the base for measuring the relative taxable capacity of the whole economy which will be discussed in Chapter 4. The developing countries are characterised by a low level of tax deduction out of the GNP compared with the developed countries. This is due to the low level of per capita GNP which makes the process of imposing a high tax rate very difficult. Most of income is spent on buying basic and essential goods. Consequently, the difficulty of imposing taxes in the developing countries is very obvious.
Table 3.3 was calculated for this thesis in order to establish the tax position for the sample. The first column shows the tax burden of the developing countries under study for the period 1986-89\(^5\). This burden is measured, in this study, by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same period. The reasons behind excluding social security contributions as well as excluding net indirect taxes were explained previously in this Chapter (section 3). The developing countries are arranged in an ascending order according to their tax burden during the same period. Therefore, the location of any country among the developing countries under study has a special importance represented by establishing the level of the tax burden in that country compared with those of the other countries. Table 3.3 also shows that the tax burden\(^6\) of the developing countries during the period 1986-89 has registered, on average, 17.6%. Paraguay and Peru occupied the lowest and the highest values of this burden respectively (see Table 3.3, first and last row).

The tax burden depends on both the denominator (GNP) and the numerator (tax revenue) of the tax burden identity. It is possible that the GNP growth rate accompanied by the same growth in tax revenue yields causes an increase in the tax burden.

\(^5\) The Gross Product which measures the level of economic activities during a certain period of time, usually a year, is considered to be the most comprehensive tax base. It affects and effects the tax revenues. When the tax revenues are related to the GNP at current factor cost (GNP minus net indirect taxes), the tax burden or tax ratio is obtained.

The methods of measuring tax burden are numerous, but most of the studies that have been carried out in this area are of one mind that the most expressive and widely known standard is the relating of tax revenues to the GNP or the GDP at current market prices.

The studies issued by the International Monetary Fund (IMF) call the tax burden which is measured by the ratio of the tax revenues to the GNP at current market prices, tax ratio. For more details about the tax base and tax burden see: Griffiths & Wall 1995, Abdel majeed 1983, and Chelliah 1971, Datta 1977.

\(^6\) The tax burden for each kind of taxes can be obtained by multiplying the tax burden in any country by the relative importance of any kind, but this is not common. Therefore, the tax burden of total tax revenues is adopted in this Chapter.
proceeds of both variables but that the tax burden remains unchanged. The rise of the tax burden during any period can represent the growth of tax revenues at a rate that exceeds the growth rate of the GNP or tax revenues remaining unchanged while there is a fall in the GNP or a growth in tax revenues accompanied by a decline in the GNP or a fall in both tax take and GNP where the fall is greater for the latter than for the former. The decrease of the tax burden during any period indicates that the growth rate of the GNP has exceeded that of tax revenue or that tax revenue has declined whereas the GNP keeps its same level, or that there has been a decline in tax revenues accompanied by a growth in the GNP or there has been a fall in both variables where the fall was higher for the former than for the latter.

It is worth mentioning that Jordan has a tax burden which is very close to the prevailing average in the group of the developing countries during the same period (17.2%) (see Table 3.3). It ranks 19th among the thirty-four developing countries included in the study. This means that Jordan divided these countries into about two equal groups and occupied a position in the middle of these countries. Table 3.3 shows the tax burden level after the arrangement of the sample countries in an ascending order according to their tax burden. These developments are related to tax effort because the tax burden represents the numerator of this statement while the relative taxable capacity of the whole economy represents the denominator of this statement. Tax effort will be measured for the Jordanian economy during the period subject to the study in the next Chapter.

3.6. Tax Revenues and their Major Components in the Developing Countries:

This section reviews the relative importance of the tax revenue components of the developing countries under study. The components and their importance will be connected later on with the empirical results of Chapter 6. It also classifies the tax revenues of the sample countries into four major components. One of the other characteristics of tax systems of the developing countries is that domestic taxes on

7 The definition of tax was previously mentioned in Chapter 1 (section 3).
goods & services as well as taxes on international trade form the main part of tax revenues. This is due to the following two reasons: firstly, the high degree of economic openness of these countries (as already explained); secondly, the ease of administrating, collecting, and amending this type of tax.

The developing countries which have a high degree of economic openness are exposed to the effects of the developments of international trade. This may cause and make the direct effects of the external shocks upon the financial sector an unavoidable matter. Accordingly, reaction increases between the fiscal developments and the developments of the external sector. This leads some economists to suggest a fiscal approach to the balance of payments (BOP). This approach says that the main reason for external imbalances is attributed to fiscal disequilibria (see sections 9 and 10 of Chapter 1 for more explanation) (Dornbusch and Fischer 1994, Hajeer 1966, Tanzi 1987).

The reason for the high percentage of customs duties and consumption tax in the tax revenues in the developing countries is due to the low level of per capita GNP, the domination of the agricultural sector (of little use as a base for imposing taxes), the high level of the marginal propensity to consume (MPC), the high level of the marginal propensity to import. Trade and consumption represent a good base for taxes. Note also the inefficient tax administration and the shortage of the technical qualifications for imposing and collecting other taxes. These taxes (taxes on international trade and domestic taxes on goods & services) can be easily imposed and collected.

Table 3.3 shows the relative importance for each major kind of tax during the period 1986-89 for the developing countries under study. This Table has been

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8 This Chapter divided tax revenues into four major components: tax on income, profits, & capital gains, domestic taxes on goods & services, taxes on international trade, and other taxes. It is clear that the first kind can be classified direct taxes, while the second and the third are indirect taxes, however, the last kind can not be classified because most of it is non-classified taxes. This classification is based on several standards which were mentioned in detail in Chapter 1 (section 3).
obtained by using different commands available in the Microfit package as shown in Appendix A. The classification of the International Monetary Fund (IMF) for taxes and their components is adopted in this Chapter. This has been done because it is very clear and uses a unified standard for all countries (Chelliah, Baas, and Kelly 1975). Looking at this Table gives a clear view about the components of tax revenue in the developing countries.

Table 3.3 shows that the average of the relative importance of tax on income, profits & capital gains in tax revenues amounted to 32.3% during the same period (1986-89). Argentina and Venezuela occupy the minimum and the maximum relative position with respect to these components of tax during the same period respectively (see Table 3.3). It is worth saying that the share of this tax in total tax revenues in Jordan during the same period was less than half of the average of that share among the developing countries during the same period (see Table 3.3). This fact will later be linked to the empirical results of Chapter 6 because it is directly related to the analysis attempted in that Chapter.

The relative importance of domestic taxes on goods & services in tax revenues during the same period (1986-89) amounted on average to 34.3%. This was the highest single revenue-taker among the four major tax-sources i.e. tax on income, profits & capital gains, domestic taxes on goods & services, taxes on international trade, and other taxes. The minimum and the maximum relative importance of the domestic taxes on goods & services during the same period were occupied by Venezuela and Mexico respectively (see Table 3.3). This was caused by the tax system and the tax base (the share of the manufacturing sector in the GDP [21.3% and 25.6% respectively]) (see Table 3.2). This sector represents the base for domestic taxes on goods. The share of this kind of tax revenues in Jordan during the same period was less than the average of that share among the developing countries during the same period (see Table 3.3). This fact is very important. It is directly related to the empirical results of measuring the relative taxable capacity and the tax effort for the four major components of tax revenues (Chapter 6).
### Table 3.3

The Relative Importance of the Tax Revenues’ Components for the Developing Countries during the Period 1986-89

(Percentages)

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax on Domestic Taxes on Other</th>
<th>Tax on Domestic</th>
<th>Taxes on Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Income, Profits &amp; Capital</td>
<td>Taxes on Profits</td>
<td>Goods &amp; Services</td>
</tr>
<tr>
<td></td>
<td>Gains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.Paraguay</td>
<td>8.1554</td>
<td>16.6818</td>
<td>32.6771</td>
</tr>
<tr>
<td>3.Brazil</td>
<td>8.9940</td>
<td>43.3041</td>
<td>41.7834</td>
</tr>
<tr>
<td>5.Syria</td>
<td>11.0363</td>
<td>57.3676</td>
<td>11.6183</td>
</tr>
<tr>
<td>6.El Salvador</td>
<td>11.7274</td>
<td>22.4056</td>
<td>42.8346</td>
</tr>
<tr>
<td>7.Colombia</td>
<td>11.9973</td>
<td>32.7183</td>
<td>35.1152</td>
</tr>
<tr>
<td>8.India</td>
<td>13.1106</td>
<td>16.7057</td>
<td>40.8231</td>
</tr>
<tr>
<td>10.Ecuador</td>
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<td>47.5147</td>
<td>22.2881</td>
</tr>
<tr>
<td>13.Turkey</td>
<td>15.3438</td>
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<td>14.Korea</td>
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<td>43.8189</td>
</tr>
<tr>
<td>15.Pakistan</td>
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<td>13.3955</td>
<td>44.5008</td>
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<td>17.Venezuela</td>
<td>16.2029</td>
<td>70.3124</td>
<td>9.4255</td>
</tr>
<tr>
<td>20.Thailand</td>
<td>17.4648</td>
<td>21.8436</td>
<td>52.3517</td>
</tr>
<tr>
<td>21.Cyprus</td>
<td>17.6119</td>
<td>32.6881</td>
<td>28.7776</td>
</tr>
<tr>
<td>22.Mexico</td>
<td>17.6636</td>
<td>29.0607</td>
<td>65.3093</td>
</tr>
<tr>
<td>23.Egypt</td>
<td>17.7074</td>
<td>32.1238</td>
<td>23.7455</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>27. Chile</td>
<td>22.6848</td>
<td>21.1495</td>
<td>56.2971</td>
</tr>
<tr>
<td>29. Fiji</td>
<td>23.3264</td>
<td>46.9226</td>
<td>16.6262</td>
</tr>
<tr>
<td>30. Zambia</td>
<td>23.4780</td>
<td>34.6821</td>
<td>38.9093</td>
</tr>
<tr>
<td>32. Mauritius</td>
<td>23.5882</td>
<td>12.3841</td>
<td>22.5023</td>
</tr>
<tr>
<td>33. Tunisia</td>
<td>23.9996</td>
<td>20.3559</td>
<td>32.2159</td>
</tr>
<tr>
<td>34. Peru</td>
<td>25.7291</td>
<td>20.4339</td>
<td>53.3602</td>
</tr>
</tbody>
</table>

1-The tax burden during the period under study is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same period.

-This Table is entirely original.

-The sources of data are as given in section 2 of this Chapter.

-The descriptions and computations of the figures which appear in this Table are as shown in Appendix A.

-The developing countries are sorted in an ascending order according to their tax burden during the same period.
Regarding taxes on international trade during the period 1986-89 for the thirty-four developing countries under study, the average share of the taxes (customs duties, import licences, and others) in total tax revenues has registered 24.2%. Jordan has recorded a relative importance for these taxes in tax revenues very close to about double the prevailing average in the group of developing countries during the period under study (47.2%) (see Table 3.3). It is worth saying that Mauritius occupied the highest figure. This was due to the high degree of economic openness (106%) (measured by the ratio of commodity exports plus imports to the GNP at current market prices) (see Table 3.2). Openness is the base for taxes on international trade. Mexico occupied the lowest share of taxes on international trade in total tax revenues (see Table 3.3). This was due to the low degree of economic openness (27%).

The average share in tax revenues of other taxes (taxes on payroll & work force, property taxes, and other non-classified taxes) constituted the remaining percentage (9.2%) during the same period (1986-89). Argentina and Mexico occupied the maximum and the minimum figures respectively among the thirty-four developing countries under the study (see Table 3.3). It is worth saying that the share of these taxes in total tax revenues in Jordan in the same period was higher than the average of that share among the developing countries during the same period (see Table 3.3). This fact again will be connected to the empirical results of Chapter 6 because it is directly related to its subject.

Consequently, it is observed that the tax burden and the relative importance of each tax -i.e. of the taxes on income, profits & capital gains, and domestically-produced goods & services- in tax revenues in Jordan are less than the prevailing average in the developing countries during the same period (1986-89). Meanwhile, the importance of taxes on international trade, and other taxes in tax revenues in Jordan, exceeded those of the developing countries' averages. These two facts are very important. They will be given more explanation when the empirical results of the relative taxable capacity and the tax effort for the major tax revenues' components are discussed in Chapter 6. This shows that there is an imbalance in the tax system of
Jordan by exploiting taxes on international trade more than domestic taxes on goods & services. The government claims that reducing imported goods, protecting domestic industry and encouraging domestic production are the main reasons behind this.

3.7. Summary of the Chapter:-

This chapter gave more details of the coverage of the study, source of data and data collection. It also explained why social security contributions and net indirect tax proceeds are excluded from the tax burden identity. Furthermore, it reviewed the tax revenues in the developing countries under study and the main characteristics of these countries. The relationship and connection of tax revenue proceeds with these characteristics have also been shown. The Chapter also reviewed the relative importance of the major components of tax revenues and the tax burden in the developing countries. Through what has been dealt with in this Chapter, we can list the following conclusions:-

1. The economies of the developing countries have common structural characteristics such as the domination of the agricultural sector in total production, the weakness of the mining sector, the high degree of economic openness, the relatively low degree of monetisation as well as a low level of per capita income and a high rate of population growth.

The average share of the following sectors in the GDP during the period 1986-89 for the thirty-four developing countries which are the subject of this study amounted to about one-fifth for the agricultural sector, one-fifth for the manufacturing sector, one-tenth for the mining sector, 16.7% for the wholesale & retail trade sector. Furthermore, the average of the degree of economic openness measured by the ratio of the merchandise exports plus imports to the GNP at current market prices during the same period for the same developing countries amounted to about 45%. In addition, the average of the degree of monetisation which is measured by the ratio of the money supply (money plus quasi money [M2]) to the GNP at current market prices
during the same period amounted to about two-fifths.

The relationship between the share of each sector -agriculture, manufacturing, wholesale & retail trade- in the GDP and the tax burden is negative. On the other hand, the relationship between the tax burden and the share of the mining sector in the GDP or the degree of monetisation or the degree of economic openness is positive in each case. All these relationships are consistent with the theoretical framework which was previously considered in the literature review Chapter (Chapter 1, section 9). This ensures that the level of the tax burden in the developing countries is directly related to the composition of the GDP and its sectoral distribution as well as the degree of economic openness and monetisation.

It is worth mentioning that the share of the four sectors (agriculture, mining, manufacturing, and wholesale & retail trade) in the GDP in Jordan during the period is less than the prevailing average of these shares among the developing countries in the sample. However, the degree of economic openness and of monetisation in Jordan during the same period is higher in both cases than the average of those of the developing countries under study.

2. The tax burden measured by the ratio of total tax revenues to the GNP at current factor cost (GNP minus net indirect taxes), amounted, on average, to 17.6%. Jordan has registered a tax burden below the prevailing average in the group of the developing countries during the period under study. It also ranks in the middle of the thirty-four developing countries subject to the study reflecting the relatively mild tax burden.

3. Taxes on income, profits & capital gains constituted about one-third of tax revenues in the developing countries under study. The reason for the low relative importance of these taxes in total tax revenues refers to the low level of per capita income, the smallness of the industrial sector, the growth of the handcraft works, the domination of the agricultural sector over the economies
of the developing countries. This makes the process of imposing taxes on these sectors and activities very difficult. Note also the inefficiency of the administration as well as the low earned income of the people who are working in these sectors. Regarding this tax in Jordan, it registered a relative importance that was less than half of the prevailing average in the developing countries during the era under study.

4. There is a predominance of domestic taxes on goods & services in total tax revenues in the thirty-four developing countries under study. The relative importance of these taxes within the tax revenues formed about a bit more than one-third during the period 1986-89, ranking first as a single source of tax revenues. Decreasing trade balance deficit, rationalising consumption and supporting Treasury resources are the most important reasons for this result. Jordan recorded a relative importance for domestic taxes on goods & services very close to two-thirds of the prevailing average in the developing countries during the era under study.

5. Taxes on international trade rank third in total revenue from taxation. Duties have averaged about one-fourth of total taxation during the period 1986-89 for the same developing countries subject to the study. This is due to the ease of both imposing and collecting them. This also reflects the high degree of economic openness which is measured by the ratio of the merchandise exports plus imports to the GNP in the developing countries and the high marginal propensity to consume (MPC) in the developing countries. The importance of customs duties in Jordan is very close to double the prevailing average in the group of the developing countries during the same period. This shows that Jordan focuses on taxes on international trade a part from generating revenues, to reduce imported goods and to protect domestic industry. Meanwhile, it gives less attention to domestic taxes on goods & services to encourage domestic production.

6. The share of other taxes in total tax revenues ranks last. It amounted, on
average, to about one-tenth during 1986-89 for the thirty-four developing countries. This share in Jordan exceeded the prevailing average in the group of the developing countries during the same period.
Chapter 4
Measuring the Whole Economy’s Relative Taxable Capacity for Developing Countries including Jordan (An Econometric Approach)

4.1. Introduction:

Relative taxable capacity and the tax effort which were previously defined in Chapter 1, occupy an outstanding position in the developing countries owing to the comparatively interventionist role played by the government in the economy. The concepts relate to the financial resources needed for state involvement and for increasing public-sector expenditure. Jordan, particularly its government, like other developing countries, has lacked and is still lacking financial resources to cover its march towards economic development. The compromise between the needs of the government for financial resources to cover its public expenditure and the ability of the citizen to pay taxes and bear the burdens is a topic in political economy and not simply in economics alone.

The relative taxable capacity and tax effort of the Jordanian economy will be estimated to discover where Jordan stands among developing countries in respect of tax performance. This would give both the government and the citizen an indication that could be a great help when drawing up fiscal policy for the future. The main aim of this Chapter is to estimate relative taxable capacity and the tax effort of the Jordanian economy, as one of the developing countries under study. The approach that will be used aims at developing an econometric model. Various methods which are applicable to the developing countries will be used in carrying out the study during the period 1986-89.
This Chapter is divided into several sections. The first three sections give details of the computation of the variables to serve the purpose of econometric model building. They in addition clarify the theoretical framework of this Chapter. Meanwhile, the last three sections show the model estimations and analysis as well as the empirical results and the connection of these results with economic structure. A brief conclusion appears at the end. It is worth saying that the empirical results which appear in this Chapter are not sufficient to propose any fiscal policy in Jordan because they are restricted to 1989. In Chapter 7, these results will be extended to cover the years from 1990 up until 1995. Therefore, the suggested fiscal policy can be shown there. All data, tables, figures, estimation of the model, analysis as well as the empirical results and conclusions which appear in this Chapter were calculated from primary sources in order specifically to support the argument of this thesis.

4.2. Theoretical Framework:

The theoretical framework for measuring the relative taxable capacity of the whole economy was discussed in Chapter 1 (section 9). This section briefly reviews this framework in order to test the consistency between the theoretical and empirical relationships. This is helpful for comparing each sign for every relationship with that sign which will appear in the estimation of the econometric model adopted in this Chapter (section 4). The most important factors that determine relative taxable capacity in the developing countries, according to the results reached by previous studies, have been shown to be included in three main factors. These factors are: the degree of economic development, the composition of the GDP, and the degree of economic openness (for further explanations see Chapter I (section 9).

The explanatory variables that lie behind these factors are the share of the agricultural sector in the GDP, per capita GNP\(^1\), the degree of monetisation as independent variables that express the degree of development. The share of the

\(^{1}\) It is considered to be the only independent variable whose ratio is made to the number of inhabitants in this method. It has been dropped from the approved equations because its coefficient does not differ from zero.
mining, or the manufacturing, or the wholesale & retail trade sectors in the GDP are variables that express the GDP structure. The degree of economic openness has been expressed by the ratio of merchandise exports or imports or both of them to the GNP.

Theoretically, a positive relationship is supposed between the tax burden and each of per capita GNP, the degree of monetisation in the economy, the share of the mining sector in the GDP and the ratio of exports or imports (or both of them) to the GNP. In other words, the dependent variable is directly proportional to each of the above-mentioned independent variables. On the other hand, theoretically, a negative relationship is supposed to exist between the tax ratio and each of the share of the agricultural sector, the wholesale & retail trade sector, and the manufacturing sector in the GDP (see Chapter 1 [section 9]). To show the degree of consistency between these ex-ante expectations and the actual data collected for the developing countries under study, a correlation matrix of variables for 1986-89 is computed (see Table 4.1). The first column of the Table shows that all the theoretical relationships which were discussed in Chapter 1 (section 9), are consistent with the empirical relationships of the developing countries.

4.3. List of the Variables, their Descriptions and Computations:-

TRA: the tax burden measured by the ratio of the total tax revenues (excluding social security contributions) to the GNP at current factor cost (excluding net indirect taxes).

GNPP: per capita GNP.

M2A: the degree of monetisation measured by the ratio of the money supply (M2) (money plus quasi money) to the GNP.

AA: the share of the agricultural sector in the Gross Domestic Product (GDP).

WA: the share of the wholesale & retail trade sector in the GDP.

MANA: the share of the manufacturing sector in the GDP.

NA: the share of the mining sector in the GDP.

FA: the degree of economic openness measured by the ratio of merchandise imports plus exports to the GNP.
Table 4.1
Estimated Correlation Matrix of the
Variables during the Period 1986-89

<table>
<thead>
<tr>
<th></th>
<th>TRA</th>
<th>GNPP</th>
<th>M2A</th>
<th>AA</th>
<th>WA</th>
<th>MANA</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRA</td>
<td>1.0000</td>
<td>.096726</td>
<td>.34728</td>
<td>-.33580</td>
<td>-.25850</td>
<td>-.16805</td>
</tr>
<tr>
<td>GNPP</td>
<td>.096726</td>
<td>1.0000</td>
<td>.18461</td>
<td>-.48516</td>
<td>.079812</td>
<td>.27940</td>
</tr>
<tr>
<td>M2A</td>
<td>.34728</td>
<td>.18461</td>
<td>1.0000</td>
<td>-.23104</td>
<td>-.15654</td>
<td>-.12486</td>
</tr>
<tr>
<td>AA</td>
<td>-.33580</td>
<td>-.48516</td>
<td>-.23104</td>
<td>1.0000</td>
<td>-.21234</td>
<td>-.45624</td>
</tr>
<tr>
<td>WA</td>
<td>-.25850</td>
<td>.079812</td>
<td>-.15654</td>
<td>-.21234</td>
<td>1.0000</td>
<td>.034487</td>
</tr>
<tr>
<td>MANA</td>
<td>-.16805</td>
<td>.27940</td>
<td>-.12486</td>
<td>-.45624</td>
<td>.034487</td>
<td>1.0000</td>
</tr>
<tr>
<td>NA</td>
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<td>.8567E-4</td>
<td>.014139</td>
<td>.13459</td>
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<td>-.10240</td>
</tr>
<tr>
<td>FA</td>
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<td>.25049</td>
<td>.27405</td>
<td>-.23553</td>
<td>-.27827</td>
<td>.24778</td>
</tr>
<tr>
<td>XA</td>
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<td>-.22781</td>
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<td>.36731</td>
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<tr>
<td>MA</td>
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<td>.29510</td>
<td>.46481</td>
<td>-.20795</td>
<td>-.23558</td>
<td>.080461</td>
</tr>
</tbody>
</table>

-This Table is entirely original.
-The sources of data are as given in section 2 of Chapter 3.
-The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.
-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
Table 4.1
Estimated Correlation Matrix of the
Variables during the Period 1986-89

<table>
<thead>
<tr>
<th></th>
<th>NA</th>
<th>FA</th>
<th>XA</th>
<th>MA</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRA</td>
<td>.034461</td>
<td>.50358</td>
<td>.45876</td>
<td>.47527</td>
</tr>
<tr>
<td>GNPP</td>
<td>-.8567E-4</td>
<td>.25049</td>
<td>.17401</td>
<td>.29510</td>
</tr>
<tr>
<td>M2A</td>
<td>-.014139</td>
<td>.27405</td>
<td>.059349</td>
<td>.46481</td>
</tr>
<tr>
<td>AA</td>
<td>.13459</td>
<td>-.23553</td>
<td>-.22781</td>
<td>-.20795</td>
</tr>
<tr>
<td>WA</td>
<td>.037280</td>
<td>-.27827</td>
<td>-.27847</td>
<td>-.23558</td>
</tr>
<tr>
<td>MANA</td>
<td>-.10240</td>
<td>.24778</td>
<td>.36731</td>
<td>.080461</td>
</tr>
<tr>
<td>NA</td>
<td>1.0000</td>
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<td>.0064997</td>
<td>.049468</td>
</tr>
<tr>
<td>FA</td>
<td>.029269</td>
<td>1.0000</td>
<td>.93259</td>
<td>.92038</td>
</tr>
<tr>
<td>XA</td>
<td>.0064997</td>
<td>.93259</td>
<td>1.0000</td>
<td>.71720</td>
</tr>
<tr>
<td>MA</td>
<td>.049468</td>
<td>.92038</td>
<td>.71720</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

-This Table is entirely original.
-The sources of data are as given in section 2 of Chapter 3.
-The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.
-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
XA: the degree of economic openness measured by the ratio of merchandise exports to the GNP.

MA: the degree of economic openness measured by the ratio of merchandise imports to the GNP.

GNP: is the Gross National Product at current market prices unless otherwise stated.

GDP: is the Gross Domestic Product at current market prices unless otherwise mentioned.

The computations of these variables appear in Appendix B.1.

4.4. Model Estimation and Analysis of Model:

4.4.1. Model Estimation:

This sub-section is devoted to showing model estimation. The regression model for the tax burden (dependent variable) is applied to previous different explanatory variables that represent the factors which determine the whole economy’s relative taxable capacity. As before, the study is based on data which were collected for this purpose, which relate to 1986-89, and which cover thirty-four developing countries including Jordan (see Chapter 3, section 2). This study uses pooled data for estimating the econometric models of this approach and that of the following Chapter. There are several advantages to using pooled data rather than cross section or time series data. The number of observations is larger in pooled data. This gives more reliable parameter estimates. Furthermore, pooled data may alleviate the problem of multicollinearity. This is possible because the independent variables vary in two dimensions. Moreover, pooled data may reduce or eliminate estimation bias (for more details see Matyas and Sevestre 1996).

Tax Revenues affect and have an effect on explanatory variables particularly the per capita GNP (bidirectional causality). To avoid the bias of ordinary least squares (OLS) estimation, the current study used Two Stage Least Squares (2SLS). This was done to allow for endogeneity. The tax ratio (tax revenues over GNP at current factor
cost [GNP minus net indirect taxes]) was regressed on per capita GNP along with some explanatory variables using the other independent variables as instruments. These variables consisted of AA, WA, MA, M2A, NA, and MANA (one of the explanatory variables which represented the degree of economic openness (FA, XA, MA) is used because of the high simple correlation between them [see Table 4.1]). The descriptions of these variables were shown in section 4.3. The per capita GNP was deleted because it is the least significant variable (see Appendix B. 2). This result is consistent with the empirical results of the previous studies. Per capita GNP was significant when the developing and developed countries were included in these studies. However, this variable was not significant when the sample was confined only to the developing countries. Then the OLS estimation was applied. Dummy variables were used for each year and for every country to allow for differences in intercept terms as follows:

\[
\begin{align*}
D1 &= 1 \text{ for } 1-34 \text{ observations, } 0 \text{ otherwise.} \\
D2 &= 1 \text{ for } 35-68 \text{ observations, } 0 \text{ otherwise.} \\
D3 &= 1 \text{ for } 69-102 \text{ observations, } 0 \text{ otherwise.}
\end{align*}
\]

Thirty three dummy variables were used for countries. For example D4 = 1 for observations, 1, 35, 69, and 103, 0 otherwise.

Three explanatory variables are statistically significant (the other independent variables are not significantly different from zero at the 5% level). These variables are: AA, WA, MA. A test is carried out to see whether log linear or linear (logarithm versus linear) is better for the model (log the ratio of the dependent variable and independent variables to the GNP at current factor cost [GNP minus net indirect taxes] or without using log) using non-nested tests by simulation (OLS). According to Sargan's, and Vuong's likelihood criterion, using linear (not log linear) is preferable (see Appendix B.2). The ratio model is preferable. A test is carried out to see whether the coefficients of the dummy variables for countries first and then for years second are jointly zero by using the F-test. According to the F-statistic, this hypothesis is accepted (see Appendix B. 2). Then the model without these dummy
variables was estimated. The main reason lying behind adopting the model is represented by reflecting all the three factors which determine the whole economy's relative taxable capacity. These factors are: the degree of development, the composition of the GDP, and the degree of economic openness. The reasons behind adopting each explanatory variable were discussed in Chapter 1, section 9.

4.4.2. Diagnostic Tests and Analysis of Model:-

4.4.2.1. Diagnostic Tests:-

Table 4.2 shows the estimation of the model which is adopted in this thesis for this approach. This model passes the autocorrelation and heteroscedasticity tests. The Lagrange Multiplier (LM) test statistic for AR(34) for the model is less than \( \chi^2 \) with 1 degree of freedom (see Table 4.2). This actually tests the first order autoregressive process. The pooled data cover thirty-four developing countries for four years (1986-89). That is why AR(34) is computed to test for the first order autoregressive process. Also the Breusch-Pagan test statistic is less than \( \chi^2 \) with 3 degrees of freedom (see Table 4.2). The model is also consistent with the theoretical economic framework of the present study which was explained in Chapter 1 (section 9). The calculations of these statistics are as shown in Appendix B.2. The following outlines brief details of each test:-

1- Serial correlation (Lagrange Multiplier test of residual serial correlation): It is well known that one of the assumptions of the classical model is that the disturbances in the model are not autocorrelated. If this assumption is not met, this means that the model suffers from autocorrelation. This problem can have serious effects on the properties of estimators and test statistics. This problem is likely to appear with the time series data. Because the current study used pooled data, the test for this problem becomes essential. There are several tests to detect autocorrelation such as Durbin-Watson (DW) test and Lagrange Multiplier (LM) test. The former was designed to test a first order
autoregressive process. The latter allows us to test for any order of autoregressive errors (for more details see Kmenta 1986, Maddala 1992, Stewart 1991). The latter, therefore, is adopted since it is valid for the pooled data model. We wish to test the null hypothesis of no autocorrelation against the alternative of autocorrelation (the calculations to carry out this test for the adopted model appear in Appendix B.2). According to the LM test statistic which equals 1.86 and the $\chi^2$ statistic with 1 degree of freedom which equals 3.84 at 5% level, the null hypothesis is not rejected. This indicates that there is no autocorrelation problem in the model.

2- Heteroscedasticity: econometric models which use pooled or cross-sectional data usually suffer from this econometric problem. The heteroscedasticity test was given adequate attention, because the current study used pooled data as shown in Chapter 3 (section 2). To alleviate any possible heteroscedasticity problem in this study, all dependent and independent variables in the model were divided by GNP or GDP, even though the normal procedures to test for heteroscedasticity will still be adopted (heteroscedasticity was discussed in detail in Chapter 1 [section 12]). It is well known that there are several tests to detect heteroscedasticity such as the Goldfeld and Quandt test and the Breusch and Pagan test. The former test is good for simple regression models rather than multiple one. The problem is to be able to identify a particular variable as a possible cause of heteroscedasticity. There may be that no unique ordering is possible if more than one variable is a potential cause of heteroscedasticity. Therefore, the latter test is adopted since it is valid for multiple regression models. Furthermore, the Breusch and Pagan test does not depend on the functional form (Maddala 1992). We wish to test that the errors in the adopted model have a constant variance (the null hypothesis) against the alternative hypothesis of their not having a constant variance. The calculations to carry out this test for the adopted model are as shown in Appendix B.2. According to the Breusch-Pagan test statistic for the model which equals
Table 4.2
Estimation of the Whole Economy’s Relative Taxable Capacity Model during the Period 1986-89

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>20.27</td>
<td>1.71</td>
<td>11.86[.000]</td>
</tr>
<tr>
<td>AA</td>
<td>-0.13</td>
<td>0.03</td>
<td>-4.16[.000]</td>
</tr>
<tr>
<td>WA</td>
<td>-0.19</td>
<td>0.06</td>
<td>-3.19[.002]</td>
</tr>
<tr>
<td>MA</td>
<td>0.12</td>
<td>0.03</td>
<td>4.65[.000]</td>
</tr>
</tbody>
</table>

$\hat{R}^2$ 0.32
LM Test Statistic (AR[34]) 1.86
$\chi^2$ with 1 Degree of Freedom (5%) 3.84
Breusch-Pagan Test Statistic 7.79
$\chi^2$ with 3 Degrees of Freedom (5%) 7.82

- This Table is entirely original.
- The total observations used to estimate this model number 136 (34 [developing countries] * 4 [years covered the period 1986-89]).
- The sources of data are as given in section 2 of Chapter 3. The descriptions and computations of the variables which appear in this Table are as shown in section 3 of this Chapter.
- Prob appearing in the Table refers to the P-value (probability value). It can be defined as the smallest significance level at which we do not reject the null hypothesis.
7.79 and the $\chi^2$ statistic which equals 7.82 at 5%, the null hypothesis is not rejected. This indicates that there is no heteroscedasticity problem in the model. It is worth saying that one of the diagnostic tests which is computed automatically by computer is the heteroscedasticity test which is based on the regression of squared residuals on squared fitted values. According to the P-value\footnote{The P-value (probability value) can be defined as the smallest significance level at which we do not reject the null hypothesis.} in the adopted model (0.170 see Appendix B.2), the null hypothesis was not also rejected. This confirms that this model is not suffering from this problem.

The coefficients of the variables in the adopted model have the anticipated signs. These prove to be sensible magnitudes and all of them are significantly different from zero at 5% level according to the t-test. The adjusted coefficient of determination ($\bar{R}^2$) is relatively low. The estimators are unbiased, consistent and efficient. Therefore, this model passes the conventional diagnostic tests (for further information about the diagnostic tests see: Pesaran and Pesaran 1993). The print-out of the adopted model’s estimation appears in Appendix B.2.

4.4.2.2. Analysis of Model:-

The analysis and explanation of results for the preferred model will appear in this sub-section. Meanwhile, the whole economy’s relative taxable capacity and the tax effort of the thirty-four developing countries including Jordan will be shown in the following section for 1989. The preferred model estimates the whole economy’s relative taxable capacity during the period 1986-89 for the thirty-four developing countries including Jordan. A number of explanatory variables is used as variables representing the determining factors of the whole economy’s relative taxable capacity. These are, first, the share of the agricultural sector in the GDP as a representative of the degree of economic development, and, second, the share of the wholesale & retail trade sector in the GDP expressing the composition of the GDP and its sectoral
distribution.

Theoretically, a negative relationship is supposed to exist between the whole economy's relative taxable capacity and the relative importance of the above-mentioned explanatory variables. Meanwhile, the ratio of merchandise imports (CIF)\(^3\) to the GNP is used as a proxy for the degree of economic openness and there is a positive relationship between it and relative taxable capacity. The justification for using the independent variables in this model was mentioned in Chapter 1 in the discussion of factors determining the whole economy’s relative taxable capacity and the variables representing those factors.

The model shows that the relative taxable capacity of the economy of each of the developing countries under study during the period forms an autonomous ratio of the GNP at current factor cost (GNP minus net indirect taxes) (20.27%). In other words, about one-fifth of the GNP is the intercept or autonomous element in taxable revenue in the model. This ratio increases only with the increase of the degree of economic openness, measured by the ratio of the commodity imports to the GNP. On the other hand, this ratio decreases with the increase of the share in the GDP of the agricultural and of the wholesale & retail trade sector.

The model shows that the coefficient of the ratio of the value added of the agricultural sector to the GDP reaches 13%. This indicates that any change in this ratio by 10% will result in creating a change in the opposite direction in the whole economy’s relative taxable capacity at the ratio of 1.3%, other things being constant (ceteris paribus). The coefficient of the second explanatory variable, (the share of the wholesale & retail trade sector in the GDP), amounts to 19%. This denotes that the increase of this ratio at a 10%, will decrease, while the other factors remain equal, the whole economy’s relative taxable capacity by a ratio of 1.9%. On the other hand, the coefficients of the last independent variable, the ratio of merchandise imports to

\(^3\) A short form of Cost, Insurance and Freight which means that goods will be delivered at the port of destination and the cost of insurance policy is included.
the GNP, amounts to 12%. This denotes that a change of 10% of the previous variable will create, other things being constant, a change in the same direction in the whole economy’s relative taxable capacity at 1.2%. The coefficients of the independent variables may be interpreted as tax rate.

Therefore, there is a negative relationship between the whole economy’s relative taxable capacity and each of the share of the agricultural sector and the wholesale & retail trade sector in the GDP separately. However there is a positive relationship between the whole economy’s relative taxable capacity and the ratio of the commodity imports to the GNP. The results of this model are consistent with the theoretical framework which was discussed in Chapter 1 (section 9).

The explanatory power of this model, which is represented by the adjusted coefficient of determination ($R^2$), amounts to 32%. This denotes that just under one-third (32%) of the change in the dependent variable (whole economy’s relative taxable capacity) can be explained through the independent variables included in the model. Meanwhile, the residual (68%) is explained by social and political factors as well as other economic factors. These factors are difficult to quantify. Their effects on the whole economy’s relative taxable capacity largely involve unmeasurable quantities. These factors were explained previously in Chapter 1 (section 9).

4.5. Empirical Results:-

In this section the whole economy’s relative taxable capacity will be estimated for the thirty-four developing countries for 1989 using the adopted model discussed in the previous section. This year was chosen among the period 1986-89 because it is the last year subject to the study and includes the latest available data about the sample. Furthermore, the analysis of the empirical results are restricted for one year to avoid repetition. In other words, the similarity of what we can say about each country in the sample in this year (1989) and about the other years (1986-88) made it better to restrict the analysis to 1989. This capacity is represented by the estimated tax revenues as a ratio of the GNP at current factor cost (the estimated tax burden or tax
ratio). A 95% confidence interval for the capacity is computed using the standard error of each predicted value. Two columns therefore show the whole economy’s relative taxable capacity are presented in Table 4.3. Note that the confidence interval we obtained for the whole economy’s relative taxable capacity is relatively wide (about +/-3.7% of the GNP at current factor prices (GNP minus net indirect taxes) (whole economy’s relative taxable capacity). This will affect both the tax effort computed to each country and the analysis of the empirical results. It is possible to produce narrower intervals by reducing the confidence limits (i.e. 90%).

The tax effort is measured in every country by the ratio of the actual tax burden to the whole economy’s relative taxable capacity. As a result of obtaining two figures for the whole economy’s relative taxable capacity for each country (95% confidence interval for the predicted value), two figures for the tax effort for each country are also computed and shown in Table 4.3. These reflect the range that this effort lies in between. We can say therefore that a country had exceeded its relative taxable capacity if both the tax effort figures were greater than one (Morocco). Conversely, if both the tax effort figures for a country were less than one, then we can say that the country had not exploited its taxable capacity (Colombia and Jordan). In cases where the tax effort bounds include the value one (Egypt), we cannot decide. In other words, we cannot say that the country had/had not surpassed its relative taxable capacity. This is because the actual tax burden lies within the 95% confidence interval for taxable capacity.

It is worth saying that the results of this Chapter are consistent with both the theoretical framework (discussed in Chapter 1, section 9) and all the practical results of the previous studies, particularly the study of Chelliah, Baas and Kelly and the study (1989) by Musgrave and Musgrave.

Table 4.3 shows the whole economy’s relative taxable capacity and the tax effort for all the developing countries for 1989. The computations of this Table appear in Appendix B.3. The sources of data for this Table is as given in section 2 of Chapter 3. The descriptions and computations of the variables which this Table is based on
Table 4.3
The Whole Economy’s Relative Taxable Capacity
and the Tax Effort of the Developing Countries for 1989

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax Burden(1)</th>
<th>Taxable Capacity</th>
<th>Tax Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95% CI</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Paraguay</td>
<td>8.9118</td>
<td>11.4592</td>
<td>19.0225</td>
</tr>
<tr>
<td>El Salvador</td>
<td>9.0026</td>
<td>10.6961</td>
<td>18.3775</td>
</tr>
<tr>
<td>Nepal</td>
<td>9.3147</td>
<td>10.6688</td>
<td>18.4696</td>
</tr>
<tr>
<td>Brazil</td>
<td>10.8841</td>
<td>9.6143</td>
<td>17.2779</td>
</tr>
<tr>
<td>Colombia</td>
<td>11.2321</td>
<td>13.2254</td>
<td>20.7496</td>
</tr>
<tr>
<td>Syria</td>
<td>11.3962</td>
<td>10.3969</td>
<td>17.9240</td>
</tr>
<tr>
<td>Ecuador</td>
<td>12.4265</td>
<td>14.3339</td>
<td>21.8699</td>
</tr>
<tr>
<td>Argentina</td>
<td>12.7161</td>
<td>11.4677</td>
<td>19.0917</td>
</tr>
<tr>
<td>India</td>
<td>13.8839</td>
<td>10.7652</td>
<td>18.3231</td>
</tr>
<tr>
<td>Philippines</td>
<td>15.7450</td>
<td>12.6716</td>
<td>20.1431</td>
</tr>
<tr>
<td>Korea</td>
<td>16.1360</td>
<td>16.4725</td>
<td>23.9983</td>
</tr>
<tr>
<td>Turkey</td>
<td>16.1949</td>
<td>14.8238</td>
<td>22.3349</td>
</tr>
<tr>
<td>Venezuela</td>
<td>17.2884</td>
<td>14.5163</td>
<td>22.0490</td>
</tr>
<tr>
<td>Mexico</td>
<td>17.5221</td>
<td>11.7542</td>
<td>19.3402</td>
</tr>
<tr>
<td>Indonesia</td>
<td>18.0640</td>
<td>11.2184</td>
<td>18.7374</td>
</tr>
<tr>
<td>Pakistan</td>
<td>18.0683</td>
<td>12.6748</td>
<td>20.1682</td>
</tr>
<tr>
<td>Egypt</td>
<td>18.0686</td>
<td>13.1314</td>
<td>20.6249</td>
</tr>
<tr>
<td>Yemen</td>
<td>18.5981</td>
<td>13.3157</td>
<td>20.8374</td>
</tr>
<tr>
<td>Jordan</td>
<td>19.2159</td>
<td>20.9186</td>
<td>28.5753</td>
</tr>
<tr>
<td>Cameroon</td>
<td>19.2580</td>
<td>9.9682</td>
<td>17.5101</td>
</tr>
<tr>
<td>Chile</td>
<td>19.2664</td>
<td>15.3116</td>
<td>22.8164</td>
</tr>
<tr>
<td>Cyprus</td>
<td>19.8487</td>
<td>17.5923</td>
<td>25.1834</td>
</tr>
<tr>
<td>Thailand</td>
<td>20.5389</td>
<td>14.9504</td>
<td>22.4905</td>
</tr>
<tr>
<td>Kenya</td>
<td>21.2798</td>
<td>14.3903</td>
<td>21.9130</td>
</tr>
<tr>
<td>Peru</td>
<td>21.5624</td>
<td>13.9580</td>
<td>21.4959</td>
</tr>
</tbody>
</table>
33. Mauritius & 27.0078 & 20.1058 & 27.7972 & .97160 & 1.3433
34. Fiji & 27.6412 & 16.3633 & 23.9936 & 1.1520 & 1.6892

1-The tax burden during the year under study is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same year.

-This Table is entirely original.

-The sources of data are as given in section 2 of Chapter 3.

-The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.

-The developing countries are sorted in an ascending order according to their tax burden during the same year.
are as shown in section 3 of this Chapter. To avoid repetition, the analysis will be restricted to the results pertaining only to several developing countries including Jordan in a later section of this Chapter. The empirical results will also be connected with the economic structure for those countries including Jordan in the same section. It is worth mentioning that all the empirical results appear in this Chapter are based on both the theoretical framework which was previously discussed in Chapter 1 (section 9) and the econometric model adopted in this study and run on the data collected by hand for the developing countries subject to study. Consequently, all these results are correct if the economic theory is logical and if the data collection as well as the adopted econometric models are correct. To explain these results we assume these conditions are met.

4.6. The Whole Economy’s Relative Taxable Capacity and Economic Structure:

The analysis of the empirical results for the year 1989 will be shown in this section for five developing countries among the thirty-four subjects in this study. It will also focus on showing the relationship between the whole economy’s relative taxable capacity in each selected country and the economic developments which have taken place in the country. This will be useful in making a connection between the tax effort figure and the economic characteristics of each country.

This sub-sample has been kept relatively small because of the similarity of what we can say about each country in this sample and about the other developing countries. This sample includes in it developing countries with both relatively high and low tax effort. It is also chosen to reflect the distribution of countries over different geographical regions. Consequently, Asia is represented by Jordan and Yemen, while Africa is represented by Tunisia. Europe is represented by one country which is Turkey. Colombia is selected to represent the Western Hemisphere. However the Middle East is represented by two countries among the above which are the Asian countries. Economic structure, locations, cultural, social, and tax systems are reasonably close to each other among those countries of the sub-sample.
The empirical results obtained in this Chapter for the developing countries in focus can be illustrated and explained by considering two important aspects: the economic structure and the tax system applied in each country. The availability of tax bases is directly related to the economic structure. The administration of taxes is a very difficult matter where employees work in small establishments. Accounting practices attaining minimal standards are very necessary to impose profit taxes on firms. Commodity taxes cannot be imposed on retailers if retail establishments are very small and unstable. The agricultural sector is largely non-monetised (food is home-consumed). A country with a high degree of economic openness is simple to tax because merchandise exports and imports pass through ports. A low income country has less scope for the transfer of resources to the government. This low income is needed to buy the very necessities of life (food). The main attributes of the economic structure, especially those included in the model adopted, for the developing countries in the study, were shown in Table 3.2 of Chapter 3. Table 4.5, in this Chapter, also shows these attributes for the sub-sample of the developing countries.

The theoretical framework of this Chapter establishes the sign of all the relationships between each causal variable and the whole economy’s relative taxable capacity. The reasons for each relationship were discussed in Chapter 1 (section 9). Chapter 3 reviewed the main attributes of the developing countries in the study and connected them with the tax burden. For example, it was shown that the developing countries characterised by a high degree of economic openness (as measured by the ratio of merchandise imports plus exports to the GNP at current market price) are characterised by a high level of tax burden. The relationship, in other words, is positive.

The estimation of the adopted model presented in this Chapter displays the applicable tax rate for each independent variable (one aspect of the economic structure), e.g. the tax rate for the ratio of merchandise imports to the GNP amounted to 12%. The whole economy’s relative taxable capacity in the five developing countries selected as a sub-sample can be computed by applying the model to Table 4.5. This can be done by multiplying the coefficient of each independent variable by
its correspondent relative importance (please refer to Table 4.5). Please also note that Table 4.4 shows a 95% confidence interval for the whole economy's relative taxable capacity. The coefficient may be interpreted as a tax rate. The relative importance represents one feature of the economic structure. It is necessary then to calculate the sum of all these results to obtain the relative taxable capacity for each country.

It is observed that the tax effort (measured by dividing the tax burden by the whole economy's relative taxable capacity) links together the concepts of economic structure and tax system. Within this context, the study will explain the empirical results in respect to the countries in the sub-sample. This will be done by focusing on the economic structure of each country. We will focus particularly on attributes which are included in the model.

In this section, the empirical results which appear in Table 4.3 concerning the whole economy's relative taxable capacity and the tax effort for these countries for 1989 will be compared with the main economic characteristics for the same developing countries which appear in Table 4.5 for the same year. The results of Table 4.3 are copied in Table 4.4 for the five developing countries in order to facilitate the comparison process among them. These characteristics are represented by the three factors which themselves determine the whole economy's relative taxable capacity. These factors are: the degree of economic development, the composition of the GDP or its sectoral distribution, and the degree of economic openness. They are represented by the last nine variables which appear in Table 4.5. However, the first variable in this Table which is the tax burden represents the dependent variable (see Table 4.5).

In the following sub-sections the explanation of the results is given for each country. The developing countries appearing in Tables 4.4 and 4.5 are arranged in an ascending order according to the tax burden, starting with the lowest figure. Colombia will be given great attention because it is the first country, while the other countries will be given less explanation in order to avoid repetition. The practical results as well as the economic structure in Jordan will be discussed in more detail.
in Chapter 7.

4.6.1. Colombia:

The Colombian economy is well diversified, with agriculture, wholesale & retail trade, manufacturing, and mining together contributing almost two-thirds of GDP (see Table 4.5). Coffee and oil remain the most important export commodities (IMF, Colombia: Recent Economic Developments, 1996). The degree of economic openness measured by the ratio of merchandise exports plus imports to the GNP amounted to about one-fourth for 1989 while per capita GNP amounted to about US$ 1200 (see Table 4.5) and population reached over 30 million.

The tax burden in Colombia during 1989 amounted to 11.2% of the GNP at current factor cost (GNP minus net indirect taxes). This is the lowest figure among the subsample (see Table 4.4 and 4.5). This burden equals about half of that of Tunisia. In other words, it is observed that this burden is very low in comparison with that of the other thirty-three developing countries. Colombia ranks 6 among those countries (see Table 4.4). Accordingly, it is expected to record low tax effort in this country.

On the other hand, the whole economy’s relative taxable capacity in Colombia ranged, according to the model with 95% confidence interval, from 13.2% to 20.7% of the GNP at current factor cost (GNP minus net indirect taxes). Comparing this relatively moderate capacity with the low tax burden shows that Colombia has not exploited its relative taxable capacity. This is confirmed when the tax effort which is measured by the ratio of the former (tax burden) to the latter (whole economy’s relative taxable capacity) is computed. The tax effort in Colombia for the year under study amounted to less than one (0.54-0.85) (see Table 4.4). This indicates that there was room to increase tax revenues in Colombia in order to exploit its whole economy’s relative taxable capacity (see Table 4.4).

The explanation of these empirical results can be found by connecting them with economic structure. It is helpful to refer to the factors which determine the whole
Table 4.4
The Whole Economy’s Relative Taxable Capacity
and the Tax Effort of the Developing Countries for 1989

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax Burden(^{(1)})</th>
<th>Taxable Capacity</th>
<th>Tax Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95% Confidence Interval</td>
<td>95% Confidence Interval</td>
<td></td>
</tr>
<tr>
<td>30. Tunisia</td>
<td>23.7115</td>
<td>16.2688</td>
<td>23.8193</td>
</tr>
</tbody>
</table>

1-The tax burden during 1989 is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same year.

- This Table is entirely original.

- The sources of data are as given in section 2 of Chapter 3.

- The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.

- The developing countries are sorted in an ascending order according to their tax burden during the same year.

- This Table is part of Table 4.3. It is reproduced to show the empirical results of the five sub-sample developing countries.
### Table 4.5
Selected Economic Indicators
for the Developing Countries for 1989

(Percentages)

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax Per Capita GNP (in US$)</th>
<th>Degree of Monetisation</th>
<th>Value Added Ratio to the GDP</th>
<th>The Ratio of Exports Plus to the Imports to the GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tax Per The Agric Whole-</td>
<td>Value Added Ratio to the GDP</td>
<td>The Ratio of Exports Plus to the Imports to the GNP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burden Capita GNP (in</td>
<td>sale &amp; Manuf-</td>
<td>Min</td>
<td>Exports to the GNP</td>
</tr>
<tr>
<td></td>
<td>of Mone</td>
<td>actur- ing</td>
<td>ing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tion)</td>
<td>tor</td>
<td>tor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retail</td>
<td>Sector</td>
<td>Sector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td>11.2</td>
<td>1188.1</td>
<td>17.9</td>
<td>16.2</td>
</tr>
<tr>
<td>Turkey</td>
<td>16.2</td>
<td>1459.7</td>
<td>28.2</td>
<td>8.8</td>
</tr>
<tr>
<td>Yemen</td>
<td>18.6</td>
<td>554.7</td>
<td>61.4</td>
<td>31.3</td>
</tr>
<tr>
<td>Jordan</td>
<td>19.2</td>
<td>1206.9</td>
<td>142.0</td>
<td>5.9</td>
</tr>
<tr>
<td>Tunisia</td>
<td>23.7</td>
<td>1295.4</td>
<td>53.2</td>
<td>12.1</td>
</tr>
</tbody>
</table>

- This Table is entirely original. The sources of data are as given in section 2 of Chapter 3.
- The computations of the variables which appear in this Table are as shown in Appendix B.1 of this Chapter. The computed figures which appear in this Table are rounded down to one decimal point.
- The developing countries which appear in this Table are sorted in an ascending order according to their tax burden which is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same year (1989).
- The degree of monetisation is measured by the ratio of the money supply (money plus quasi money [M2]) to the GNP.

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economy's relative taxable capacity, especially the included independent variables in
the model of the first approach (see section 2 and 4 of this Chapter). Table 4.5 shows
that the relative importance of all the variables ranks in a different position among the
sub-sample of the developing countries under study.

The mild figure for the whole economy's relative taxable capacity in Colombia
reflects the high relative importance of agriculture and wholesale & retail trade sector
in the GDP. Colombia, according to these sectors, ranks the highest second and third
respectively among the five developing countries (see Table 4.5). The theoretical
framework of this Chapter shows that there is a negative relationship between the two
independent variables and this capacity. This adversely affected the whole economy's
relative taxable capacity of Colombia. The inverse relationship is the result of several
reasons. An increase in the share of the agricultural sector in the GDP means a
decrease in taxable benefits due to the relatively low level of agricultural sector
income (Bahl 1972). There is a high degree of non-monetisation in the agriculture
sector (Musgrave and Musgrave 1989). Such output cannot be subjected to taxes,
because the agricultural community is distinguished by consuming a great deal of its
production (Chelliah 1971, Musgrave and Musgrave 1989). It is administrationally
difficult to tax farmers. Also the government has no willingness to impose taxes on
the agricultural sector for political reasons. There is also an inverse relationship
between the share of the wholesale & retail trade sector in the GDP and relative
taxable capacity. Accounting practices attaining minimal standards are very necessary
to impose profit taxes on firms. Commodity taxes cannot be imposed on retailers if
retail establishments are very small and unstable. The administration of taxes is a very
difficult matter where employees work in small establishments.

Table 4.5 also shows that the degree of economic openness measured by the ratio
of merchandise imports to the GNP is relatively low. Colombia, according to
openness recorded the lowest figure among the five countries which is under study.
Consequently, this gives a moderate whole economy's relative taxable capacity as a
result of the positive relationship between it and the degree of economic openness.
There are several reasons lying behind this positive relationship. The base of customs
duties and other taxes such as import licenses is imports (Griffiths and Wall 1995). Imports play a part in the ease of imposing and collecting taxes on them. That is to say taxes are simplified in a high open economy where merchandise imports pass through ports. These imports can be readily established by tax authorities (Musgrave and Musgrave 1989). Taxes are imposed directly on imports and indirectly on incomes earned by importers. This reflects the increase in the individual's ability to pay taxes and the capability of the government to collect them (Bahl 1971, Musgrave and Musgrave 1989).

4.6.2. Turkey:-

In Turkey, two-thirds of the GDP was produced by the four following sectors: agriculture, wholesale & retail trade, manufacturing, and mining. Meanwhile, merchandise exports plus imports formed two-fifths of the GNP. The population numbered over 50 million and per capita GNP amounted to US$ 1460 for 1989 (see Table 4.5). The tax effort in Turkey according to the model for 1989 ranged between 0.73 - 1.09 (see Table 4.4). This was the outcome of registering the tax burden (measured by the ratio of tax revenues [excluding social security contributions] to the GNP at current factor cost [excluding net indirect taxes]) (16.2%) a figure lies in the 95% confidence interval for the whole economy's relative taxable capacity (14.8% - 22.3% of the GNP at current factor cost). The tax effort is the result of dividing the former (tax burden) by the latter (the whole economy's relative taxable capacity). In this case, we cannot say that Turkey did/did not surpass its whole economy's relative taxable capacity.

To explain these empirical results, we have to look at Table 4.5 to see how these results can be connected with economic structure. Turkey registered the lowest figure after Colombia according to the tax burden. This represents the numerator of the tax effort identity. However the denominator of this identity, which is the whole economy’s relative taxable capacity, is affected by the independent variables which appear in Table 4.5. These variables in Turkey rank it in a different position among the five developing countries. The variables range between the lowest after Jordan for
agriculture sector, the lowest after Colombia for the ratio of the merchandise imports to the GNP and the highest after Tunisia for the share of the wholesale & retail trade sector in the GDP. To avoid repetition, the relationship between each variable and relative taxable capacity was shown in the previous sub-section. The reasons lying behind each relationship were also discussed.

4.6.3. Yemen:-

The Yemen Arab Republic, located in the southwestern corner of the Arabian peninsula, borders on both Saudi Arabia and South Yemen. It has a population of over 8 million (Arab Banking Corporation, 1990) and a per capita GNP of US$ 555 (see Table 4.5). The contribution of agriculture, the wholesale & retail trade, manufacturing, and mining sectors together has averaged about 70% of the GDP in 1989. The degree of economic openness measured by the ratio of merchandise exports plus imports to the GNP amounted to about one-third during the same year (see Table 4.5). The tax effort recorded in Yemen according to the adopted model in 1989 ranged from 0.89 to 1.40 (one of the tax effort figures below one while the other over one (see Table 4.4). However, the actual tax burden (18.6% of the GNP at current factor cost (GNP minus net indirect taxes) lies in the range of Yemen's whole economy's relative taxable capacity with a 95% confidence interval (13.3% - 20.8% of the GNP at current factor cost). Again, as in the case of Turkey, we cannot say whether Yemen has surpassed its whole economy's relative taxable capacity.

These results can be explained by connecting them with economic structure. The explanation will take into consideration the factors which determine the whole economy's relative taxable capacity. Table 4.5 shows that the degree of economic openness measured by the ratio of commodity imports to the GNP recorded the lowest figures after Colombia and Turkey among the sub-sample of the developing countries under study. This affected the relative taxable capacity of Yemen adversely. There is a positive relationship between relative taxable capacity and the degree of economic openness. Furthermore, the share of the wholesale & retail trade sector in the GDP ranks fourth. There is an inverse relationship between this explanatory variable and
relative taxable capacity. Several reasons lie behind the above-mentioned two relationships. To avoid repetition, these were discussed in sub-section 4.6.1.

The whole economy’s relative taxable capacity, which represents the denominator of the tax effort identity, ranged, as shown earlier, between 13.3% - 20.8% of the GNP at current factor cost (GNP minus net indirect taxes) according to the model. However, the tax burden in Yemen, which represents the numerator of this identity, reached 18.6% of that GNP. In terms of ranking, this is the highest figure after Tunisia and Jordan among the five developing countries subject to the study.

4.6.4. Jordan:-

Table 4.4 shows that the recorded tax effort in Jordan does not reach one (0.67 - 0.92). This suggests that Jordan has not exploited its whole economy’s relative taxable capacity for 1989. This means that there was a room for collecting more tax revenues to reach the exploitation of its whole economy’s relative taxable capacity to the full. The Jordanian whole economy’s relative taxable capacity as a percent of the GNP at current factor cost (GNP minus net indirect taxes) ranged between 20.9% and 28.6%. This means that if Jordan as well as the other thirty-three developing countries applies the same tax rates for each type and base of the tax system, it can collect the predicted value which lies in the middle of the above two taxable capacity’s limits.

On the other hand, the recorded tax burden in Jordan during the same year (1989) reached 19.2% of the GNP at current factor cost. This occurs because Jordan has not applied the prevailing average tax rate obtained from the model for the thirty-four developing countries. Consequently, the tax effort which is the result of dividing the latter (tax burden) over the former (whole economy’s relative taxable capacity) reached less than one. This shows that the Jordanian economy’s relative taxable capacity has not been exploited. In other words, this gives an indication that the Jordanian economy could have exploited more of its whole economy’s relative taxable capacity.
The explanation of the empirical results can be shown by connecting them with economic structure. The explanation will take into consideration the factors which determine the whole economy’s relative taxable capacity especially the independent variables included in the model of the first approach. These are: the share of agriculture, and the wholesale & retail trade sectors in the GDP separately, and the degree of economic openness (as measured by the ratio of merchandise imports to the GNP at current market prices). Table 4.5 shows the following important points:–

1- Some independent variables recorded the least figures among the five developing countries for the same year (1989). These variables are the ratio of the value added of each of the agriculture, and the wholesale & retail trade sectors to the GDP. There is an inverse relationship between relative taxable capacity and the ratio of both the agriculture and the wholesale & retail trade sectors to the GDP. Several reasons lie behind this. Again the agricultural sector is largely non-monetised (food is home-consumed). It is administratively difficult to tax farmers. As in case of Colombia, the government has no willingness to impose taxes on the agricultural sector for political reasons. The administration of taxes is a very difficult matter where employees work in small establishments. Accounting practices attaining minimal standards are very necessary to impose profit taxes on firms. Commodity taxes cannot be imposed on retailers if retail establishments are very small and unstable.

On the other hand, some of these variables have recorded the highest figure among the five developing countries, for example, the ratio of merchandise imports to the GNP for the same year. Jordan is a country with a high degree of economic openness. This makes it simple to tax merchandise imports because they pass through ports. This means that the whole economy’s relative taxable capacity should also record a high figure as a result of the positive/negative relationship between each of these variables and relative taxable capacity. This has been confirmed by the recorded capacity which ranged with a 95% confidence interval between 20.9% - 28.6% of the GNP
at current factor cost (GNP minus net indirect taxes). This capacity is the highest among the five developing countries in the sub-sample. Therefore, this reflects the economic structure represented by nine economic indicators (see Table 4.5).

The relative taxable capacity of the Jordanian economy, which is the highest figure among the five developing countries appearing in Table 4.4. is in line with Musgrave and Musgrave’s point of view (1989). They showed that relative taxable capacity depends on the economic structure of each country. Musgrave and Musgrave also showed that the capacity is proportional to the degree of economic openness. Jordan manifested the highest openness among the sub-sample (see Table 4.5). This therefore led to an expectation that it will record a high relative taxable capacity and this is what occurred. A country with a high degree of economic openness has more scope for transferring resources to the public sector since it is easy for the government to collect and impose taxes on imports as shown earlier.

2- The tax burden registered in Jordan for 1989 amounted, as shown earlier, to 19.2% of the GNP at current factor cost (GNP minus net indirect taxes). Jordan according to this figure ranks the highest after Tunisia among the five developing countries which appear in Table 4.5. It is worth saying that further explanation for these empirical results pertaining to Jordan will be given in Chapter 7 when the whole economy’s relative taxable capacity during the period 1973-95 is estimated.

4.6.5. Tunisia:-

Tunisia is the smallest of the North African Countries. Its principal mineral resource is phosphate rock, which although of a lower quality and less abundant than Morocco could still provide the country with its main export product for the next century. Tunisia’s oil and gas reserves are not particularly extensive, but in recent years they have enabled the country to rank as a net oil exporter. Its population
numbers about eight million (Arab Banking Corporation, 1990). Its per capita GNP is over twelve hundred dollars. The share of agriculture, manufacturing, the wholesale & retail trade and mining together has contributed almost half of GDP, while the degree of economic openness amounted to about 70% of the GNP at current market prices for 1989 (Table 4.5).

The tax effort in the Tunisian economy according to the model for the year 1989 ranged with a 95% confidence interval between 1.00 and 1.46 (see Table 4.4). This shows that the recorded tax effort in Tunisia for 1989 almost exceeded one. This indicates that Tunisia surpassed its whole economy’s relative taxable capacity.

Table 4.5 shows the included variables in the adopted model. The figure of the share of the agriculture in the GDP is the lowest after Jordan and Turkey among the sub-sample of the developing countries (see Table 4.5). There is an inverse relationship between this share and relative taxable capacity. The reasons lying behind this relationship were discussed in Chapter 1, section 9. Some of these were mentioned in the previous four sub-sections. For example, it is administrationally difficult to tax farmers. Also the government has no willingness to impose taxes on the agricultural sector for political reasons. Consequently, this affected the relative taxable capacity of Tunisia positively. The degree of economic openness in Tunisia is the highest after Jordan (see Table 4.5) and the relationship between the openness and relative taxable capacity is positive. Several reasons lie behind this relationship. Imports play a part in the ease of imposing and collecting taxes on them. Therefore, this also affected the relative taxable capacity of the whole economy positively. The same analysis is valid for the share of the wholesale & retail trade sector in the GDP. This, in turn, leads to record the highest whole economy’s relative taxable capacity after Jordan as a result of the positive/negative relationship between the capacity and the included variables in the model of the first approach.

It is worth mentioning that the tax burden in Tunisia is very high and ranks first among the same sub-sample under study for 1989. This, in turn, leads to a relatively high tax effort. This was due to the fact that the numerator of the tax effort identity
(tax burden) (23.7% of the GNP at current factor cost [GNP minus net indirect taxes]) almost exceeded the denominator (the whole economy’s relative taxable capacity [16.3% - 23.8% of the GNP at current factor cost]) of this identity during the same year. The place of Tunisia according to its tax burden among the thirty-four developing countries lies among the last five countries (see Table 4.4). This means that the tax burden is relatively high.

It is worth saying that Colombia and Yemen registered the lowest figures of the whole economy’s relative taxable capacity for the model (13.2% - 20.8% of the GNP at current factor cost [GNP minus net indirect taxes]). They were followed by Turkey (14.8% - 22.3%), then Tunisia (16.3% - 23.8%), followed by Jordan (20.9% - 28.6%) which registered the highest figure (see Table 4.4). The whole economy’s relative taxable capacity as previously defined in Chapter 1 (section 6) is the tax ratio (tax burden) that has to be collected when each country applies the same tax rates for each type and base of the tax system. Therefore, if all the five developing countries applied the same tax rate as shown, each country would obtain a tax burden equal exactly to the middle of the whole economy’s relative taxable capacity figures (predicted value). This means that each country will be exploiting its relative taxable capacity to the full. However, as a result of those countries not exploiting their tax base as much as the others did, this led to a different order. Colombia records the least tax burden (11.2% of the GNP at current factor cost [GNP minus net indirect taxes]), followed by Turkey (16.2%), then Yemen (18.6%) and Jordan (19.2%). Tunisia (23.7%) registers the highest figure (see Tables 4.4 and 4.5).

4.7. Summary of the Chapter:

This study covers the period 1986-89, includes thirty-four developing countries. It uses pooled data combining both cross-sectional and time series data. The degree of economic development, the composition of GDP, and the degree of economic openness are the most important factors which determine the whole economy’s relative taxable capacity.
The whole economy's relative taxable capacity and tax effort of the developing countries including Jordan were estimated during the same period. The analysis was limited to the results pertaining to several developing countries including Jordan, while the whole economy's relative taxable capacity and tax effort were estimated for all of the developing countries which were subjected to study for 1989 only. A separate section was devoted to explaining the empirical results and to connecting them with economic structure in a sub-sample of these developing countries including Jordan.

The most important result of this Chapter with respect to the Jordanian economy is represented by the fact that Jordan did not exploit its whole economy's relative taxable capacity to the full. The recorded tax effort in Jordan in 1989 for the model did not exceed one (0.67 - 0.92). In other words, there was room to impose more taxes or increase current tax rates to exploit the relative taxable capacity to the full. This result will be given further explanation when it is connected with the economic situation prevailing during the period 1973-89 from a public choice perspective (see sun-section 7.4.6 in Chapter 7).
Chapter 5
Measuring Individual’s Relative Taxable Capacity
for the Developing Countries including Jordan
(An Econometric Approach)

5.1. Introduction:-

The relative taxable capacity for the whole economy of each developing country in the study was estimated in Chapter 4. This Chapter will estimate the relative taxable capacity of the individual for the same sample of developing countries during the same period (1986-89).

The questions asked in each of the two Chapters are different. Consequently, different approaches in each of the two Chapters have been adopted. The first approach (the relative taxable capacity of the whole economy), discussed in the previous Chapter, estimates the relative taxable capacity of the developing countries by dividing each of the independent variables and the dependent variable by the GNP at current factor cost (GNP minus net indirect taxes) or GDP of the sample of the developing countries under study. Meanwhile, the second one (the individual’s relative taxable capacity) which will be adopted in this Chapter estimates the relative taxable capacity for each individual by dividing the explanatory variables and the explained variable by the number of population.

The first approach estimates the relative taxable capacity of the whole economy expressed by how much the society is able to produce and how much is estimated to be deducted by taxes. However, the second approach estimates the relative taxable capacity of the individual. It studies how much the individual’s contribution to production is and how much of that is estimated to be deducted as tax. Furthermore,
the ratio of the individual’s share in taxes to his share in the GNP (per capita GNP) measures the tax burden. The tax burden (or the tax ratio) is the basis for estimating the relative taxable capacity of the economy. On the other hand, the first approach reflects the ability of the government to impose taxes, collect them, and the desire it has in this respect, while the second approach reflects the ability of individuals to pay taxes and bear the burden.

The main aim of this Chapter (as well as the previous one) is to establish whether tax revenues in Jordan can be increased/decreased and by how much. To achieve the goal of this Chapter, it will be divided into several sections. The first part gives details about the computation of the variables to serve the purpose of econometric model building and application. It also explains the theoretical framework. The second part is devoted to showing the model estimation and analysis as well as the empirical results. A brief conclusion appears at the end.

It is worth mentioning that the empirical results appearing here are not enough to suggest any fiscal policy in Jordan since they cover the years up until 1989 only. In Chapter 7, these results will be extended to cover the years from 1990 up until 1995. Therefore, the proposed fiscal policy can be better shown there. It is also worth saying that all data, tables, estimation of the model, analysis as well as the empirical results and conclusions which appear in this Chapter were calculated from primary sources in order specifically to support the argument of the study.

5.2. Theoretical Framework:

The same factors which determine the relative taxable capacity of the whole economy in Chapter 4 were adopted in the model of the second approach (measuring the individual’s relative taxable capacity). These factors are: the degree of economic development, the composition of the GDP or its sectoral distribution, and the degree of economic openness. These factors are expressed in this Chapter by three sets of variables. Per capita GNP, the individual’s share in the agricultural sector, and the money supply (M2) per capita are three alternative explanatory variables used to
represent the first factor. Furthermore, the individual's share in the manufacturing sector, the mining sector and the wholesale & retail trade sector represent three independent variables used to express the second factor. The share of the individual in total commodity exports plus imports and his share from each of them separately (i.e. \(FP[MP+XP], XP, MP\)) as three alternative explanatory variables express the third factor.

The theoretical framework was discussed in detail in the literature review Chapter (Chapter 1, section 10). The relationship between each previous independent variable and the dependent variable (the individual's contribution to tax revenues) for the developing countries under study is positive. These relationships are shown in the simple correlation matrix (see Table 5.1). In other words, the dependent variable is directly proportional to each of the above-mentioned independent variables. This means that the individual's contribution to tax revenues will increase as a result of increasing any of the above-mentioned independent variables. This also shows that any increase in the individual's share from each independent variable reflects the increase of the individual's ability to pay taxes.

Table 5.1 reflects the sign of the relationship between the dependent variable (the individual's contribution to tax revenues) and each independent variable and among the independent variables themselves. This will be useful for comparing each sign for every relationship with that sign which will appear in the estimation of econometric model adopted in this Chapter (section 4). Consequently, the consistency between ex-ante expectations and empirical relationships can be tested.

The first column of Table 5.1 shows that the empirical relationship between the dependent variable (the individual's contribution to tax revenues) and each independent variable is positive. This is consistent with the theoretical framework which was mentioned in Chapter 1 (section 10).
### Table 5.1

Estimated Correlation Matrix of the
Variables during the Period 1986-89

<table>
<thead>
<tr>
<th></th>
<th>TRP</th>
<th>GNPP</th>
<th>M2P</th>
<th>AP</th>
<th>WP</th>
<th>MANP</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRP</td>
<td>1.000</td>
<td>.911</td>
<td>.854</td>
<td>.402</td>
<td>.779</td>
<td>.770</td>
</tr>
<tr>
<td>GNPP</td>
<td>.911</td>
<td>1.000</td>
<td>.862</td>
<td>.435</td>
<td>.850</td>
<td>.810</td>
</tr>
<tr>
<td>M2P</td>
<td>.854</td>
<td>.862</td>
<td>1.000</td>
<td>.362</td>
<td>.757</td>
<td>.585</td>
</tr>
<tr>
<td>AP</td>
<td>.402</td>
<td>.435</td>
<td>.362</td>
<td>1.000</td>
<td>.550</td>
<td>.389</td>
</tr>
<tr>
<td>WP</td>
<td>.779</td>
<td>.850</td>
<td>.757</td>
<td>.550</td>
<td>1.000</td>
<td>.706</td>
</tr>
<tr>
<td>MANP</td>
<td>.770</td>
<td>.810</td>
<td>.585</td>
<td>.389</td>
<td>.706</td>
<td>1.000</td>
</tr>
<tr>
<td>NP</td>
<td>.435</td>
<td>.419</td>
<td>.322</td>
<td>.417</td>
<td>.405</td>
<td>.369</td>
</tr>
<tr>
<td>FP</td>
<td>.741</td>
<td>.752</td>
<td>.692</td>
<td>.236</td>
<td>.566</td>
<td>.584</td>
</tr>
<tr>
<td>XP</td>
<td>.586</td>
<td>.577</td>
<td>.450</td>
<td>.163</td>
<td>.340</td>
<td>.518</td>
</tr>
<tr>
<td>MP</td>
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<td>.821</td>
<td>.823</td>
<td>.272</td>
<td>.680</td>
<td>.579</td>
</tr>
</tbody>
</table>

-This Table is entirely original.
-The sources of data are as given in section 2 of Chapter 3.
-The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.
-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
Table 5.1
Estimated Correlation Matrix of the
Variables during the Period 1986-89

(Continued)

<table>
<thead>
<tr>
<th></th>
<th>NP</th>
<th>FP</th>
<th>XP</th>
<th>MP</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRP</td>
<td>.43470</td>
<td>.74132</td>
<td>.58630</td>
<td>.79487</td>
</tr>
<tr>
<td>GNPP</td>
<td>.41875</td>
<td>.75201</td>
<td>.57672</td>
<td>.82151</td>
</tr>
<tr>
<td>M2P</td>
<td>.32163</td>
<td>.69186</td>
<td>.45044</td>
<td>.82333</td>
</tr>
<tr>
<td>AP</td>
<td>.41687</td>
<td>.23561</td>
<td>.16348</td>
<td>.27189</td>
</tr>
<tr>
<td>WP</td>
<td>.40496</td>
<td>.55652</td>
<td>.34028</td>
<td>.68084</td>
</tr>
<tr>
<td>MANP</td>
<td>.36874</td>
<td>.58436</td>
<td>.51817</td>
<td>.57939</td>
</tr>
<tr>
<td>NP</td>
<td>1.0000</td>
<td>.20682</td>
<td>.15979</td>
<td>.22495</td>
</tr>
<tr>
<td>FP</td>
<td>.20682</td>
<td>1.0000</td>
<td>.93272</td>
<td>.95275</td>
</tr>
<tr>
<td>XP</td>
<td>.15979</td>
<td>.93272</td>
<td>1.0000</td>
<td>.77911</td>
</tr>
<tr>
<td>MP</td>
<td>.22495</td>
<td>.95275</td>
<td>.77911</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

-This Table is entirely original.
- The sources of data are as given in section 2 of Chapter 3.
- The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.
- The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
5.3. List of the Variables, their Descriptions and Computations:

TRP: the individual's contribution to tax revenues measured by the ratio of total tax revenues (excluding social security contributions) to the number of population.

GNPP: per capita GNP (Gross National Product).

M2P: the degree of monetisation measured by the ratio of the money supply (M2) (money plus quasi money) to the number of population.

AP: the individual's share in the agricultural sector.

WP: the individual's share in the wholesale & retail trade sector.

MANP: the individual's share in the manufacturing sector.

NP: the individual's share in the mining sector.

FP: the degree of economic openness measured by the ratio of merchandise imports plus exports to the number of population.

XP: the degree of economic openness measured by the ratio of merchandise exports to the number of population.

MP: the degree of economic openness measured by the ratio of merchandise imports to the number of population.

GNP: is the Gross National Product at current market prices unless otherwise stated.

All the data have been converted from the local currency of each country to US$ by using the average of exchange rate (RF) during each year of the period under study (1986-89). This has been done in order to ensure that all data are presented in the same currency. The computations of the above-mentioned variables appear in Appendix C.1.

5.4. Model Estimation and Analysis of Model:

5.4.1. Model Estimation:

This sub-section displays model estimation. The preferred model is developed in the current study using the same procedures followed in Chapter 4 (see Chapter 4, sub-section 4.4.1). The only difference is that according to non-nested tests by
simulation using logarithmic form (not linear) is preferable (see Appendix C.2). Then the log linear (log per-capita) model is estimated. The log model is good because it is theoretically more sensible. It also allows to conduct a formal test of per-capita versus non-per-capita since \( \log(\text{TRP}) = \log(\text{TR/POP}) = \log(\text{TR}) - \log(\text{POP}) \). Thus, \( \log \) (population) can be entered separately as a regressor and the scaling POP can be tested (test the hypothesis of homogeneity in population). The test shows that the log per-capita model is preferable (see Appendix C.2).

Therefore, the log per-capita model is estimated and it is the preferred model for this approach. The included variables in the model are statistically significant. The other independent variables were excluded from the model because they are not significantly different from zero at the 5% level. The main reason lying behind adopting the model is represented by reflecting all the three factors which determine the individual’s relative taxable capacity. These factors are: the degree of development, the composition of the GDP, and the degree of economic openness. The reasons behind adopting each explanatory variable were previously discussed in Chapter 1 (section 10).

5.4.2. Diagnostic Tests and Analysis of Model:-
5.4.2.1. Diagnostic Tests:-

Table 5.2 shows the estimation of the preferred model. The model passes the autocorrelation and heteroscedasticity tests (see Table 5.2). The model is also consistent with the theoretical economic framework of the present study which was explained in Chapter 1 (section 10). The calculations of these statistics are as shown in Appendix C.2.

The coefficients of the variables in the adopted model have the anticipated signs. These prove to be sensible magnitudes and all of them are significantly different from zero at 5\% level according to the t-test. The adjusted coefficient of determination (\( R^2 \)) is relatively high. The estimators are unbiased, consistent and efficient. The print-out of the adopted model’s estimation appears in Appendix C.2.
Table 5.2
Estimation of the Individual’s Relative Taxable Capacity Model during the Period 1986-89

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.69</td>
<td>0.18</td>
<td>3.91 [.000]</td>
</tr>
<tr>
<td>LM2P</td>
<td>0.28</td>
<td>0.04</td>
<td>6.76 [.000]</td>
</tr>
<tr>
<td>LNP</td>
<td>0.10</td>
<td>0.02</td>
<td>3.81 [.000]</td>
</tr>
<tr>
<td>LMANP</td>
<td>0.11</td>
<td>0.04</td>
<td>2.84 [.005]</td>
</tr>
<tr>
<td>LFP</td>
<td>0.27</td>
<td>0.04</td>
<td>7.54 [.000]</td>
</tr>
</tbody>
</table>

$\bar{R}^2$ 0.83

LM Test Statistic (AR[34]) 0.29

$X^2$ with 1 Degree of Freedom (5%) 3.84

Breusch-Pagan Test Statistic 1.85

$X^2$ with 4 Degrees of Freedom (5%) 9.49

- This Table is entirely original.
- The total observations used to estimate this model number 136 (34 [developing countries] * 4 [years covered the period 1986-89]).
- The sources of data are as given in section 2 of Chapter 3. The descriptions and computations of the variables which appear in this Table are as shown in section 3 of this Chapter.
- Prob appearing in the Table refers to the P-value (probability value). It can be defined as the smallest significance level at which we do not reject the null hypothesis.
5.4.2.2. Analysis of Model:-

This sub-section shows the analysis and explanation of results for the model. The individual’s relative taxable capacity and the tax effort of the thirty-four developing countries including Jordan will be computed for 1989 only. The reasons lying behind choosing this year as a representative for the period 1986-89 were discussed in Chapter 4, section 4.5. We should keep in mind that any increase in the individual’s share of each independent variable causes an increase in the individual’s ability to pay taxes. It consequently increases his relative taxable capacity.

The model during the period 1986-89 uses (log) the degree of monetisation represented by the ratio of money supply (M2) to the population. This variable expresses the degree of economic development. The model also uses (log) the individual’s share in each of the mining sector, and of the manufacturing sector respectively as explanatory variables. These two independent variables represent the composition of the GDP or its sectoral distribution. Meanwhile, (log) the individual’s share in commodity exports plus imports represents the degree of economic openness. Theoretically, as was shown in the literature review Chapter (Chapter 1, section 10), the individual’s relative taxable capacity is supposed to increase with the increase of all the above-mentioned independent variables.

The model adopted the degree of monetisation instead of the per capita of the GNP or the agricultural sector as an expression of the degree of economic development because it is statistically significant. Furthermore, there are several good economic reasons behind adopting this explanatory variable. The most important reasons for the use of monetisation in the economy as an explanatory variable expressing the degree of economic development can be signified through reviewing the factors which affect the money supply (money plus quasi money [M2]). These factors are: net domestic credit, net foreign reserves in the banking system and all the other items such as the capital of the banking system. There is a positive relationship between the first two factors and the money supply. However, a negative relationship exists between the third factor and the money supply. Therefore, the increase of the net domestic credit
or of the net foreign reserves will increase the money supply (liquidity). Meanwhile if the other items increase, the money supply will fall. The theoretical background of adopting this explanatory variable was discussed in Chapter 1, section 10.

It was shown in Chapter 1, section 10 that the degree of monetisation reflects the degree of economic development. It also reflects the degree of economic openness and represents the disposable income which may exceed the GNP when foreign aid and other external (financial) transfers are added to that product (see Table 5.5 [Jordan]). Consequently, this reflects an increase in the ability of individuals to pay taxes.

The model estimates the elasticity of the tax system in the sample of developing countries for the included independent variables. In other words, it shows how the growth rate of any independent variables included in the model will affect the growth rate of per-capita tax revenues (individual’s contribution to tax revenues). If the growth rate of the former exceeds that of the latter, elasticity for that variable will be less than unity. If the opposite occurs, the elasticity will exceed unity. The elasticity reflects the capacity to generate growth of the individual’s contribution to tax revenues. The first independent variable’s coefficient (the degree of monetisation) equals 28%. This shows that the relative taxable capacity of the individual (the estimated contribution of the individual to taxes) will change by 28% of any change in the ratio of money supply (M2) to the population, other things remaining equal.

The relative taxable capacity of the individual also increases whenever his income coming from the mining sector increases. This sector can be taxed easily. The coefficient of this explanatory variable amounts to 10%. This indicates that the individual’s relative taxable capacity will increase by 10% of any increase in the individual’s income from the mining sector. The coefficient of the third independent variable (the individual’s share in the manufacturing sector) amounts to 11%. This shows that a change in the relative taxable capacity of the individual by 11% will occur if, ceteris paribus, the individual’s share in that sector is double.

The model adopts the individual’s share in the manufacturing sector as a variable expressing the composition of the GDP, in addition to the individual’s share in the
mining sector for several reasons. The individual's share in the manufacturing sector reflects economic and commercial activity. It also reflects the ability of individuals to pay taxes and bear the burden as a result of the availability of the tax base. The estimation of the model for the period 1986-89 displays a positive relationship between the last independent variable (the individual's share in the manufacturing sector) and the relative taxable capacity of the individual. On the other hand, the use of this independent variable related to the GDP in the first approach (the whole economy's relative taxable capacity) refers to a negative relationship between this variable and the relative taxable capacity of the economy. This relates to the fact that the first approach measures the ability of the government to impose taxes and collect them, and its willingness to do this. Therefore, the ability of the government to collect taxes from the manufacturing sector decreases as soon as the ratio of this sector to the GDP increases. Most people who are working in this sector easily evade paying taxes because they do not keep easily audited written accounts. However, an increase in the individual's share from this sector in the second approach reflects an increase of the individual's ability to pay taxes.

The coefficient of the last independent variable (the ratio of merchandise exports plus imports to the population) amounts to 27%. This means that if this variable rises by one unit, 27% of that unit accrues to the government tax revenues. The model shows that the elasticities of the tax system for the degree of both monetisation (the ratio of money supply to the population) and economic openness (the ratio of exports plus imports to the population) are very close to each other (28% and 27% respectively). The same can be said about the second and the third explanatory variables (the individual's share in the mining and manufacturing sectors) (10% and 11% respectively).

All the practical results of this model are consistent with the theoretical relationship explained in section 2 of this Chapter and in section 10 of Chapter 1. These relationships are between the independent variables and the dependent variable. Furthermore, the explanatory power of this model, which is represented by the adjusted coefficient of determination ($R^2$), amounts to 83%. This indicates the fact
that 83\% of the change in the dependent variable (the individual’s contribution to tax revenues) is explained through the independent variables included in this model (per capita of each of the following: the money supply, the mining sector, the manufacturing sector, and merchandise exports plus imports). Meanwhile, the residual (17\%) is explained by social and political factors as well as other economic factors. These factors are not directly measurable. These factors were mentioned in Chapter 1, section 9.

The explanatory power of this model is considered to be comparatively high. This denotes the fact that the attempt to estimate relative taxable capacity by relating the independent variables and the dependent variable to the number of inhabitants has a positive effect on the results of this model compared with estimating relative taxable capacity by relating the explanatory variables and the explained variable to the GNP or GDP.

5.5. Empirical Results: -

In this section the individual’s relative taxable capacity will be estimated for the thirty-four developing countries including Jordan for 1989. This capacity is represented by the estimated individual’s contribution to total tax revenues. The tax effort is measured in every country by the ratio of the actual individual’s contribution to tax revenues over the individual’s relative taxable capacity. In other words, the model of this approach to estimate the relative taxable capacity of the individual (the estimated contribution of the individual to tax revenues) is applied. As stated in Chapter 4, a 95\% confidence interval for the capacity is computed using the standard error of each predicted value. Since the model adopted in this Chapter is in terms of log per capita (not per capita), great attention is given to compute the 95\% confidence interval for each predicted value (see Appendix C.3 for the calculations). Two columns therefore to show the individual’s relative taxable capacity are presented in Table 5.3. Note that the confidence interval we have obtained for the individual’s relative taxable capacity is relatively narrow (see Table 5.3). This affects both the tax effort and the analysis of the empirical results.
The individual's contribution to taxes in each country is divided by the individual's relative taxable capacity in the same country to compute the tax effort for the group of the developing countries under study. Again as a result of obtaining two figures for the relative taxable capacity for each country (95% confidence interval for the predicted value), two figures for the tax effort for each country are also computed and shown in Table 5.3. These reflect the range that this effort lies in between. We can say therefore, as mentioned in Chapter 4, that a country had exceeded its relative taxable capacity if both the tax effort figures were greater than one (Yemen). Conversely, if both the tax effort figures for a country were less than one, then we can say that the country had not exploited its taxable capacity (Colombia and Jordan). In cases where the tax effort bounds include the value one (Brazil), we can not decide. In other words, we cannot say that the country had/had not surpassed its relative taxable capacity. This is because the actual individual's contribution to tax revenues lies within the 95% confidence interval for taxable capacity.

It is worth saying that all the empirical results obtained in this Chapter are consistent with the theoretical framework of the study which was discussed in Chapter 1, section 10. They are also consistent with the practical results of the previous studies relating to this subject, especially the study of Tait and Eichengreen.

Table 5.3 shows the individual's relative taxable capacity and the tax effort for the developing countries in the study for 1989. The computations of the Table appear in Appendix C.3. The analysis will be restricted to the results pertaining to several developing countries including Jordan in a later section. The empirical results will also be linked with economic structure for those countries in the same section.

5.6. The Individual's Relative Taxable Capacity and Economic Structure:-

As in Chapter 4, the explanation of the empirical results for 1989 will be shown in this section for five developing countries among the thirty-four in the study. The discussion will also focus on showing the relationship between the individual's relative taxable capacity in each country selected and the economic structure of the
Table 5.3  
The Individual's Relative Taxable Capacity and the  
Tax Effort of the Developing Countries for 1989

<table>
<thead>
<tr>
<th>Country</th>
<th>Individual's Taxable Contribution to Tax Revenues</th>
<th>95% Confidence Interval</th>
<th>Tax Effort 95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal</td>
<td>12.5216</td>
<td>17.0581</td>
<td>19.8095</td>
</tr>
<tr>
<td>Argentina</td>
<td>19.6005</td>
<td>19.1104</td>
<td>22.6675</td>
</tr>
<tr>
<td>Ghana</td>
<td>33.3509</td>
<td>37.9415</td>
<td>43.8335</td>
</tr>
<tr>
<td>India</td>
<td>43.7044</td>
<td>39.5270</td>
<td>45.7247</td>
</tr>
<tr>
<td>Pakistan</td>
<td>52.7532</td>
<td>54.5948</td>
<td>63.0238</td>
</tr>
<tr>
<td>Egypt</td>
<td>54.9255</td>
<td>55.1972</td>
<td>63.7389</td>
</tr>
<tr>
<td>Kenya</td>
<td>63.7361</td>
<td>37.3472</td>
<td>43.1654</td>
</tr>
<tr>
<td>Zambia</td>
<td>64.5937</td>
<td>86.4168</td>
<td>99.7096</td>
</tr>
<tr>
<td>Paraguay</td>
<td>70.1827</td>
<td>81.1635</td>
<td>93.8695</td>
</tr>
<tr>
<td>Liberia</td>
<td>81.1952</td>
<td>72.2824</td>
<td>83.4772</td>
</tr>
<tr>
<td>Indonesia</td>
<td>84.1323</td>
<td>70.5899</td>
<td>81.5035</td>
</tr>
<tr>
<td>Yemen</td>
<td>91.5222</td>
<td>69.4656</td>
<td>80.2673</td>
</tr>
<tr>
<td>Philippines</td>
<td>93.7405</td>
<td>89.7052</td>
<td>103.5809</td>
</tr>
<tr>
<td>El Salvador</td>
<td>96.7206</td>
<td>87.7361</td>
<td>101.6115</td>
</tr>
<tr>
<td>Colombia</td>
<td>104.4833</td>
<td>111.4211</td>
<td>128.6216</td>
</tr>
<tr>
<td>Ecuador</td>
<td>106.0022</td>
<td>110.1382</td>
<td>127.1960</td>
</tr>
<tr>
<td>Brazil</td>
<td>115.3085</td>
<td>111.1328</td>
<td>129.5152</td>
</tr>
<tr>
<td>Cameroon</td>
<td>134.1645</td>
<td>97.3279</td>
<td>112.3215</td>
</tr>
<tr>
<td>Turkey</td>
<td>165.5773</td>
<td>145.1581</td>
<td>167.6049</td>
</tr>
<tr>
<td>Syria</td>
<td>178.7210</td>
<td>169.9783</td>
<td>196.2824</td>
</tr>
<tr>
<td>Morocco</td>
<td>187.5032</td>
<td>119.2625</td>
<td>137.6309</td>
</tr>
<tr>
<td>Peru</td>
<td>187.6603</td>
<td>176.9928</td>
<td>204.4249</td>
</tr>
<tr>
<td>Thailand</td>
<td>203.6184</td>
<td>201.0037</td>
<td>231.9926</td>
</tr>
<tr>
<td>Jordan</td>
<td>203.9962</td>
<td>249.4022</td>
<td>288.2783</td>
</tr>
</tbody>
</table>

219
<table>
<thead>
<tr>
<th>Country</th>
<th>Table 1</th>
<th>Table 2</th>
<th>Table 3</th>
<th>Table 4</th>
<th>Table 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunisia</td>
<td>214.0375</td>
<td>198.8051</td>
<td>229.4298</td>
<td>.93291</td>
<td>1.0766</td>
</tr>
<tr>
<td>Chile</td>
<td>284.3289</td>
<td>146.5247</td>
<td>169.8406</td>
<td>1.6741</td>
<td>1.9405</td>
</tr>
<tr>
<td>Venezuela</td>
<td>324.1643</td>
<td>263.4331</td>
<td>304.2171</td>
<td>1.0656</td>
<td>1.2305</td>
</tr>
<tr>
<td>Mexico</td>
<td>340.1754</td>
<td>168.6009</td>
<td>194.7071</td>
<td>1.7471</td>
<td>2.0176</td>
</tr>
<tr>
<td>Fiji</td>
<td>343.2527</td>
<td>196.6680</td>
<td>227.1041</td>
<td>1.5114</td>
<td>1.7453</td>
</tr>
<tr>
<td>Uruguay</td>
<td>387.6736</td>
<td>331.4291</td>
<td>382.8316</td>
<td>1.0126</td>
<td>1.1697</td>
</tr>
<tr>
<td>Mauritius</td>
<td>405.1695</td>
<td>278.3513</td>
<td>321.8434</td>
<td>1.2589</td>
<td>1.4556</td>
</tr>
<tr>
<td>Malaysia</td>
<td>457.9876</td>
<td>434.9105</td>
<td>502.6066</td>
<td>.91122</td>
<td>1.0531</td>
</tr>
<tr>
<td>Korea</td>
<td>508.7666</td>
<td>371.4157</td>
<td>429.2992</td>
<td>1.1851</td>
<td>1.3698</td>
</tr>
<tr>
<td>Cyprus</td>
<td>545.3284</td>
<td>427.1215</td>
<td>494.1551</td>
<td>1.1036</td>
<td>1.2768</td>
</tr>
</tbody>
</table>

-This Table is entirely original.

-The sources of data are as given in section 2 of Chapter 3.

-The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.

-The developing countries are sorted in an ascending order according to the individual's contribution to tax revenues during the same year.

-The individual's relative taxable capacity figures appear in terms of US$. 

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country. This will be useful in making a connection between the tax effort figure and the economic characteristics of each country. The sub-sample has been kept relatively small because of the similarity of what we can say about each country in it and about the other developing countries. This sample includes the developing countries with both relatively high and relatively low tax effort. It is also chosen to reflect the distribution of countries over different geographical regions (see section 6 of Chapter 4 for more details).

In this section, the empirical results which appear in Table 5.3 concerning the individual’s relative taxable capacity and the tax effort for these countries will be compared with the main economic characteristics for the same developing countries which appear in Table 5.5 for 1989. The results of Table 5.3 are copied in Table 5.4 for the five developing countries in order to facilitate the comparison process among them. These characteristics are represented by the three factors which themselves determine the individual’s relative taxable capacity. These factors are: the degree of economic development, the composition of the GDP or its sectoral distribution, and the degree of economic openness. They are represented by the last nine variables which appear in Table 5.5. The first variable in the same Table (the individual’s contribution to tax revenues) represents the dependent variable (see Table 5.5). In the following sub-sections the analysis of the empirical results is given for each country. To avoid repetition, we should keep in mind the following important points:-

1- The developing countries appearing in Tables 5.4 and 5.5 are arranged in an ascending order according to the contribution of the individual to tax revenues recorded in each, starting with the lowest figure. Yemen, therefore, will be given great attention because it is the first country. The other countries will be given less explanation. The practical results as well as the economic developments in Jordan will be discussed in more detail in Chapter 7.

2- The individual’s relative taxable capacity is defined as the individual’s contribution to tax revenues that has to be collected when each country applies the same tax rates for the tax system by applying regression analysis. The
capacity also takes into consideration the factors which determine this capacity. These factors reflect the ability of individuals to pay taxes (see section 3 of Chapter 1).

3- The theoretical framework of this Chapter establishes the sign of all the relationships between each causal variable and the individual’s relative taxable capacity. All these relationships are positive. The reasons for each relationship were discussed in Chapter 1 (section 10). Any increase in the individual’s share from each independent variable reflects an increase in his ability to pay taxes. The "ability-to-pay principle" was discussed in Chapter 1 (section 3).

4- The estimation of the model presented in this Chapter demonstrates the applicable tax elasticity for each independent variable (one aspect of the economic structure), e.g. the elasticity for the individual’s share from the manufacturing sector amounted to 11%. The individual’s relative taxable capacity in the five developing countries selected as a sub-sample can be computed by applying the model to Table 5.5 (after converting all the included independent variables into logs). This can be done by multiplying the coefficient of each independent variable by its correspondent relative importance (please refer to Table 5.5). The individual’s share from each variable represents one feature of the economic structure. It is necessary then to sum all these results to obtain the relative taxable capacity for the model (after converting this figure for each country into per capita [not log per-capita]).

5- The tax effort which is measured by dividing the individual’s contribution to taxation by the individual’s relative taxable capacity, links together the concepts of economic structure and tax system. The empirical results obtained for the thirty-four developing countries in the study can therefore be explained by considering these two aspects (economic structure and tax system). For example, a country with a low per capita income from the explanatory variables has less scope for the transfer of resources to the government. This
low income is needed to cover the household basic needs, where this is defined (see for example Todaro 1997) to mean simple subsistence only\(^1\). The main attributes of the economic structure, especially those included in the model adopted, for the developing countries in the study are shown in Table 5.5. The independent variables included in the model are the log of the following: M2P, NP, MANP, FP. All the abbreviations are as described in section 5.3 of this Chapter.

6- The explanation of the empirical results for the sub-sample developing countries is restricted, in the following sub-sections, to 1989. This is done because the analyses for this year are valid for the other years (1986-88).

5.6.1. Yemen:–

The individual’s contribution to tax revenues in Yemen for 1989 amounted to US$ 91.5. It registers the lowest figure among the sub-sample (see Tables 5.4 and 5.5). This contribution equals less than half of that of Jordan and Tunisia. In other words, it is observed that this contribution is low compared with those of the thirty-four developing countries (see Tables 5.3 and 5.4). On the other hand, the individual’s relative taxable capacity in Yemen lies, according to the model, between US$ 69.5 - 80.3 with a 95% confidence interval. This is the lowest relative taxable capacity among the sub-sample of the developing countries (see Table 5.4). This means that this tax (predicted value) which is approximately close to average (but not the average as the case in Chapter 4) of the above two figures since the 95% confidence interval was computed in terms of log per capita then it was converted into per capita tax revenues) had to be paid by individual’s in Yemen when it applied the same tax rates for each type and base of the tax system. In other words, Yemen had exploited more than its individual’s relative taxable capacity. This is confirmed when the tax effort which is measured by the ratio of the former (individual’s contribution to tax

\(^1\) Basic needs are a term used by the International Labour Organisation to refer to the necessities for a minimum standard of living (such as food, shelter, clothing...etc.) (Todaro 1997).
revenues) to the latter (individual’s relative taxable capacity) is computed. The tax effort in Yemen exceeds one (1.14 - 1.32) (see Table 5.4). This indicates that there was no room to increase tax revenues in Yemen.

The explanation of these empirical results can be shown by connecting them with the economic structure. It is helpful to refer to the factors which determine the individual’s relative taxable capacity, especially the independent variables included in the adopted model of the second approach (see section 2 and 4 of this Chapter). Table 5.5 shows that the per capita of all the variables ranks in different positions among the sub-sample of the developing countries in the study. Three independent variables included in the model recorded the lowest figures. These variables are: per capita of manufacturing sector, mining sector, and merchandise exports plus imports (see Table 5.5).

Therefore, the recorded individual’s relative taxable capacity in Yemen for the year under study resulted from the lowest individual’s share from the previous variables (see Table 5.5). These variables can be interpreted as tax bases. The theoretical framework of this Chapter shows that there is a positive relationship between each explanatory variable (tax base) and this capacity. The reasons lying behind each relationship were discussed in Chapter 1, section 10. The decline per capita of each independent variable, therefore, decreases the individual’s ability to pay taxes (Sarojini 1992). This is in line with equity. It represents one of the most important attributes of a good tax system. Equity was discussed in detail in Chapter 1, section 3. Yemen is a country with a low income. As stated before, this income is needed to buy the necessities of life (food) (Musgrave and Musgrave 1989). These necessities are usually exempted from tax and this reduces the individual’s relative taxable capacity. The same can be said about the other independent variables. The availability of tax bases is, therefore, related to the economic structure.

5.6.2. Colombia:-

The tax effort in Colombia, according to the model for 1989, amounted to less than
one (0.81 - 0.94) (see Table 5.4). This indicates that there was room to increase tax revenues in Colombia in order to exploit its individual’s relative taxable capacity. These results can be explained by connecting them with the economic structure. Table 5.5 shows that the per capita of all the variables during the same year ranks in different positions among the sub-sample of the developing countries under study. These positions ranged between the second highest for the individual’s share in the mining and manufacturing sectors and the lowest for the ratio of money supply to the population (see Table 5.5). The coefficients of the explanatory variables included in the adopted model, which estimate the elasticity of the tax system, show that the tax elasticity for the first two explanatory variables (mining and manufacturing) is relatively low (10%), while this elasticity for the money supply is relatively high (28%). As previously shown, there is a positive relationship between the individual’s relative taxable capacity and each independent variable and its magnitude depends on the above-mentioned coefficients. Consequently, the individual’s relative taxable capacity recorded modest figures in Colombia (US$ 111.4 - 128.6 with 95% confidence interval). These are the lowest figures after Yemen among the five developing countries (see Table 5.4). These figures represent the denominator of the tax effort identity (the estimated contribution of the individual to tax revenues). However, the individual’s contribution to tax revenues which represents the numerator amounts to US$ 104.5. This again is the lowest figure after Yemen among the five developing countries (see Table 5.5). This, in turn, leads to a relatively low tax effort.

Musgrave and Musgrave (1989) showed that relative taxable capacity depends on the economic structure of each country. The capacity is proportional to per capita income from the explanatory variables. A country with a low per capita income from these has less scope for the transfer of resources to the public sector. This, therefore, reduces relative taxable capacity. In the case of Colombia, it registered, for example, the lowest the money supply per capita (see Table 5.5). This leads to an expectation that Colombia will record a low individual’s relative taxable capacity. This is what occurred (see Table 5.4). This analysis is consistent with the economic framework of relative taxable capacity which was discussed in Chapter 1 (sections 8-10).
5.6.3. Turkey:

The tax effort in Turkey lay between 0.99 and 1.14 (see Table 5.4). This shows that the lower figure (limit) is very close to one. In this case, this indicates that Turkey almost certainly exploited its individual’s relative taxable capacity for 1989.

To explain the empirical result, we have to look at Table 5.5 to see how this result can be linked with the economic structure. Turkey ranks the highest after Tunisia and Jordan among the sub-sample according to the individual’s contribution to tax revenues. This represents the numerator of the tax effort identity. However, the denominator of this identity which is the individual’s relative taxable capacity is affected by the independent variables (please refer to Table 5.5). These variables in Turkey rank in a different position among the five developing countries. It ranges for the explanatory variables included in the model between the highest first and the lowest second for per capita of the manufacturing sector and of the mining sector respectively. Consequently, this gives a relatively moderate individual’s relative taxable capacity (US$ 145.2 - 167.6) compared with the actual individual’s contribution to tax revenues (US$ 165.6).

Turkey in respect of relative taxable capacity ranks third among the sub-sample of developing countries. Note also that Turkey ranks third according to the individual’s contribution to tax revenues. The contribution reflects both tax bases (economic structure) and tax system (tax rates). The relative taxable capacity of the individual reflects both tax bases (independent variables included in the model can be interpreted as tax bases) and tax elasticities (the coefficient of each independent variable is interpreted as a tax elasticity).

5.6.4. Jordan:

Table 5.4 shows that the individual’s relative taxable capacity for Jordan for 1989 lay between US$ 249.4 - 288.3. This means that, given the logic of the model, if Jordan as well as the other thirty-three developing countries applied the same tax
Table 5.4
The Individual’s Relative Taxable Capacity and the Tax Effort of the Developing Countries for 1989

<table>
<thead>
<tr>
<th>Country</th>
<th>Individual’s Contribution to Tax Revenues</th>
<th>Taxable Capacity</th>
<th>Tax Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95% Confidence Interval 95% Confidence Interval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yemen</td>
<td>91.5222</td>
<td>69.4656</td>
<td>80.2673</td>
</tr>
<tr>
<td>Colombia</td>
<td>104.4833</td>
<td>111.4211</td>
<td>128.6216</td>
</tr>
<tr>
<td>Turkey</td>
<td>165.5773</td>
<td>145.1581</td>
<td>167.6049</td>
</tr>
<tr>
<td>Jordan</td>
<td>203.9962</td>
<td>249.4022</td>
<td>288.2783</td>
</tr>
<tr>
<td>Tunisia</td>
<td>214.0375</td>
<td>198.8051</td>
<td>229.4298</td>
</tr>
</tbody>
</table>

-This Table is entirely original.
-The sources of data are as given in section 2 of Chapter 3.
-The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.
-The developing countries are sorted in an ascending order according to the individual’s contribution to tax revenues during the same year.
-The individual’s relative taxable capacity figures appear in terms of US$.
-This Table is part of Table 5.3. It is reproduced to show the empirical results of the five sub-sample developing countries.
Table 5.5
Selected Economic Indicators for
the Developing Countries for 1989

(In US$)

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax Revenues</th>
<th>Gross National Product</th>
<th>Agric-Supply</th>
<th>Whole-Manufacturing</th>
<th>Min- plus</th>
<th>Exports</th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yemen</td>
<td>91.5</td>
<td>554.7</td>
<td>340.5</td>
<td>129.1</td>
<td>52.3</td>
<td>57.7</td>
<td>6.8</td>
<td>162.0</td>
</tr>
<tr>
<td>Colombia</td>
<td>104.5</td>
<td>1188.1</td>
<td>213.2</td>
<td>198.3</td>
<td>174.7</td>
<td>252.8</td>
<td>91.5</td>
<td>331.4</td>
</tr>
<tr>
<td>Turkey</td>
<td>165.6</td>
<td>1459.7</td>
<td>411.8</td>
<td>126.5</td>
<td>248.0</td>
<td>385.5</td>
<td>27.9</td>
<td>573.6</td>
</tr>
<tr>
<td>Jordan</td>
<td>204.0</td>
<td>1206.9</td>
<td>1644.3</td>
<td>59.5</td>
<td>81.6</td>
<td>140.9</td>
<td>85.5</td>
<td>1029.7</td>
</tr>
<tr>
<td>Tunisia</td>
<td>214.0</td>
<td>1295.4</td>
<td>689.0</td>
<td>153.5</td>
<td>257.8</td>
<td>183.1</td>
<td>100.9</td>
<td>923.2</td>
</tr>
</tbody>
</table>

-This Table is entirely original. The sources of data are as given in section 2 of Chapter 3.
-The computations of the variables which appear in this Table are as shown in Appendix C.1 of this Chapter. The computed figures which appear in this Table are rounded down to one decimal point.
-The developing countries which appear in this Table are sorted in an ascending order according to their individual’s contributions to tax revenues which is measured by dividing total tax revenues (excluding social security contributions) over the number of population in each country for 1989.
system (included in the model), Jordan would collect approximately the mean of the amounts cited above (the predicted value). The individual’s contribution recorded to tax revenues in Jordan for the same year (1989) reached US$ 204. This occurred because Jordan had not applied the prevailing average tax rate obtained from the model for the thirty-four developing countries.

Consequently, the tax effort which is the result of dividing the latter (individual’s contribution to tax revenues) by the former (individual’s relative taxable capacity), amounts for the model to less than one (0.71 - 0.82). This refers to the fact that the actual contribution of the individual to taxes has not surpassed the individual’s relative taxable capacity. In other words, there was room to increase tax revenues in Jordan in order to use its individual’s relative taxable capacity.

When the tax effort for the model of the first approach which was mentioned in Chapter 4 is compared with that of the model of the second approach which is mentioned in this Chapter, we observe that there is an important common factor between them. This is represented by the fact that the recorded tax effort according to each had not exceeded one. This effort according to each ranged with a 95% confidence interval 0.67 - 92% and 71% - 82% respectively. This means that there was room to increase tax revenues in Jordan for 1989 in order to exploit the relative taxable capacity. This shows that these results are consistent with each other.

The explanation of the empirical results can be shown by connecting them with the economic structure. It also will take into consideration the factors which determine the individual’s relative taxable capacity, especially the independent variables included in the model of the second approach. Table 5.5 shows the following important points:

1. The ratio of money supply to the population in Jordan ranks first among the five developing countries under study for 1989 as shown. It exceeded the per capita GNP during the same year by US$ 437 (see Table 5.5). This is due mainly to the accelerated growth rates of the money supply which is not
matched by a similar increase in the GNP. This was the outcome of increasing the net foreign reserves resulting from the inflow of Arab financial assistance. In addition to this there was the increase of the general budget fiscal deficit, which led the government to finance this deficit by external and internal borrowing, particularly printing money in the form of extraordinary advances offered by the Central Bank of Jordan. This resulted in an increase in the net domestic credit offered to the government.

Consequently, this led to a monetary expansion, which, in turn, raised the inflation rates in 1989 to double figures. This increased the proceeds of consumption tax and income tax in Jordan. Income tax, during inflation, grows in revenue importance since it is progressive. The starting basic point and the starting point for each of the higher rate bands fall in real terms. Accordingly, the taxpayers may find themselves moving into higher brackets. The taxpayers, therefore, find themselves paying at a higher marginal rate (Sandford 1992).

2- The individual’s contribution to tax revenues in Jordan amounted for 1989, as shown earlier, to US$ 204.0. Jordan according to this figure ranks the highest after Tunisia among the five developing countries which appear in Table 5.5. It lies above the prevailing average among the thirty-four developing which amounts to US$ 185.5 (see Tables 5.3 and 5.4). It is worth saying that further explanation for these empirical results pertaining to Jordan will be given in Chapter 7 when the individual’s relative taxable capacity during 1973-95 is estimated.

5.6.5. Tunisia:-

The tax effort demonstrated by individuals in Tunisia according to the model for 1989 ranged between 0.93 - 1.08 with a 95% confidence interval (see Table 5.4). In this case, it is very difficult to decide whether Tunisia surpassed/ did not surpass its individual’s relative taxable capacity. This is because the individual’s contribution to
tax revenues lay between the two values (limits) of the individual’s taxable capacity with 95% confidence interval.

Table 5.5 shows the independent variables included in the model. These are: the individual’s share from each of the mining sector (NP), merchandise exports plus imports (FP), money supply (M2P), and the manufacturing sector (MANP). These variables recorded in Tunisia the highest first for the first variable (NP), the second for the second and the third variables (FP and M2P), and the third for the last variable (MANP) among the sub-sample of the developing countries under study respectively. This, in turn, leads to a relatively high individual’s relative taxable capacity as a result of the positive relationship between the relative taxable capacity and the included variables in the model of the second approach (US$ 198.8 - 229.4). The individual’s relative taxable capacity depends on both the coefficients of the independent variables included in the model (elasticities) and the magnitude of each explanatory variable in the country. The analysis which was adopted in the previous four sub-sections, particularly the relationship between the capacity and per capita income from these explanatory variables, is valid here. This analysis connects relative taxable capacity with economic structure.

The actual individual’s contribution to tax revenues in Tunisia for 1989 is very high. Tunisia, in respect of this contribution, ranks first among the same sub-sample under study (US$ 214.0). This, in turn, leads to a relatively moderate tax effort. This resulted from the numerator of the tax effort identity (the contribution of the individual to tax revenues) and the denominator (the individual’s relative taxable capacity) of this identity for 1989. The place of Tunisia according to this contribution among the thirty-four developing countries lies in the second half of these countries (25) (see Table 5.4). This means that this contribution is high. Please note that the developing countries are arranged in an ascending order, starting with the lowest contribution.

It is worth saying that Yemen registered the lowest figures of the individual’s relative taxable capacity, followed by Colombia, then Turkey. They were followed
then by Tunisia. Jordan occupied the highest relative taxable capacity figures (see Table 5.4). The individual's relative taxable capacity as previously defined in Chapter 1 (section 6) is the individual contribution to tax revenues that has to be collected when each country applies the same tax rates for each type and base of the tax system. Therefore, if all thirty-four developing countries apply the same tax rate as shown, each country will obtain an individual contribution to tax revenues equal exactly to the predicted value of the individual's relative taxable capacity. In this case, this means that each country exploits its relative taxable capacity.

However, as a result of those countries not exploiting their tax base as much as the other did, this led to their obtaining different individual contributions to tax revenues. Yemen records the least burden (US$ 91.5), followed by Colombia (US$ 104.5), then Turkey (US$ 165.6) and Jordan (US$ 204.0). Tunisia registers the highest figure (US$ 214.0) (see Tables 5.4 and 5.5). This is reflected by the tax effort recorded in each country which is measured by the ratio of the latter (individual's contribution to tax revenues) to the former (individual's relative taxable capacity).

The individual's relative taxable capacity was connected with the economic structure of each developing country in the sub-sample in this section. It was shown that relative taxable capacity is directly proportional to each independent variable. Countries with a high per capita income from these explanatory variables (aspects of economic structure) (Jordan and Tunisia) registered a high individual's relative taxable capacity. Furthermore, countries with a low per capita income from these sources (Yemen and Colombia) are also countries with low individual's relative taxable capacity. This reflects the availability of tax bases. The reasons for this relationship were shown in the previous sub-sections. This is consistent with the economic theory. Per capita of the variables included in the model represents a tax base. Any increase in the base will increase relative taxable capacity. This is because it increases the individual's ability to pay taxes. This is in line with equity (see Chapter 1, section 3, for further discussion about the attributes of a good tax system and how these can be connected with relative taxable capacity). The reasons lying behind each relationship were discussed in detail in Chapter 1, sections 9 and 10.
It is worth saying that the point of view of this study which was discussed in Chapter 1, section 5 is that relative taxable capacity is not the same figure for all countries regardless of the stage of development or the economic structure and the tax system of each. This means that each country has its own relative taxable capacity. This point can be clarified by looking at Table 5.4. Each country has its own relative taxable capacity. Furthermore, it is obvious that the tax effort does not depend only on the individual’s contribution to tax revenues. Yemen is a country with the lowest individual’s contribution to tax revenues but it registered the highest tax effort (see Table 5.4) among the five developing countries in the sub-sample, while Tunisia, a country with the highest of this contribution recorded a moderate tax effort. This reflects the economic structure of each and clarifies the point of view of this study.

5.7. Summary of the Chapter:-

The individual’s relative taxable capacity and the tax effort for the developing countries including Jordan were estimated for 1989 in this Chapter. The analysis was carried out on several selected developing countries including Jordan. The individual’s relative taxable capacity was also connected with economic structure for those countries. The relative taxable capacity of the individual and the tax effort were estimated for all the developing countries which were the subject of the study.

The most important result of this Chapter is similar to that of Chapter 4. It is represented by the fact that the tax effort recorded in Jordan according to the model did not exceed one for 1989. This indicates, according to this model, that there was room to increase tax revenues in Jordan. This result, as stated in Chapter 4, will be given greater explanation when is connected with the economic situation which was prevailing during the period 1973-89 from a public choice perspective (see sub-section 7.4.6 in Chapter 7).
Chapter 6
Estimating the Relative Taxable Capacity and the Tax Effort for Developing Countries including Jordan
(An Arithmetic Approach)

6.1. Introduction:

On tackling the approaches by which the relative taxable capacity for a certain economy is estimated, it was mentioned that they are divided into two kinds. The first uses econometric models. The second uses arithmetic. The first approach was divided, in the current study, into two sub-approaches. The first was called the whole economy's relative taxable capacity. This capacity was estimated for the thirty-four developing countries which are the subject of the study for the period 1986-89 in Chapter 4. The second sub-approach was called the individual’s relative taxable capacity and was estimated for the same developing countries during the same period in Chapter 5.

The second approach estimates the relative taxable capacity of the developing countries under study by adopting an arithmetic approach. The theoretical framework for this approach was explained in Chapter 1 of this thesis. In the present Chapter, the relative taxable capacity will be estimated for thirty-four developing countries for the same period. It is worth saying that this approach for total tax revenues is a special case of the econometric models discussed in Chapters 4 and 5 (see section 1.6 in Chapter 1 for more details).

The main advantage of this approach is represented by measuring the relative taxable capacity for total tax revenues as well as for their major components. In addition, this approach does not suffer from any econometric problems which may arise as a result of using econometric models. However, it does not take into account
the factors which determine the relative taxable capacity as the econometric approach does. These factors were discussed in Chapter 1, sections 9 and 10.

The main aims of this Chapter are two in number. The first is to find out whether tax revenues in Jordan can be increased/decreased. This Chapter will look at the range of exploitation of relative taxable capacity in Jordan. In other words, we will have one of three possible cases. First, Jordan exploits its relative taxable capacity to the full. This means that there is no room to increase tax revenues. Second, the country does not exploit the capacity. This suggests that there is room to increase taxes in order to exploit the relative taxable capacity to the full. This can be done by increasing current tax rates or by imposing new taxes. Third, Jordan exceeds its relative taxable capacity. In this case tax revenues should be decreased in order to ensure that exploitation does not proceed beyond capacity. We will proceed by comparing the tax burden for total tax revenues with the relative taxable capacity.

The second aim is to find which taxes should be increased/decreased among the components of the tax revenues. This Chapter will also investigate if there is a balance in exploiting all the tax revenue component bases in Jordan or not compared with those of the other thirty-three developing countries in the study. If there is a shortfall, we will ask what the government should do to achieve the balance of the tax system in Jordan. This will be done by dividing total tax revenues into four major components, as will be shown later, and then computing the relative taxable capacity and the tax effort for each. Accordingly, we will be able to see which taxes should be increased/decreased. In other words, as stated in Chapter 1, the practical results of this approach can be compared across economic sectors (tax bases) to show which of them are better candidates for an increase/decrease in tax revenues in an overall reform package (Dahl and Mitra 1990). It is worth saying that all data, computations, tables, analysis as well as the empirical results and conclusions which appear in this Chapter are entirely original and are the researcher's own work.
6.2. Theoretical Framework:

The relative taxable capacity was defined in Chapter 1 as the tax revenue per unit of the GNP that has to be collected when each country applies the same tax rate for each type and base of the tax system. The approach which is adopted in this Chapter estimates the relative taxable capacity arithmetically for the major components of tax revenues and for each of the developing countries under study. This will be done by computing the actual tax burden (TB) for each type of tax and for every country. This burden is measured by the ratio of the proceeds of each tax to its base. Then the average of the TB of each tax for the sample of the developing countries is computed. This average represents the relative taxable capacity (RTC). The tax effort tax (TE) for every tax and for each country is measured by the ratio of the former (TB) to the latter (RTC) (see Chapter 1, section 6 and sub-section 8.3). This approach shows how much each country exploits the available tax base to collect taxation compared with the other developing countries.

The GNP at current factor cost (GNP minus net indirect taxes) is considered, in this work, as a base for total tax revenues (excluding social security contributions). The reasons for excluding net indirect taxes from the GNP and excluding social security contributions from tax revenues were discussed in Chapter 3, section 3. Total tax revenues are then divided into four major components as follows:

1- The first part is tax on income, profits & capital gains. The GNP at current factor cost (GNP minus net indirect taxes) is also considered to be a base for it.

2- The second part is taxes on international trade. The degree of economic openness represented by merchandise exports plus imports is considered to be its base.

3- The third kind is domestic taxes on goods & services. The GNP at current factor cost (GNP minus net indirect taxes) minus merchandise exports
represents the base for these taxes. Commodity exports are excluded from the base for domestic taxes on goods & services because they are subject to customs duties at the time of exploitation. Also the exporters' profits are included in income, profits & capital gains taxes.

4- The last part is other taxes (mainly the proceeds from taxes on payroll & work force and property taxes). The GNP at current factor cost (GNP minus net indirect taxes) is the base for these taxes.

It should be mentioned that there are better tax bases than those selected to represent the previous tax revenue components in every country. Because of the comparatively large size of the sample (thirty-four developing countries), and the variations in productive structure and tax system in each of the developing countries under study -in addition to the non-availability of data in regard to these bases for the sample- the bases that are more general and comprehensive are adopted. This avoids the above-mentioned variations and secures a unified standard.

6.3. Computation of the Relative Taxable Capacity (RTC) and the Tax Effort (TE):-

This section shows the steps in computing the relative taxable capacity and the tax effort for total tax revenues and the four major components of these revenues shown earlier. These are the following:-

1- The total tax revenues (excluding social security contributions) as well as the four components of these revenues have been divided by their bases in each country in every year of the period 1986-89 to compute the TB for each tax for each year and for every country. Several reasons lie behind the exclusion of social security contributions from tax revenues. All of them were mentioned in detail in Chapter 3, section 3.

2- The average of the TB for each tax for four years is computed by itself for
every country. This is done in order to decrease the impact of fluctuations such as natural disasters or unfavourable climatic conditions as shown in section 2 of Chapter 3.

3- To compute the RTC for each tax in the period, the average of the TB for the thirty-four developing countries for each kind of tax has been computed (this is done by using the "COR" command which is available in the Microfit package).

4- The TE for every kind of tax during the era under study (1986-89) and for every country is computed by dividing the TB for each type of tax and for every country by the respective RTC.

5- The developing countries therefore, are sorted in an ascending order according to the tax burden recorded in every country for the same period (this is done by using the "ORDER" command which is also available in the Microfit package).

6- According to the TE recorded in each, the developing countries are ranked for every kind of tax for the period 1986-89 by using the "RANK" command which is available in the same package.

7- All the above-mentioned steps, except the third one because it can not be run by the "BATCH" file, have been done by using the "BATCH" file to facilitate the computation editing process. This file is available in the MS-DOS Editor package. The file is run with the "BATCH" command which is available in the Microfit package to compute the RTC and the TE for each country and for every kind of tax (see Appendix D).

6.4. Empirical Results:-

In this section the relative taxable capacity (RTC) and the tax effort (TE) will be
computed for the thirty-four developing countries including Jordan for the period 1986-89. This approach considers the average of the tax burden (TB) for all the developing countries under study as a representative of relative taxable capacity. When the capacity is compared with the applicable tax rate in any of the developing countries (TB), by dividing the latter (TB) by the former (RTC), we find out the tax effort of that country. Applying this to the previous tax revenue components in all the developing countries in the study, the results which are displayed in Table 6.1 are obtained. This Table is computed by using different commands and facilities available in the Microfit package as shown earlier. The RTC for total tax revenues as well as for each kind of taxes are not shown in the Table. This is because the RTC represents one figure for each kind of taxes (the average of the tax burden). The sources of data are previously mentioned in Chapter 3, section 2. The developing countries are sorted in an ascending order in this Table according to the tax burden recorded in each country for the period 1986-89.

Three possible cases may be obtained in respect of the tax effort (TE). First, when the TE for any kind of tax reaches integral one. The country is then considered to have exploited the base of that kind of tax to the full. Second, when the TE exceeds integral one in any country and for any tax revenue components. This means that the country exceeds, in exploitation, its relative taxable capacity. Third, when the TE for any kind of tax is less than integral one. This means that the country has not yet reached the exploitation of its relative taxable capacity of that tax to the full. It is worth saying that all the empirical results appearing in this Chapter are based on both the theoretical framework previously discussed in Chapter 1 (section 6 and sub-section 8.3) and the data collected by hand for the developing countries subject to study as well as the computation of the RTC and the TE. Consequently, all these results are correct if the economic theory is logical and if the data collection as well as the adopted procedures for computation are correct.

The analysis will be limited to the results pertaining to Jordan because the circumstances in Jordan are the primary target of the present study. The concentration on Jordan is also appropriate because of the similarity of what is said about Jordan
to what might be said about the other thirty-three developing countries included in the study. The results pertaining to Jordan can be followed by looking at the line of the observation serial number 19 in Table 6.1. The place of Jordan, according to the TE for total tax revenues and their four major components among the thirty-four developing countries under study, is very important. It gives an indication, in addition to the TE figures, about the range of exploitation of relative taxable capacity. Figures 6.1 and 6.2 show the TE of total tax revenues as well as of the four major components of these revenues for the thirty-four developing countries for the period 1986-89. When the TE in Jordan for total tax revenues and the four major components in the same period (1986-89) is compared, we observe the following important points:

1- First of all, it might be useful to say that the TE of total tax revenues properly represents the first approach for measuring the relative taxable capacity and the tax effort which was reviewed in Chapter 1. It is called the "Tax Burden" (see Chapter 1, sub-section 8.1). It is observed that the order of Jordan among the group of the developing countries for the same period according to this method, is identical to its order according to the tax burden applicable in it. This is obvious when we look at Table 6.1 and see the rank of Jordan or any other developing country under study in respect of the tax burden recorded in it and compare this rank with that of the TE of total tax revenues.

2- The TE of total tax revenues (excluding social security contributions) amounted to 0.978 for the period 1986-89. This shows that the TE had not exceeded the relative taxable capacity. That is to say that Jordan almost exploited its relative taxable capacity to the full during this period (about 2% of the relative taxable capacity was unexploited). This means that there was some room for collecting more tax revenues to reach the exploitation of the relative taxable capacity to the full but it is relatively low.
Table 6.1
The Tax Effort (TE) for the Developing Countries during the Period 1986-89

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Tax Effort</th>
<th>Tax Rank of TE</th>
<th>Tax on Income, Profits Rank of TE</th>
<th>Taxes on International Trade Rank of TE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Paraguay</td>
<td>.46417</td>
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<td>.23034</td>
<td>.56636</td>
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</table>

- This Table is entirely original.
- The sources of data are as given in section 2 of Chapter 3.
- The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.
- The developing countries are sorted in an ascending order according to their tax burden during the same period.
- The tax burden during the period under study is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same period.
Table 6.1
The Tax Effort (TE) for the Developing Countries during the Period 1986-89

(Continued)

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<th>Country</th>
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<th>Other Taxes</th>
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</table>

This Table is entirely original.

The sources of data are as given in section 2 of Chapter 3.

The descriptions and computations of the figures which appear in this Table are as shown in section 3 of this Chapter.

The developing countries are sorted in an ascending order according to their tax burden during the same period.

The tax burden during the period under study is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes) during the same period.
This result has been reflected in the lower position of Jordan among the countries of the sample in the study. According to the TE it ranks 19. This reflects the moderate TE of these revenues. This result will be explained when the TE of the breakdown of total tax revenues is discussed later on. It is worth saying that the empirical result of this approach for total tax revenues is consistent with those of the previous two Chapters. These Chapters adopted an econometric approach to the measurement of relative taxable capacity for the same developing countries in the same period. The TE figure (0.978) has been recorded as a result of the figures of both the TB which was registered by the Jordanian economy and the RTC which represented the average of the TB of the thirty-four developing countries. The TB in Jordan, which represents the numerator of the TE identity, amounted to 17.2% of the GNP at current factor cost (GNP minus net indirect taxes) for the period 1986-89. The TB may be interpreted as a tax rate. This figure, therefore, shows that the tax rate in Jordan is 17.2% of the income (output). This rate is relatively low compared to the other thirty-three developing countries (see Table 6.1). Musgrave and Musgrave (1989) showed that it is usually agreed that developing countries should be expected to achieve a tax burden of at least 18% of the GNP. This therefore suggests that the tax burden in Jordan (17.2% of the GNP) is less than the lowest figure that should be obtained. This is consistent with the TE result for total tax revenues. The TE shows that there was room to increase total tax revenues in Jordan for the period 1986-89. This refers, economically speaking, to what was discussed in Chapter 1, sub-section 3.4.2. It shows the relationship between tax rate, tax revenues and excess burden. The less the tax rate, the less the excess burden (tax distortion) (Cullis and Jones 1992, Musgrave and Musgrave 1989).

Meanwhile, the RTC for the sample, which represents the denominator of the TE identity, amounted to 17.6% of the GNP at current factor cost (GNP minus net indirect taxes) in the same period. This means that if Jordan applied
Figure 6.1: The tax effort (TE) for total tax revenues (STY), tax on income, profits, and capital gains (SINTY), and taxes on international trade (SEXTY) for the developing countries during the period 1986-89.

Figure 6.2: The tax effort (TE) for domestic taxes on goods & services (SDOMY) and other taxes (SOTHERY) for the developing countries during the period 1986-89.
the same tax rate for every kind of taxes, it would collect 17.6% of its GNP at current factor cost. As a result of not applying this, the tax burden in Jordan lies below the prevailing average of the thirty-four developing countries. This means that it could increase tax revenues by 0.4% of the GNP at current factor cost. This would allow it to exploit the relative taxable capacity to the full.

3- There was a remarkable decline in the TE of tax on income, profits & capital gains in Jordan during the period 1986-89 compared with that of total tax revenues. It amounted 0.436 against 0.978 for total tax revenues. The figure is less than half of the relative taxable capacity during 1986-89. This denotes that Jordan exploited the GNP as a base for these taxes by less than the average applicable in the group of the developing countries in the study for the same period. This was the outcome of calculating the TB (which represents the numerator of the TE identity) and the RTC (which represents the denominator of the TE identity). The figures came out as 2.6% and 5.9% of the GNP at current factor cost (GNP minus net indirect taxes) respectively. The place of Jordan among the countries of the group ranks 7. This reflects the low recorded TE for this tax. In other words, Jordan fell in the rank-ordering based upon the TE of this tax for 1986-89 comparing with that of total tax revenues.

The low TE, which was achieved for the period 1986-89, was the outcome of the amendments which took place in income tax law since 1985. These amendments give generous exemptions for different income brackets. In addition there is the devaluation of the Jordan Dinar (JD) which started in late 1988 and continued until the beginning of 1990. This depreciation of the exchange rate of the JD, which amounted to one-third of the original value, led to an increase in the prices of imported goods and services. This in turn increased the domestic prices. This reduced the realised profits of the trade sector and decreased income subject to tax. It is worth saying that income tax in Jordan is progressive.
4- The TE of taxes on international trade amounted to 1.203 for the period 1986-89. It exceeded relative taxable capacity by 20.3%. Both the TB and the RTC caused this result. They amounted to 10.9% and 9.0% of the merchandise exports plus imports respectively. The TB and the RTC represent the numerator and the denominator of the TE identity respectively. This shows that Jordan had exploited the base of these taxes (merchandise exports plus imports) more than the other thirty-three developing countries did (more, in other words, than the average applicable in the developing countries selected as a sample in the current study). This resulted in the low-ranked place of Jordan among the countries of the group. Jordan ranks 25. The result reflects the high recorded TE for these taxes. The concentration on taxes on international trade aims to reduce the chronic deficit of the trade balance and to limit the imports of luxury goods. This is usually done through raising the rates of customs duties and imposing new charges on some imported commodities and materials that were not subjected before to customs duties.

The high TE of these taxes is also due mainly to the Jordanian authority’s decision to impose a temporary ban on imports of selected goods (such as cars, T.V sets, video cameras and cars). This decision which was effected as recently as 1989 adversely influenced the value of imports. Imports represent the denominator of the TB, along with exports. Hence, this led to a high TB figure. It is worth saying that taxes on international trade are more efficient than income tax. This is because they generate a lower excess burden. They are also in line with simplicity since they require lower administration and compliance costs than those of income tax (Sandford 1992). They (taxes on international trade) are used to achieve equity through imposing heavy tax rates on luxuries and low rates on necessities (Cullis and Jones 1992). This is the case in Jordan.

5- There was a low level of TE of domestic taxes on goods & services in Jordan during 1986-89, recording 0.612. Therefore, we observe that Jordan
exploited only about three-fifths of its relative taxable capacity for these taxes. This indicates that about two-fifths of the capacity was not exploited. The Jordanian government attributed this to the policies adopted which aimed at promoting domestic industries, giving support to investment, and providing tax exemptions. The reasons lying behind these policies are to encourage economic growth, to substitute imported commodities by domestically-produced alternatives, and to boost the Kingdom's earnings of foreign reserves.

The TE figure was the outcome of registering the TB (TB is the numerator of the TE identity) as 5.5% of the GNP at current factor cost minus merchandise exports while the RTC (RTC is the denominator of the TE identity) amounted to 9.0%. This shows that Jordan had exploited the base of these taxes (the GNP at current factor cost minus merchandise exports) less than the other thirty-three developing countries did. This resulted in the ranking of Jordan among the thirty-four countries of the group being at place 12. The rank reflects the low recorded TE for these taxes for the period 1986-89. The achievement of the TB figure for these taxes in Jordan is due mainly to the replacement of the excise duties by the consumption tax since 1988. The latter (consumption tax) expands the tax base of the former (excise duties), raises the tax rates, and reclassifies some other taxes to be included in the proceeds of those taxes and excluded from the proceeds of other taxes (see Chapter 2 for more detail).

6- The TE of other taxes (mainly property taxes) for the period 1986-89 also exceeded the relative taxable capacity in Jordan. It also registered the highest TE figure among the four major components of tax revenues, amounting to 1.572. This means that Jordan had surpassed the relative taxable capacity of these taxes by 57.2%. Jordan exploits the base of these taxes (GNP minus net indirect taxes) more than one and a half times the average applicable in the developing countries group in the study.
7- Regarding the common factors in the period 1986-89, we observe the low TE for each of (i) the tax on income, profits & capital gains and (ii) the domestic taxes on goods & services. The TE for the two components of tax revenues in Jordan has not reached two-thirds of the relative taxable capacity. These results are the outcome of the economic structure and tax system in Jordan. The administration of these kinds of taxes is a very difficult matter because most employees work in small establishments. Furthermore, accounting practices are relatively backward. Better practices are necessary if profit taxes are consistently and comprehensively to be imposed on firms. Moreover, domestic taxes on goods & services cannot be imposed on retailers because retail establishments are small and unstable. The agricultural sector is largely non-monetised. Nowadays, all taxes are of a monetary kind.

On the other hand, the TE in Jordan exceeds integral one for each tax on international trade and other taxes. These results are again the outcome of the economic structure and tax system. Jordan is a country with a high degree of economic openness. Openness is measured by the ratio of merchandise exports plus imports to the GNP at current market prices. Table 3.2 in Chapter 3 shows that the openness figure in Jordan for the period 1986-89 amounted to 65%. This made it easy to tax because commodity exports and imports pass through ports. The empirical results of the tax revenue components show that there is an imbalance in exploiting the different tax bases. It is also obvious that the TE of total tax revenues registered a less than maximal figure in the period 1986-89. It was less than the level associated with exploiting relative taxable capacity to the full (0.98).

Accordingly, this approach does not estimate relative taxable capacity for total tax revenues only, but it also estimates the relative taxable capacity for the four major tax revenue components separately. This gives an indication of guidelines to draw up fiscal policy for various kinds of taxes. It is worth mentioning that this is the main advantage of adopting this approach in the current study.
The empirical results of Table 6.1 pertaining to Jordan lead us to conclude that the fiscal policy decision makers should have focused during the era after 1989 on each of (i) the tax on income, profits & capital gains, and (ii) the domestic taxes on goods & services. This is due to their low relative TE among those revenues compared with their tax bases. Jordan has not reached exploiting the bases of these taxes by the average of their rates applicable in the developing countries in the study. On the other hand, it is also clear that the planners and the fiscal policy designers during the same period should have reviewed taxes on international trade and other taxes. The TE for these two taxes shows that they exceeded the average applicable in the developing countries under study. This revision aims to reach a balance in exploiting the different tax bases. In other words, both (i) the tax on income, profits & capital gains, and (ii) the domestic taxes on goods & services should be raised. However, taxes on international trade and other taxes should be lowered. Note that the above conclusion is reached on economic grounds alone. It does not incorporate the political or social implications of the changes suggested.

These conclusions are in line with the policies of the comprehensive medium term growth-oriented adjustment programme for the period 1992-1998. This programme has been designed by the government of Jordan in cooperation with the International Monetary Fund (IMF). At the heart of the programme goals is the reduction of macroeconomic imbalances. The government is especially interested in the reduction of the budget deficit by means of tax reform. The intention is to use taxes to maintain a balance between the demand for, and the limited availability of, resources in the future1. Furthermore, these conclusions are also in line with the World Trade Organisation (WTO) (previously called General Agreement on Tariffs and Trade (GATT). This organisation was established in 1947 to promote the expansion of international trade through the removal of tariffs and other restrictions on cross-

1 The Jordanian authorities have formulated a macroeconomic adjustment and structural reforms programme covers the period 1996-98 (IMF Survey, 1996). This programme which is supported by the IMF is based on the latest political and economic developments which have taken place during the last two years namely; the peace process, the association with European Union and the changes in the world economy. The centrepiece of the programme is a remarkable acceleration of structural reforms, particularly in the area of taxes.
frontier trade. Jordan has recently joined WTO. One of the requirements was to apply the lowest tariff for any particular product to all of its suppliers.

6.5. Summary of the Chapter:

In this Chapter, the relative taxable capacity and the tax effort of the developing countries including Jordan was estimated for the period 1986-89 by adopting an arithmetic approach. This shows how much each country exploits the available tax base to collect taxation compared with the other developing countries. This Chapter has also investigated if there is a balance in exploiting the tax revenue component bases in Jordan or not compared with those of the other thirty-three developing countries. The analysis was limited to the results pertaining to Jordan. The relative taxable capacity was estimated according to the previous approach for all the developing countries under study. The most important results which were reached in respect of Jordan can be summarised as follows:

1- It was observed that the recorded TE for total tax revenues in Jordan in the period 1986-89 did not reach integral one. This denotes the fact that Jordan had not exploited its relative taxable capacity. This means that there was room for collecting more tax revenues to reach the exploitation of the relative taxable capacity to the full. The scope is relatively modest (about 2% of the relative taxable capacity or 0.4% of the GNP at current factor cost [GNP minus net indirect taxes]).

2- This approach estimates the relative taxable capacity for total tax revenues as well as for their four major components. It was seen that there is an imbalance in the TE for those components in Jordan for the period 1986-89. The TE both of taxes on international trade and of other taxes exceeded integral one by 20% and 57% respectively. This indicates that Jordan has exploited these two kinds of taxes by more than their relative taxable capacity by the percentages indicated. This is attributed to the ease of imposing taxes on them and the ease of collecting them to achieve economic objectives apart
from the financial objective. Reducing the trade balance deficit is the most important among these aims.

3- In contrast, the tax effort realised in Jordan for the period 1986-89 has not reached integral one either for tax on income, profits & capital gains or for domestic taxes on goods & services. The empirical results show that Jordan exploits the bases of customs duties and other taxes at a rate that exceeds the average prevailing in the group of the developing countries. This is matched with the non-exploitation of more than one-third of its relative taxable capacity in respect of (i) the tax on income, profits & capital gains and (ii) the domestic taxes on goods & services. The government justifies this by pointing to the economic objectives it is pursuing. These objectives are to encourage domestic industries and production in order to decrease imported goods. A further aim is to support exports by giving them tax exemptions. However, as shown earlier, this creates an imbalance in exploiting each tax base and it creates distortion in the economy.

4- Since this is the case in Jordan, this leads us to call for tax reform. Necessary measures and proper procedures should be taken to create a balance for the tax system. This can be embodied by adopting the following policies:

1- Reducing customs duties and other taxes and concentrating on (i) the tax on income, profits & capital gains and (ii) the domestic taxes on goods & services. This includes reconsidering exemptions and deductions allowed by income tax law, and limiting the benefit which is obtained to those people who have low income or are poor. Tax cuts mean, as shown in Chapter 1, sub-section 3.4.2 and sections 4 and 5, a lower excess burden. This means more efficient tax (Sandford 1992, Musgrave and Musgrave 1989).

2- Extending the comprehensiveness of the General Sale Tax (GST) as a step toward imposing Value Added Tax (VAT). This consists of
expanding the base through subjecting more commodities to tax. This again reduces the excess burden (tax distortion). GST creates a lower excess burden than that of selective excise tax. This was mentioned in Chapter 1, section 3.

These policies are in line with the IMF advice to Jordan to adopt immediate tax reforms. They are also in line with the WTO requirement of reducing the high tariff rates in order to remove any barriers to free international trade.
Chapter 7

Estimating the Relative Taxable Capacity of the Jordanian Economy during 1973-95

7.1. Introduction:

The opinion is frequently expressed in all countries that taxes have not only reached their maximum, but have gone beyond the ability of the citizen to pay. This opinion has also been voiced in Jordan and is frequently expressed at the present time (see sub-sections 7.4.6 and 7.5.6). The criticism reflects the continuous increase of taxes under different names, with different bases, with different modes of collection, levied at different rates. The effect is to create a wide gap between the total income of the individual and his disposable income after the deduction of all kinds of taxes (Mankiw 1994). This causes citizens to call for a reduction in taxes or at least a halt to their continuous increase. On the other hand, the government is dependent for its programmes on the available domestic resources.

Clearly the subject of relative taxable capacity has a place of special importance. The citizen and the government are trying to find an answer to the following questions:- Have the tax revenues actually exceeded the relative taxable capacity of the Jordanian economy? Should the government therefore try to decrease taxes? Are tax revenues still below the capacity of the Jordanian economy and its ability to bear taxes? If revenues are less than the ceiling, this would enable the government to increase current taxes and - on economic grounds alone - discuss the citizens’ continuous complaints about the rise of taxes and the increase of the burden. The government’s needs for tax revenues and the citizens’ complaints are two contradictory subjects. The former is based on the need for the government to finance public expenditures and to reduce the budget deficit. The latter does not incorporate this constraint. According to the citizens’ point of view, the thesis is the less tax the better in all cases. The present study, concerned as it is with economics, does not
take account of these complaints. They are mentioned here to show that the subject is a timely research area.

To cast more light on the potential for tax, this Chapter estimates the relative taxable capacity and the tax effort of the Jordanian economy for the period 1973-1995 using the different approaches adopted in this study. The first approach estimates relative taxable capacity for the whole economy. Meanwhile, the second approach estimates the individual's relative taxable capacity. Finally, the third approach estimates the income tax elasticity. It is worth mentioning that all data, tables, estimations and analysis as well as the empirical results and conclusions which appear in this Chapter are the researcher's own work.

7.2. Coverage of the Chapter and Source of Data:-

This Chapter uses the time series data of the Jordanian economy. All the data are collected for a period of twenty three years (1973-95). Owing to limited data, this Chapter ends with data relating to the year 1995\(^1\). The number of variables which the data are collected for each year amounts to thirteen. This is a list of those variables and their descriptions:-

\begin{itemize}
  \item A: the value added of the agricultural sector.
  \item N: the value added of the mining sector.
  \item MAN: the value added of the manufacturing sector.
  \item W: the value added of the wholesale & retail trade sector.
  \item INDN: the proceeds from net indirect taxes.
  \item GDP: the Gross Domestic Product at current market prices.
  \item RF: the annual average exchange rate for the Jordanian local currency (Jordan Dinar [JD]) against the US$.
  \item M2: the money supply (money plus quasi money).
\end{itemize}

\(^1\) It is worth saying that data relating to 1996 are preliminary for some variables and not available for the others. They are subject to revision until the final figures are published. They are unlikely to be available until approximately early 1998.
X: the value of merchandise exports (Free On Board [FOB]).
M: the value of merchandise imports (Cost, Insurance and Freight [CIF]).
GNP: the Gross National Product at current market prices.
POP: the population number in each year.
TR: the proceeds from tax revenues.

The data collection was first done by hand. All data were then read on to the computer using the Microfit package. This package is available in the computer laboratory at the University of Surrey. All data were obtained from the Central Bank of Jordan (CBJ) Publications as follows:

- Monthly Statistical Bulletin, Department of Research and Studies, CBJ, January 1988 - April 97 issues:
  - Table (1): "Major Economic Indicators".
  - Table (3): "Money Supply".
  - Table (27): "Central Government Domestic Revenues".
  - Table (34): "Balance of Payments According to Cash Basis".
  - Table (46): "Gross National Product at Current Prices".
  - Table (60): "Average Exchange Rates of Major Foreign Currencies (Per Unit)".

The original sources of these Tables are:
- The General Budget issued by the Ministry of Finance (MF).
- The National Accounts Statistics issued by the Department of Statistics.
- The Department of Research and Studies at the CBJ.

7.3. The Methodology of this Chapter:

This section is devoted to discussing the methodology of this Chapter. It displays the approaches which will be adopted to estimate the relative taxable capacity of the Jordanian economy during 1973-95. The advantages and disadvantages of each
approach were discussed earlier. Three approaches (as stated before) are adopted: the whole economy's relative taxable capacity, the individual's relative taxable capacity, and the income tax elasticity. The previous three Chapters showed the empirical results reached in the present study (using different approaches) to estimate the relative taxable capacity in Jordan as one of the thirty-four developing countries in the study. The adoption of the all three approaches, and not limiting the study to one of them, to the measurement of the tax performance of the Jordanian economy, gives an integrated conception about the tax effort and the relative taxable capacity as well as the elasticity of the tax system in Jordan.

It is worth saying that the models of the relative taxable capacity of the first two approaches are comparative measures. They depend on computing relative taxable capacity in a country like Jordan in comparison with a group of developing countries. When applying these models to Jordan, consideration should be given to similarity of the kind of taxes included in Jordan and the other countries which were taken when these models were estimated. Thereupon, total tax revenues in this Chapter are restricted to the central government. This total does not include the taxes which are collected by local municipalities and autonomous institutions (including de facto taxes such as the charges and fees levied by the Jordanian Universities) when the models of relative taxable capacity were applied to Jordan.

The addition of these additional fiscal elements would result in a rise of the amount of taxes collected in Jordan as compared with its relative taxable capacity. This would lead to ambiguity, and misstatement in the models of relative taxable capacity. If it were possible to include these elements in the data relating to all thirty-four developing countries of the sample, the coefficients of the explanatory variables included in each model of the relative taxable capacity would rise. This would be reflected in the rise of relative taxable capacity in Jordan (and actual tax revenue proceeds). This, in case of increasing both relative taxable capacity and tax revenues by the same amount, neutralises the influence of the addition of those taxes to the ratio of the exploit part of relative taxable capacity in Jordan. The non-availability of data about these taxes for the sampled thirty-four developing countries made it
impossible to carry this out.

It is also worth mentioning that all the empirical results appearing in this Chapter are based on both the theoretical framework which was discussed in Chapter 1 (sections 8-10) and the econometric models developed or adopted in this study. These models were run on the pooled data collected by hand for the developing countries subject to study including Jordan (Chapters 4 and 5). Consequently, all these results are correct if the economic theory is logical and if the data collection as well as the adopted econometric models are correct. We assume that these conditions are met.

7.4. The First Approach: Estimating the Jordanian Whole Economy's Relative Taxable Capacity and the Tax Effort:

7.4.1. Theoretical Framework:

The same factors which determine the whole economy's relative taxable capacity in Chapter 4 were adopted. These factors are: the degree of economic development, the composition of the Gross Domestic Product (GDP) or its sectoral distribution, and the degree of economic openness. These factors were elsewhere represented by the same independent variables (see Chapter 1, section 9 and section 2 of Chapter 4).

Before reviewing the empirical results derived from this approach, it will be helpful to examine the consistency of the relationship between each independent variable (representing one factor that determines the whole economy's relative taxable capacity) and the dependent variable in Jordan during the period 1973-95 (as compared with that of the other developing countries). The theoretical relationships

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2 The explanatory variables that represent these factors are: the share of the agricultural sector in the GDP, per capita GNP, the degree of monetisation. These independent variables express the degree of economic development. The share of mining, or manufacturing, or wholesale & retail trade sectors in the GDP are three variables that express the GDP structure. The degree of economic openness has been expressed by the ratio of merchandise exports or imports or both of them to the GNP at current market price.
are explained in Chapter 1, section 9.

Table 7.1 shows the matrix of the simple correlation of these variables. This matrix is computed for Jordan for the period 1973-95 by using the "COR" command available in the Microfit package. This matrix is very important in showing the sign of the relationship between the dependent variable and each independent variable and among the independent variables themselves. This will be helpful for comparing each sign for every relationship with that sign which appeared in the corresponding matrix for the thirty-four developing countries for the period 1986-89 (see Table 1 in Chapter 4).

Compare the matrix of the correlation in Table 7.1, column 1, with the corresponding statistic for the group of thirty-four developing countries which appears in the first column of Table 1 in Chapter 4. It emerges that each of the relationships between the dependent variable and each of the independent variables is consistent.

7.4.2. List of the Variables and their Descriptions:

To avoid repetition, see section 4.3 in Chapter 4 for the list of variables and their descriptions.

7.4.3. Computation of the Variables:

All the above-mentioned variables are computed in this Chapter by dividing some variable over the GNP at current market prices (or at current factor cost [GNP minus net indirect taxes]), others by the GDP at current market prices as shown in section 3 of Chapter 4. The same steps of computing the variables of Chapter 4 are adopted to compute those of this Chapter (see section 3 of Chapter 4). This has been done by using the "BATCH" file to facilitate the computation editing process. This file is available in the MS-DOS Editor package. The file was run with the "BATCH" command which is available in the Microfit package to compute the variables of this approach.
Table 7.1
Estimated Correlation Matrix of the First
Approach's Variables for Jordan during 1973-95

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</tr>
<tr>
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<tr>
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<td>.34356</td>
<td>.35174</td>
<td>.27844</td>
<td>.22197</td>
<td>.54549</td>
</tr>
</tbody>
</table>

-This Table is entirely original and has been obtained by using the "COR" command which is available in the Microfit package for all the variables of this period.
-The sources of data are as given in section 2 of this Chapter.
-The descriptions and computations of the figures which appear in this Table are as shown in section 4 of this Chapter (4.2 and 4.3).
-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
Table 7.1
Estimated Correlation Matrix of the First
Approach's Variables for Jordan during 1973-95

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<th>FA</th>
<th>XA</th>
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</thead>
<tbody>
<tr>
<td>TRA</td>
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<td>.78731</td>
<td>.80152</td>
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<td>GNPP</td>
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<td>.34356</td>
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<td>.65143</td>
<td>.89058</td>
<td>.35174</td>
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<tr>
<td>AA</td>
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<td>-.31759</td>
<td>-.27706</td>
<td>-.27844</td>
</tr>
<tr>
<td>WA</td>
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<td>-.50493</td>
<td>.76472</td>
<td>-.22197</td>
</tr>
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<td>.42885</td>
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<td>.51357</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

-This Table is entirely original and has been obtained by using the "COR" command which is available in the Microfit package for all the variables of this period.
-The sources of data are as given in section 2 of this Chapter.
-The descriptions and computations of the figures which appear in this Table are as shown in section 4 of this Chapter (4.2 and 4.3).
-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
7.4.4. Empirical Results:

This sub-section shows the empirical results, their computation and explanation. The model of the first approach (the model adopted in Chapter 4) was applied to estimate the relative taxable capacity of the Jordanian economy (the estimated ratio of the tax revenues to the GNP at current factor cost) for the period 1973-95. A 95% confidence interval for the capacity is computed using the standard error of each predicted value. Two columns therefore to show the whole economy's relative taxable capacity are presented in Table 7.2. Note that the confidence interval we obtained for the whole economy's relative taxable capacity is relatively wide. This will affect both the tax effort computed to each year and the analysis of the empirical results.

What was done was this: the actual tax burden was divided by the relative taxable capacity of the Jordanian economy in the same year in order to compute the tax effort for each year of the period 1973-95. As a result of obtaining two figures for the relative taxable capacity for each year (95% confidence interval for the predicted value), two figures for the tax effort for each year are also computed and shown in Table 7.2. These reflect the range that this effort lies in between. We can say therefore, as mentioned in Chapter 4, that Jordan had exceeded its relative taxable capacity if both the tax effort figures were greater than one. Conversely, if both the tax effort figures for a year were less than one, then we can say that Jordan had not exploited its taxable capacity (1973-89). In cases where the tax effort bounds include the value one (1990-95, see Table 7.2), we can not decide. In other words, we cannot say that Jordan had/had not surpassed its relative taxable capacity. This is because the actual tax burden lies within the 95% confidence interval for taxable capacity.

It is worth mentioning that more explanations for the empirical results which appear here will be given in a later sub-section by connecting these results with the economic developments which took place during the period under study. The explanations will take into consideration the factors which determine the whole economy's relative taxable capacity, particularly the included independent variables in the model adopted for this approach (see sub-section 7.4.5). These results will also
be given further explanation when they are connected with the economic situation prevailing during the period from a public choice perspective (see sub-section 7.4.6). It is also worth saying that the results of this Chapter are consistent with both the theoretical framework (discussed in Chapter 1, section 9) and all the practical results of the previous studies, particularly the Chelliah, Baas, and Kelly study and the study (1989) by Musgrave and Musgrave.

Table 7.2 shows the relative taxable capacity and the tax effort of the Jordanian economy as a whole for the model of the first approach. The Table has been obtained by using different commands and facilities available in the Microfit package as follows:

1- After each variable is computed, the model adopted is applied to Jordan to estimate the relative taxable capacity of the Jordanian economy.

2- The tax effort for each year for the adopted model in the period 1973-95 is computed by dividing the actual tax burden by the relative taxable capacity of the economy. This is obtained from the previous step.

3- These two steps have been done for the model adopted for each year and for both the lower and the upper limits of the whole economy's relative taxable capacity (a 95% confidence interval.

4- The BATCH file is used to obtain the results of all the previous steps.

To find out the yield of relative taxable capacity as an absolute figure, we multiply its ratio by the GNP at current factor cost (GNP minus net indirect taxes). This will not change the results obtained by computing the tax effort of the Jordanian economy after converting both the denominator (relative taxable capacity) and the numerator (tax burden) of the tax effort identity to the absolute figure. The reason is that one of these two methods is derived from the other.
Table 7.2 shows the relative taxable capacity of the Jordanian economy for 1973-95 as a ratio of the GNP at current factor cost (GNP minus net indirect taxes) for the model. The empirical results show that the whole period can be divided into two sub-periods. The first covers the years 1973-89. It is worth saying that the analysis of the empirical results will focus mainly on this period (1973-89). This is done because both the tax effort figures did not exceed one. This indicates that Jordan did not exploit its relative taxable capacity to the full during these years (see Table 7.2). In other words, this shows that there was room to increase tax revenues by imposing new/increasing the rate of taxes. The second period covers the first half of the current decade (1990-95). In this period one tax effort figure was less than one and the other exceeded one (Table 7.2). Therefore, we cannot say that Jordan surpassed or did not surpass its whole economy’s relative taxable capacity.

We may now review the evidence on the tax effort and the relative taxable capacity of the Jordanian economy collected according to the model for the period 1973-95. The evidence is presented in Table 7.2. The following points may be made:-

1- The tax effort recorded during the 1970s reaches its minimum in 1973 and its maximum in 1977 in the above-mentioned model. The high recorded tax effort in 1977 was due (as will be shown later) to the high tax burden registered in that year (see Table 7.2). The jump in the tax burden in this year (see Table 7.2) was due to the fiscal legislation which was passed in the form of new laws and regulations as well as amendments in existing ones aiming at an increase in domestic revenues. In 1977 customs and excise duties on the following imported and domestically-produced commodities were increased: cigarettes, tiles, sanitary ware, bricks, cotton thread, bleached and unbleached rice and its derivative products, and matches. Furthermore, fees on public works contracts, road services, insurance companies, and optometrist licenses were increased (see Central Bank of Jordan, Annual Report, 1977).
Table 7.2
The Whole Economy’s Relative Taxable Capacity and the Tax Effort of Jordan during 1973-95

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax Burden(1)</th>
<th>Taxable Capacity</th>
<th>Tax Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95% Confidence Interval</td>
<td>95% Confidence Interval</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>11.7364</td>
<td>17.2911</td>
<td>24.8003</td>
</tr>
<tr>
<td>1974</td>
<td>12.2266</td>
<td>17.2244</td>
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</tr>
<tr>
<td>1975</td>
<td>14.7044</td>
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<td>27.9930</td>
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<td>19.8698</td>
<td>27.4272</td>
</tr>
<tr>
<td>1979</td>
<td>16.6465</td>
<td>20.4192</td>
<td>28.0432</td>
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<tr>
<td>1980</td>
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<td>20.1823</td>
<td>27.8637</td>
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<tr>
<td>1983</td>
<td>17.7124</td>
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<td>17.1785</td>
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<td>19.5189</td>
<td>27.0821</td>
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<td>17.1444</td>
<td>18.1525</td>
<td>25.6905</td>
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<td>1987</td>
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<td>18.4505</td>
<td>25.9831</td>
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<td>1992</td>
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<td>29.9045</td>
</tr>
<tr>
<td>Year</td>
<td>Tax Burden</td>
<td>Relative Taxable Capacity</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td>1993</td>
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<td>22.0756</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>26.9110</td>
<td>21.0482</td>
<td></td>
</tr>
</tbody>
</table>

1. The tax burden is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes).

2. This Table is entirely original. The sources of data are as given in section 2 of this Chapter. The descriptions and computations of the variables which this Table is based on are as shown in subsection 4.3 of this Chapter.

3. The tax effort is measured by dividing the tax burden on the relative taxable capacity in each year.

4. The relative taxable capacity represents the estimated proceeds of total tax revenues as a percentage of the GNP at current factor cost (GNP minus net indirect taxes).

5. The figures of the tax burden and the relative taxable capacity appear as a percent of the GNP at current factor cost (GNP minus net indirect taxes).
2- The tax effort recorded in 1973, which represents the first year of the present study, and in 1992 according to the model adopted to estimate this approach, represents the minimum and the maximum tax effort recorded in the whole period (1973-1995) respectively. The lowest actual tax burden was recorded in 1973 (11.7%). The highest actual tax burden was recorded in 1992 (29.4%). The burden for the latter year (1992) includes about 2% of the GNP as non-current revenues. This latter statistic represents the customs duties collected on the cars of the Jordanian returnees from the Arab Gulf Countries in the aftermath of the regional crisis (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996).

3- The tax effort for 1973, 1977, and 1992 may be mentioned. The tax effort reached its minimum for the whole period (1973-95) in 1973. It reached its maximum for the 1970s in 1977. It recorded the highest tax effort for the whole period of the study in the third year cited, i.e. 1992. However, we find that the remaining years recorded a relatively lower tax effort than that of 1992. It is worth mentioning that all these empirical results will be explained in the following two sub-sections.

7.4.5. The Relative Taxable Capacity of the Jordanian Economy and the Economic Structure and Development:-

This sub-section explains the empirical results by connecting them with the economic development and structure of the Jordanian economy. The explanation of the empirical results can be shown by linking them with economic structure and development. The explanation will take into consideration the factors which determine the relative taxable capacity of the whole economy, especially the independent variables included in the model adopted. These independent variables were the share of the agricultural sector, the wholesale & retail trade sector in the GDP. In addition, the degree of economic openness was included. It was measured by merchandise imports as a ratio of the GNP (see Table 7.3).
Table 7.3 shows that the last independent variable (the ratio of merchandise imports to the GNP) has increased, in general, gradually over the period 1973-95. This independent variable demonstrate a positive relationship between it and the dependent variable (tax burden). There are several reasons for the positive relationship between relative taxable capacity and the degree of economic openness. Imports are directly relevant to imposing and collecting taxes at the border. That is to say that taxes are simpler to collect in a highly open economy where merchandise imports pass through ports. These imports can be readily established by tax authorities (Musgrave and Musgrave 1989). Furthermore, the base of customs duties and other trade-related taxes (such as import licenses) is imports (Griffiths and Wall 1995).

However, as a trend, the share of the agricultural sector in the GDP has decreased slightly over the period 1973-95 (see Figure 7.3). This independent variable has an inverse relationship with the dependent variable (tax burden). There are several reasons for the negative relationship. It is administratively difficult to tax farmers. Also the government has no willingness to impose taxes on the agricultural sector for political reasons. Furthermore, there is a high degree of non-monetisation in the agriculture sector (Musgrave and Musgrave 1989). Such output cannot be taxed, because the agricultural community is distinguished by consuming a great deal of its production (Chelliah 1971, Musgrave and Musgrave 1989). An increase in the share of the agricultural sector in the GDP means a decrease in taxable resources due to the relatively low level of agricultural sector income (Bahl 1972). Further reasons for the negative relationship between the share of the agricultural sector in the GDP and relative taxable capacity were mentioned in Chapter 1, sub-section 9.1.

The same can be said about the share of the wholesale & retail trade sector in the GDP (WA) (see Table 7.3). There is an inverse relationship between this variable (WA) and relative taxable capacity. The reason lying behind this relationship is that the people who are working in this sector do not keep accounts of their transactions. This makes taxation of this sector a very difficult matter. In other words, taxes are not feasible until accounting practices attain minimal standards. Taxes are very difficult if retail establishments are impermanent and very small (Musgrave and
Musgrave 1989). In addition there is the ease of tax evasion and the possibility for the employers in this sector to avoid taxes because of the difficulty of auditing accounts which are presented by them. Consequently, all the above-mentioned independent variables, as a result of their direction over the whole period, have a positive effect on the relative taxable capacity of the economy.

As a result of all the above-mentioned economic developments (which have taken place throughout the whole of the period [1973-95]), in general this capacity increased slightly over the same period according to the model of this approach (see Table 7.2).

The tax burden over the period 1973-89 has averaged 16.8% of the GNP at current factor cost. However, this burden jumped for the period 1990-95 to amount, on average, to 25.9%. Consequently, when the latter (tax burden) is divided by the former (whole economy’s relative taxable capacity) to compute the tax effort in each year, the effort recorded, on average, moderate figures for the period 1973-89 (less than one for both figures). This result was reported earlier. The tax effort, however, has exceeded integral one for one figure of the tax effort while the other was below one during the period 1990-95 according to the model adopted for this approach.

The reason therefore for obtaining relatively high tax effort during 1990-95 (compared with that of 1973-89) is not to be found in the denominator of the tax effort identity (relative taxable capacity), but in the numerator of this identity (tax burden). Consequently, the explanation should focus on the latter. This will be discussed in detail in sub-section 7.5.5. However, the following sub-section is devoted to discussing the explanation of the empirical results for the period 1973-89. This will be done in order to answer the following question: Why did the government not exploit its relative taxable capacity for this period?. The answer can be found by discussing the economic situation prevailing during the period from a public choice perspective. We will see that the location of Jordan is very important in exploring the above question.
Table 7.3
The Included Variables in the Whole Economy's Relative Taxable Capacity Model for Jordan during 1973-95
(Percentages)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax Burden</th>
<th>Agriculture Sector &amp; Retail to the GDP</th>
<th>Wholesale &amp; Retail Sector to the Trade Sector GNP</th>
<th>Imports to the GNP to the GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>11.7364</td>
<td>8.0619</td>
<td>11.8994</td>
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</tr>
<tr>
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<td>6.9282</td>
<td>10.9888</td>
<td>51.8354</td>
</tr>
<tr>
<td>1976</td>
<td>17.7596</td>
<td>7.7274</td>
<td>11.8012</td>
<td>59.4837</td>
</tr>
<tr>
<td>1977</td>
<td>19.5714</td>
<td>7.7617</td>
<td>12.5370</td>
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</tr>
<tr>
<td>1978</td>
<td>17.5316</td>
<td>9.8678</td>
<td>11.5873</td>
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</tr>
<tr>
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<td>16.6465</td>
<td>12.2589</td>
<td>11.7227</td>
<td>58.3515</td>
</tr>
<tr>
<td>1980</td>
<td>16.0951</td>
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<td>12.6324</td>
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</tr>
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<td>14.5920</td>
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<td>1982</td>
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</tr>
<tr>
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<td>17.1444</td>
<td>5.2829</td>
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<tr>
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<tr>
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<td>Variable 4</td>
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<td>------------</td>
<td>------------</td>
<td>------------</td>
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<td>8.3224</td>
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</tr>
<tr>
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<td>4.7524</td>
<td>8.7084</td>
<td>57.4696</td>
</tr>
</tbody>
</table>

- This Table is entirely original and the sources of data are as given in section 2 of this Chapter.
- The computations of the variables which appear in this Table are as shown in sub-section 4.3 of this Chapter.
- Tax burden is measured by dividing total tax revenues (excluding social security contributions) over the GNP at current factor cost (GNP minus net indirect taxes).
Figure 7.1: The ratio of the agricultural sector (AA), and the wholesale & retail trade sector (WA) to the GDP in Jordan for 1973-95.

Figure 7.2: The ratio of merchandise imports (MA) to the GNP in Jordan for 1973-95.
7.4.6. The Explanations of the Empirical Results:

The most important result of Chapters 4, 5, 6, and 7 with respect to the Jordanian economy is represented by the fact that Jordan did not exploit its relative taxable capacity to the full during 1973-89. It is worth exploring the following questions: Why did the government not exploit its relative taxable capacity for this period? Why did it run a budget deficit?. Tackling this question leads us to discuss the economic situation which was prevailing during the period 1973-89 from a public choice perspective. Methodological individualism can lead the way for these explanations. This reflects the intentions of people. The explanation of the empirical results can be shown by discussing the growth of the government through the bureaucracy and fiscal illusion hypotheses. The explanation will cover the supply and demand sides (the willingness of the government to impose and collect taxes and the willingness of the citizens to pay taxes). Part of the explanation can be found in the "voting-with-feet" and "median voter" hypotheses. Some of these are valid, to a great extent, in relation to what was going on in Jordan during the period. Moreover, the answers to the above questions, as shown later, can be found in the location of Jordan.

First of all, a general idea about the political system in Jordan is given. Jordan is a hereditary monarchy with a parliamentary system. King Hussein is the 42nd generation direct descendent of the Prophet Mohammed. The Constitution allows the King to appoint, dismiss or accept the resignation of the Prime Minister, and the cabinet ministers upon the recommendation of the Prime Minister. The legal system is based on two basic sources: Islamic Law and Civil Law. Several measures have been taken to ensure that democracy is based on a solid footing. The most important among these is the re-introduction of political parties to the Parliament in 1989.

1. Bureaucracy:

Bureaucrats for present purposes are government officials and employees, i.e. civil
servants. In the model of Niskanen, they are budget maximisers. Niskanen (1971) showed that the government budget can be as much as twice as large as that demanded by the bureau’s sponsor. This explains why the level of the bureau’s expenditure might be larger than the median voter’s preferred quantity. Larger budgets enable bureaucrats to achieve their preferences (Baumol 1959, Mueller 1989).

It is easy to see why a bureau would wish to charge a higher price for a given output. The extra revenue could be used to offer higher salaries or promotion to a higher rank (in addition to public reputation, patronage, ease of making changes) (Niskanen 1971, Mueller 1989). One way to justify a larger salary is to expand the bureau’s output (i.e. its budget), and then to demand higher salaries due to the expanded demand for a bureaucracy (Warren 1975).

It is worth mentioning that the rent-seeking concept is directly related to the subject discussed above. Rent-seeking analysis is the same as imposing taxes. It occurs as a result of bureaucrats (monopolists) (Cullis and Jones 1992) and as a result of the absence of perfect competition and the existence of monopoly. This causes a loss in efficiency as a result of reducing consumer surplus (Mueller 1989). It also redistributes income from consumers to the monopolist. This rent can be reduced through establishing perfect competition. This allows the market mechanism to operate in an efficient way. This can be achieved by decreasing public lands, mineral rights, freeing international trade by reducing customs duties, elimination of setting a price ceiling or price floor (Anderson and Hill 1983).

The government bureau’s supplies a non-market output. It does not typically supply a number of units of output, but levels of activities from which output levels must be inferred (Niskanen 1971). The taxpayers are interested in the final output that these

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3 In most of the countries, there are several good explanations for the growth of government spending. The most important are: the government as a provider of public goods and eliminator of externalities, the government as re-distributor of income and wealth, interest groups, bureaucracy, and finally fiscal illusion. The most relevant to Jordan will be discussed here. These are bureaucracy and fiscal illusion. The others will not be discussed. These are mentioned in detail by Mueller (1989).
activities produce. The output is being supplied inefficiently. In other words, the budget is in excess of the efficient level. The budget is expanded beyond the point where marginal public benefits equal marginal costs (the bureau is a monopolist supplier and alone knows the true cost) (Niskanen 1971). This leads to exhausting part of the consumer surplus which in turn reduces economic welfare (Niskanen 1971). The hypothesis that the bureau budget exceeds the optimum levels is difficult to test because output is hard to measure (Mueller 1989).

One side of this analysis is valid for Jordan while the other is not. The government fiscal policy during the period 1973-89 could be considered as a budget maximiser to achieve the goals which were mentioned. However, it charged prices inferior to cost for publicly-supplied products. Total public expenditures increased during the period 1973-89 by more than 9-fold. Current expenditures formed on average 65% of total public spending (see Table 2.3 of Chapter 2). This was due mainly to the high military expenditures which took up about a quarter of total public spending. Wages and salaries constitute the largest component of civilian expenditure. They accounted for 25% of current fiscal outlays (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). Civilian employment increased rapidly.

The government response to the recession since the mid 1980s, as shown in Chapter 2, was also to continue the momentum of economic activity by maintaining expansionary fiscal policies which led to the widening of the overall budget deficit. There was an increased internal and external indebtedness. They in turn increased the pressure on the balance of payments and the exchange rate (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). This reflected the government’s wish to maximise its budget regardless of the adverse economic consequences. This, as shown, represents the way in which bureaucrats can achieve the targets which were mentioned.

On the other hand, Jordan operated a system of administered prices, primarily involving an overvalued exchange rate. The government adopted during the period
1973-89 extensive subsidy programmes (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). Goods and services subsidised included basic food staples, energy, agriculture product and input, transportation, and medical care. The Ministry of Supply provided basic foodstuffs such as wheat, sugar, rice, powdered milk, and sorghum at prices below import costs. In other words, the government sets a price-ceiling which is below cost and pays the difference out of public finance. Expenditure on education and health have always accounted for a large segment of Jordan’s total budgetary outlays. This strategy has paid dividends in terms of marked improvements in literacy, health and the social indicators. It is worth saying that education in Jordan is free. The Ministry of Health subsidises health care by giving cards to the poor, granting them lower fees.

The government of Jordan ran a budget deficit as a result of increasing its expenditures without increasing taxes. In other words, the government did not exploit its relative taxable capacity. The explanation for this can be found by looking at the location of Jordan. It is at a critical juncture, a largely arid land mass east of the River Jordan, bounded by Syria to the north, Iraq to the northeast, Saudi Arabia to the south and east, Israel to the west. Jordan has the longest front line with Israel. It also represents a shield for Saudi Arabia and the other Arab Gulf Countries because it is located between Israel and these countries. Therefore, these countries used to offer Jordan financial grants to improve and modernise its military forces. These grants were divided equally between military expenditures and the government budget. This represents a commitment from these countries to Jordan. This commitment was announced in two Arab countries conferences (Baghdad and Amman).

The availability of financial assistance, which resulted from the inflow of Arab financial aid following the Baghdad and Amman Conferences held in 1978 and 1980 respectively, has contributed in financing part of the government expenditure. This reduces the government’s need for increasing taxes. It is worth mentioning that inflow of assistance for 1989 amounted to JD 261.7 million. This figure was equal to 70% of total tax revenues (of which, of course, it was not a part). Even so, it was less
than what agreed upon in the above two conferences. These grants were stopped in 1990 as a result of Jordan’s stand toward the Gulf Crisis (Jordan supported Iraq).\(^4\) This forced the government to rely more on tax revenues to finance its expenditures. The tax burden increased, on average, from 17% of the GNP at current factor cost (GNP minus net indirect taxes) for the period 1973-1989 to 26% of the GNP at current factor cost for the first six years of the 1990s (the period followed the Gulf Crisis). This resulted in an increased tax effort in Jordan during this period. The empirical results for 1992-95 show that Jordan surpassed its relative taxable capacity.

Another point is no less important than what has been mentioned above. It is the fact that the government did not have the knowledge that it was not exploiting its relative taxable capacity to the full. This is because there has been no studies conducted about this subject. The present study is the first to examine this topic.

2. Fiscal Illusion Hypothesis:-

This hypothesis is not valid for explaining the empirical results of the current thesis for the period 1973-89. Even so, it is an important result in the public choice literature and of direct relevance to the years since 1992. Therefore, the analysis of the fiscal illusion hypothesis will be discussed in sub-section 7.5.6. This is done because the empirical results for the period 1992-95 will be considered there.

\(^4\) It is worth mentioning that after the Gulf Crisis and as result of the commitment of Jordan to go ahead with the peace process, the developed countries such as USA, Japan and Germany started to support Jordan by financial grants and concessional loans. The IMF and The World Bank also offer Jordan technical and financial assistance to manage the economy. These grants for 1995, the last year subject to the study, amounted to JD 173.7 million. This figure formed only 17.3% of total tax revenues compared with 70% in 1989 as shown above. These grants are conditional upon going with the economic adjustment programmes. These programmes aim to reduce the budget deficit through increasing taxes and reducing expenditures (through seeking debt relief or debt rescheduling from Paris and London Clubs) (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996).
3. Median Voter Hypothesis:-

The growth of government expenditure in Jordan can be explained by considering the median voter hypothesis. This hypothesis says that each candidate is pulled toward the party median: the need to win the election pulls him/her back toward the population median (Mueller 1989). It is clear that if each candidate adopts this strategy then, both will move side by side at the position of the median voter (Cullis and Jones 1992). This hypothesis is helpful in two-party politics. There is no governing party in Jordan. This is because Jordan has more than twenty parties. None of them has the power to be a governing party. Moreover, none represents the majority of the population.

Deacon (1977) modelled government expenditure decisions as if they were the private choice of the median voter (Mueller 1989). Davis (1966), and Deacon (1972) showed that one can apply the median voter hypothesis and write government spending as a function of the attributes of the median voter if it is assumed that citizens vote directly on the government expenditure issue, and the only issue to be decided is the level of the spending (Mueller 1989). In Jordan, the government has chosen to run a deficit in its budget in order to tackle one economic problem which has a great effect on political stability. Unemployment is one of the top issues. It will be shown that its rate is very high (18% in 1993). This leads to an excess staff (Williamson 1964). It also affects the productivity of government spending. Further, the government does not have increased taxes in order to make people satisfied. This can be explained by the median voter hypothesis. The government tries to adopt the policy which captures the median voter (not to gain their vote but to avoid any strikes or violent action).

The government therefore has chosen the easiest way which has no visible adverse consequences on people to finance its deficit. However, the debt will be paid later on by children and grandchildren of the current generation. People are more likely interested in the present rather than the future. This shows clearly that the government during the 1970s and the 1980s has made efforts to make people happy
by requiring them to pay less taxes regardless of the economic situation. This is preferable from the citizen’s point of view and is consistent with the median voter hypothesis. The behaviour of the government during the period is also due to the rapid continuous change in the government (sometimes, within the space of a single year the government is changed twice). This has made the government interested only in the short run (maximum one year) and it neglects the long run. Consequently, this has made consecutive governments delay dealing with the most important economic problems to the next government.

The above-mentioned behaviour can be viewed as consistent with Down’s model. Down’s theory of the "conserver" reminds us that one of the bureaucrats resists change (Reisman 1990). The conserver believes that negative change is very bad, meanwhile positive change is not very good. In other words, the government of Jordan may believe that it will lose more often from change than it can gain. That is to say, the government resists changes because citizens prefer to stay as they are as a result of not knowing the outcome. An example will clarify the point. The Jordan Dinar (JD) had remained fixed to the special drawn rights (SDR) for more than twenty years through the end of 1998, when it was depreciated by about one-third of its original value. These governments actually know the response of the citizens to any decision such as eliminating subsidies on bread or increasing prices of other basic goods. Such decisions caused violent outbreaks in 1989 and 1996. The government more than doubled the price of bread in 1996. Protests have damaged many public benefits such as clinics and schools. Military forces intervened to stop this. This happened in the south and the middle of the country and the King told the media that misleading and misled elements were responsible. This lasted for about two weeks. The same happened in 1989 when the prices of many goods such as petrol increased by about 20%. Again we are talking here about the median voter hypothesis. Citizens in Jordan believe that the decision-makers are those who get the benefit from their decisions. Therefore, the trust between officials and citizens is missing.
4. Voting-with-the-Feet Hypothesis:

The Tiebout hypothesis -"voting-with-the-feet"- is very important. It can give an analytical framework for what happens in Jordan. Tiebout (1956) shows that all preferences will be revealed through the silent voting-with-feet of individuals exiting and entering communities. In other words, individuals select the community which best satisfies their preferences (Cullis and Jones 1992). The Tiebout hypothesis is obviously of considerable theoretical importance but its assumptions mean it has little effect in practice\(^5\). One of the conditions for perfect competition is free mobility of resources. This assumption is also set by the Tiebout hypothesis (voting-with-feet).

The government grants generous exemptions and tax preferences to people to establish their investment projects outside great Amman (the capital of the kingdom) and to reside there (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). The government also makes this offer more attractive by getting all the facilities available to these areas (communications, transportation, electricity, water, roads.. etc). This is done in order to enhance regional development but contributed to the budget deficits. People still prefer Amman to be the location of their companies. Therefore, what is achieved by this policy is minimal and below the level targeted. This is because, as the Tiebout hypothesis states (1956), people move to jurisdictions that meet their particular preferences such as the provision of public goods and services.

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\(^5\) The voting-with-the-feet hypothesis assumes: full knowledge of all the communities, costless mobility (no work problem or transport costs (Musgrave and Musgrave 1989), no externalities, absence of spillover across communities, absence of economic of scale in producing public goods (Mueller 1989). The application of these assumptions has been discussed by many authors such as Musgrave and Musgrave (1989). They showed that attention should be given to the assumption required to make mobility efficient. For further discussion and detail about the Tiebout hypothesis see Musgrave and Musgrave (1989), Cullis and Jones (1992), and Mueller (1989).
5. Further Explanations for the Empirical Results:

It is worth saying that there are many reasons why the government ran budget deficits even though it could have more fully exploited the relative taxable capacity. These are directly related to the public choice framework. The willingness of citizens to pay taxes is the first reason. It is worth saying that there is a huge difference between the ability-to-pay principle and the willingness to pay taxes. The former is an economic aspect while the latter is a public choice. The former represents one of the two alternatives on which equity is based (the benefit and the ability-to-pay principles) (Sandford 1992, Brown and Jackson 1995). This ability depends on the income and wealth of the taxpayer. In other words, the ability-to-pay principle means that the rich taxpayer should pay a higher marginal rate of tax than the poor (equality of sacrifice) (Musgrave and Musgrave 1989). This principle was discussed in detail in Chapter 1 section 3. Musgrave and Musgrave (1989) showed that the relative taxable capacity provides a comprehensive measure of the ability-to-pay principle.

On the other hand, the latter (willingness to pay taxes) is reflected in the wariness of the public and the degree they are convinced about paying taxes. Citizens may have the ability to pay taxes but not the willingness to do so. This can be clarified by discussing the willingness to pay in Jordan. This willingness can be seen as very low because of religion, traditions, norms and value judgements. Citizens show that the government has no right to impose and collect taxes because they look at paying taxes as an illegal action according to the Islamic religion. They show that what should be implemented in any Islamic country is zakat. This is a compulsory amount imposed on income or wealth of people which can be paid in a monetary way or in kind. In other words, it is a proportional income tax which aims mainly at redistribution of income from rich to poor people. This is besides financing the government expenditure. Furthermore, people in Jordan claim that there is bureaucratic corruption. They see the tax bill which everyone has to pay and do not see, in turn,

6 The above analysis is also valid for the willingness of the government to impose and collect taxes and its ability to do so. The government, for example, has no willingness to impose taxes on the agricultural sector for political reasons.
the services or the improvement of publicly produced goods. It is common in Jordan to hear that people in higher positions in the government are becoming rich rapidly. According to the point of view of citizens, the reason behind this is corruption.

The unemployment rate among Jordanians peaked to 25% in the aftermath of the August 1990 regional crisis (see Jordan: Ministry of Labour, Department of Research and Studies, Annual Report, 1992 and 1993). On the other hand, Jordan hosts more than 150 thousand expatriate workers and experts from Egypt, Philippines, Pakistan, India, Korea Syria, Lebanon, Sri Lanka and other countries. Unemployed Jordanian people do not have the willingness to work in the same posts as foreign workers because most of these are in agriculture, nursing, cleaning, and construction. Jordanians prefer office work in the government more than professional work even if the salary is less.

The International Monetary Fund (IMF) always gives the same prescription for all the developing countries. This consists of reducing the budget deficit through raising taxes and decreasing expenditures, depreciation of exchange rate, in addition to freeing international trade. They claim that the problems in these countries are the same. However, the feeling of citizens in Jordan is that the IMF serves the interest of the developed countries. It aims at enabling the country later on to pay its external loans to the lenders (industrial countries and the IMF itself) through mobilising the sources and directing them to achieve this goal. This results in a lower standard of living of citizens, increasing the poverty and the unemployment rate. That is why the IMF programmes in Jordan face several difficulties in being implemented. The second reason can be viewed as the willingness of citizens to pay taxes.

The budget deficit can be financed through four sources: external borrowing, internal borrowing from the public, printing money (though the central bank), and taxes (Mankiw 1994). The government in Jordan prefers to finance this deficit through external and internal borrowing. Internal borrowing means increased demand on the available domestic credit. This will raise the interest rate. It is worth addressing the following question: what is the effect of raising the interest rate in the
economy taking into consideration the public choice framework?. The effect of changing the interest rate may be neutral on the decisions of citizens about taking mortgages from commercial banks for housing. This is because of religion. According to Islamic law an interest rate is illegal. Therefore, people try to find other sources of financing rather than commercial banks. The Islamic Bank is a good example of this. This bank runs business according to Shari’a (Islamic law) by sharing out the profit or loss with the people.

On the other hand, a rise in interest rates will affect the big projects, companies based on economies of scale to be established or expanded. To avoid such adverse consequences, the government supports these by providing them with loans at concessionary rates (a low interest rate, long grace period). This, to a great extent, neutralises the effect of increasing the interest rate as a result of financing the budget deficit. Furthermore, the interest rate up until early 1990s was determined by the Central bank of Jordan. It was not determined by the market mechanism (supply and demand). The real interest rate (interest rate minus inflation rate) during most of the years of the 1970s and 1980s was negative (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). The intuition behind that was to apply Turkish Islamic Law which gives a fixed interest rate plus a margin as a commission for commercial banks. The IMF asked the monetary authority to leave the determination of the interest rate to the commercial banks. This led to obtaining a positive real interest rate during the last few years (3%-5%) (see CBJ, Monthly Statistical Bulletin, and CBJ, Annual report for 1995).

Members of Parliament (MPs) in Jordan always ask for more government expenditures to develop their areas (the place where the tribes live). However they oppose financing any increase in spending by increasing taxes without suggesting alternative sources. This is consistent with the hypothesis that providing public goods and services for the communities is behind the growth of the government expenditure. This behaviour is also consistent with the hypothesis of interest groups (majority rule) (Mueller 1989). MPs oppose increasing taxes because they (as representatives of the citizens) feel that citizens in Jordan are overtaxed compared with the goods and
services offered by the government. In other words, they believe that a higher volume of public services, taking into consideration the Arab Gulf Counties’ grants, can be provided for the same level of taxation. That is to say the government did not try to use (exploit) its relative taxable capacity because of the citizens feeling about the tax level compared with the publicly produced goods.

To conclude what is mentioned above, we can see that even though the fiscal illusion hypothesis explains the reasons lying behind growth of the government to a size larger than citizens prefer, it does not provide explanations for why the government does that. The bureaucracy and the growth of government spending hypothesis, as shown earlier, provide the explanation for this. The explanations of the empirical results therefore were discussed in a public choice framework. This includes the supply and demand sides (the willingness of the government to impose and collect taxes and the willingness of the citizens to pay taxes). The explanations were connected with some public choice hypotheses. These consist of the median voter, and the Tiebout’s voting with feet hypotheses. Furthermore, the hypotheses behind the growth of the government were also discussed (the bureaucracy and fiscal illusion). It is worth saying that economists in Jordan and the staff of the IMF have not, so far, addressed the subject of public choice in explaining what is going on in Jordan while the current study does. However, the study shows that the explanation of the empirical results are more likely to be found in economic rather than public choice theories. The location of Jordan which resulted in an inflow of financial grants from the Arab Gulf Countries reduced the need of the government to use its relative taxable capacity by increasing tax revenues.

7.5. The Second Approach: Estimating the Individual’s Relative Taxable Capacity and the Tax Effort for Jordan:-

In this section, the estimations of the model of Chapter 5 will be applied to estimate the individual’s relative taxable capacity in Jordan for the period 1973-95. To achieve this, the section will be divided into five sub-sections as follows:-
7.5.1. Theoretical Framework:

The same factors which determined relative taxable capacity in Chapter 5 were selected. They were represented by the same independent variables. Table 7.4 shows the matrix of simple correlation of these variables. It is computed for Jordan for the period 1973-95 by using the "COR" command which is available in the Microfit package. This matrix shows the sign of the relationship between the dependent variable (the individual's contribution to tax revenues) and each independent variable. This is helpful for comparing each sign for every relationship in Jordan with that sign which appeared in the corresponding matrix for the thirty-four developing countries in the study for the period 1986-89 (see Table 1 in Chapter 5). It is worth mentioning that the theoretical relationships and the reasons for selecting each variable were discussed in the literature review Chapter (Chapter 1, section 10). Looking at the first column in each of the above-mentioned Tables (Table 1 in Chapter 5, Table 7.4 in this Chapter), it is evident that all the relationships between the explained variable and the explanatory variables are consistent.

7.5.2. List of the Variables and their Descriptions:

To avoid repetition, see section 5.3 in Chapter 5 for the list of variables and their descriptions.

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7 These factors are: the degree of economic development, the composition of the GDP or its sectoral distribution, and the degree of economic openness. Each of these were represented by three independent variables. The first factor was expressed by per capita GNP, the individual's share in the agricultural sector, and the money supply (M2) per capita. The individual's share in each of the manufacturing sector, the mining sector and the wholesale & retail trade sector express three independent variables to represent the second factor. The individual's share in the gross commodity exports plus imports and his share from each of them separately as three alternative explanatory variables represent the third factor.
Table 7.4
Estimated Correlation Matrix of the Second Approach's Variables for Jordan during 1973-95

<table>
<thead>
<tr>
<th></th>
<th>TRP</th>
<th>GNPP</th>
<th>M2P</th>
<th>AP</th>
<th>WP</th>
<th>MANP</th>
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<td>.79663</td>
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<td>.77141</td>
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<td>.89328</td>
<td>.82100</td>
<td>.70337</td>
<td>.96936</td>
</tr>
</tbody>
</table>

-This Table is entirely original and has been obtained by using the "COR" command which is available in the Microfit package for all the variables of this period.
-The sources of data are as given in section 2 of this Chapter.
-The descriptions and computations of the figures which appear in this Table are as shown in section 5 of this Chapter (5.2 and 5.3).
-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
Table 7.4
Estimated Correlation Matrix of the Second Approach’s Variables for Jordan during 1973-95

(Continued)

<table>
<thead>
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<th>FP</th>
<th>XP</th>
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<td>.88891</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

-This Table is entirely original and has been obtained by using the "COR" command which is available in the Microfit package for all the variables of this period.

-The sources of data are as given in section 2 of this Chapter.

-The descriptions and computations of the figures which appear in this Table are as shown in section 5 of this Chapter (5.2 and 5.3).

-The coefficient of the simple correlation of two variables ranges between integral one of the positive complete correlation and negative integral one of the complete negative correlation. This matrix shows the simple correlation relationship between two variables for all possible relationships.
7.5.3. Computation of the Variables:

All the above-mentioned variables are computed in this Chapter. This has been done by dividing each variable over the number of inhabitants in each year of the period as shown in section 3 of Chapter 5. This has been done by using the "BATCH" file to facilitate the computation editing process. This file is available in the MS-DOS Editor package. The file was run with the "BATCH" command which is available in the Microfit package.

7.5.4. Empirical Results:

This sub-section is devoted to showing the empirical results, their computation and explanation. The model of the second approach (the model in Chapter 5) was applied to Jordan to estimate the individual’s relative taxable capacity (the individual’s estimated contribution to tax revenues) for 1973-95. As mentioned in the first approach, a 95% confidence interval for the capacity is computed using the standard error of each predicted value. Since the model adopted is in terms of log per capita (not per capita), great attention is given to compute the 95% confidence interval for each predicted value. This will be mentioned later in this sub-section. Two columns therefore to show the individual’s relative taxable capacity are presented in Table 7.5. Note that the confidence interval we have obtained for the individual’s relative taxable capacity is relatively narrow (see Table 7.5). This affects both the tax effort and the analysis of the empirical results.

What was done was this: the individual’s contribution to tax revenues was divided by the individual’s relative taxable capacity in the same year in order to obtain the tax effort for the period under study (1973-95). Again as a result of obtaining two figures for the relative taxable capacity for each year (95% confidence interval for the predicted value), two figures for the tax effort for each year are also computed and shown in Table 7.5. These reflect the range that this effort lies in between. We can say therefore, as mentioned in Chapter 5, that Jordan had exceeded its relative taxable capacity if both the tax effort figures were greater than one (1992-95). Conversely,
if both the tax effort figures for a year were less than one, then we can say that Jordan had not exploited its taxable capacity (1973-75, 1989-91). In cases where the tax effort bounds include the value one (1976-88 see Table 7.5), we can not decide. In other words, we cannot say that the country had/had not surpassed its relative taxable capacity. This is because the individual’s contribution to tax revenues lies within the 95% confidence interval for taxable capacity.

It is worth saying that all the empirical results obtained in this Chapter are consistent with both the theoretical framework of the study (discussed in Chapter 1, section 10) and the practical results of the previous studies on this subject, especially the study of Tait and Eichengreen.

Table 7.5 shows the relative taxable capacity per person in Jordan and the tax effort demonstrated by each individual in Jordan according to the model of the second approach. This Table has been obtained by using different commands available in the Microfit package as follows:

1- After the log of each variable is computed in terms of US$, the adopted model is then applied to Jordan to estimate the individual’s relative taxable capacity. The model is applied as follows: the estimation of the second approach’s model for the developing countries for the period 1986-89 was applied to Jordan for the period 1973-95 in order to compute the individual’s relative taxable capacity. Then a 95% confidence interval for the log of the individual’s relative taxable capacity is computed. The figures (lower and upper limits) for each year then were converted from US$ to the Jordanian Dinar (JD) after they converted from log per-capita to per-capita. This was done by using the annual average exchange rate of the JD against the US$ in each year. This aims to obtain the individual’s relative taxable capacity in terms of JD instead of the US$.

2- The tax effort figures for each year for the lower and the upper limits of the individual’s relative taxable capacity are computed by dividing the
individual's contribution to tax revenues by his relative taxable capacity which is obtained from the previous step.

3- The BATCH file is used to obtain the results of all the previous steps.

This approach estimates the individual's relative taxable capacity by dividing all the variables by the number of inhabitants. However, the first approach (please refer to Chapter 4) estimates the relative taxable capacity for the whole economy using the ratio of these variables to the GNP at current factor cost (GNP minus net indirect taxes) or GDP. The yield of the tax revenues can be obtained by multiplying the individual's relative taxable capacity by the number of population.

Table 7.5 shows the individual's relative taxable capacity and the tax effort in Jordan according to the model. It is worth saying that the analysis of the empirical results will focus mainly on the first half of the current decade. This is done because the fiscal policy for the future can be based on these years. 1995 will be given a great attention because it is the last year subject to the study. The individual's relative taxable capacity has been exploited to the full and more during the 1992-95. This means that the actual individual's contribution to tax revenues for the period exceeds his relative taxable capacity. 1995 recorded the highest tax effort for the whole of the period 1973-95. It ranged between 1.12 and 1.30. This denotes that the individual's relative taxable capacity had been not only exploited to the full, but had also exceeded this ratio in this year (1995). This indicates that the government could have eliminated some taxes or decreased the rates of the current taxes for the period 1992-95. These empirical results will be connected with the economic structure and its development in the next sub-section. Meanwhile, sub-section 7.5.6 is devoted to discussing the explanation of the results from a public choice perspective.

Comparing the tax effort computed for the model of the first approach with that of this approach (the second approach) for Jordan shows that both agree on a tax effort that is the highest in 1977 among the years of the 1970s (1973-79) (see Tables 7.2 and 7.5).
<table>
<thead>
<tr>
<th>Year</th>
<th>Individual's Contribution to Tax Revenues(^{(1)})</th>
<th>95% Confidence Interval</th>
<th>Taxable Capacity</th>
<th>Tax Effort</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>20.4167</td>
<td>.69332</td>
<td>25.5028</td>
<td>.80057</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>25.1297</td>
<td>.68833</td>
<td>31.6257</td>
<td>.79460</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>32.1458</td>
<td>.72643</td>
<td>38.3407</td>
<td>.83843</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>47.1603</td>
<td>.87887</td>
<td>46.4473</td>
<td>1.0154</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>59.7484</td>
<td>.96787</td>
<td>53.4113</td>
<td>1.1186</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>59.9271</td>
<td>.93200</td>
<td>55.7271</td>
<td>1.0754</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>70.8724</td>
<td>.89492</td>
<td>66.7662</td>
<td>1.0615</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>78.8262</td>
<td>.87092</td>
<td>78.1499</td>
<td>1.0087</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>101.3043</td>
<td>.91803</td>
<td>94.6876</td>
<td>1.0699</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>110.1298</td>
<td>.92621</td>
<td>102.5806</td>
<td>1.0736</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>116.1394</td>
<td>.98901</td>
<td>101.7260</td>
<td>1.1417</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>118.5559</td>
<td>.93593</td>
<td>109.6839</td>
<td>1.0809</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>118.6168</td>
<td>.95138</td>
<td>107.8019</td>
<td>1.1003</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>111.3031</td>
<td>.98112</td>
<td>98.2214</td>
<td>1.1332</td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>112.7903</td>
<td>.95684</td>
<td>102.0747</td>
<td>1.1050</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>113.2144</td>
<td>.89841</td>
<td>109.1199</td>
<td>1.0375</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>117.2392</td>
<td>.70764</td>
<td>143.3347</td>
<td>.81794</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>141.8973</td>
<td>.79429</td>
<td>154.8046</td>
<td>0.91662</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>143.3396</td>
<td>.80140</td>
<td>154.9862</td>
<td>0.92485</td>
<td></td>
</tr>
</tbody>
</table>

\(^{(1)}\) The Individual's Relative Taxable Capacity and the Tax Effort of Jordan during 1973-95.
<table>
<thead>
<tr>
<th>Year</th>
<th>Contribution to Tax Revenues</th>
<th>Taxable Capacity</th>
<th>Tax Effort</th>
<th>Relative Taxable Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>211.9407</td>
<td>168.3935</td>
<td>1.0900</td>
<td>1.2586</td>
</tr>
<tr>
<td>1993</td>
<td>205.0338</td>
<td>167.8709</td>
<td>1.0567</td>
<td>1.2214</td>
</tr>
<tr>
<td>1994</td>
<td>213.3884</td>
<td>170.8039</td>
<td>1.0819</td>
<td>1.2493</td>
</tr>
<tr>
<td>1995</td>
<td>233.7450</td>
<td>180.3749</td>
<td>1.1208</td>
<td>1.2959</td>
</tr>
</tbody>
</table>

1- The individual's contribution to tax revenues is measured by dividing total tax revenues (excluding social security contributions) over the population.

- This Table is entirely original. The sources of data are as given in section 2 of this Chapter. The descriptions and computations of the variables which this Table based on are as shown in section 5 of this Chapter (sub-sections 5.2 and 5.3).

- The tax effort is measured for the model by dividing the individual's contribution to tax revenues on the individual's relative taxable capacity in every year.

- The individual's relative taxable capacity represents the estimated proceeds of the individual's contribution to tax revenues in terms of Jordan Dinar (JD).

- The figures of the individual's contribution to tax revenues and the individual's relative taxable capacity appear in terms of JD.
7.5.5. The Individual's Relative Taxable Capacity and the Economic Structure:

This sub-section focuses on the explanation of the empirical results of the previous sub-section by connecting them with the economic structure. The explanation will take into consideration the economic development which has taken place during the period 1973-95. The tax effort for 1992-95, according to the model, has exceeded one (see Table 7.5). This shows that there was no room to increase tax revenues in Jordan. This indicates that Jordan has surpassed the individual's relative taxable capacity for the same model. In other words, Jordan could logically reduce tax revenues according exclusively to this model.

The explanation for the empirical results can be found by linking the data with two aspects: economic structure and tax system. Chapter 2, section 2 of this thesis discusses the structure of the Jordanian economy. It was shown that Jordan is a country with a low middle income. Such a country has limited scope for the transfer of resources to the government (Musgrave and Musgrave 1989). Individual income is needed to buy necessities (food). These are usually exempted from tax. This, therefore, influences the individual's relative taxable capacity adversely. This result is in line with the ability-to-pay principle. The Jordanian economy has limited natural resources and a small domestic production base. This means a small tax base. This reduces the individual's relative taxable capacity. The economy is strongly service-oriented. This generates a good tax base. Accordingly, we expect a moderate individual's relative taxable capacity in Jordan.

We must also take into consideration the factors which determine the individual's relative taxable capacity. We need especially to consider the independent variables included in the model of the second approach. These independent variables were represented by the individual's share from each sector, i.e. the mining sector, the manufacturing sector. We need also to look at the degree of both monetisation and economic openness (see Table 7.6). We should keep in mind that the relationship between each of the above-mentioned independent variables and the individual's relative taxable capacity is positive. This means that any change in any variable will
lead to a change in the individual’s relative taxable capacity in the same direction. In other words, an increase in per capita value of each explanatory variable will generate an increase in relative taxable capacity. This again reflects the individual’s ability to pay tax which was discussed in Chapter 1, section 3. The reasons for each relationship were mentioned in Chapter 1, sections 9 and 10.

Table 7.6 shows that the trend of all the independent variables was, on general, upward over the period under study (1973-95) (see Figures 7.7 and 7.8). These independent variables, as shown earlier, are positively correlated with relative taxable capacity. This has affected the individual’s relative taxable capacity positively during the whole period (1973-95) (see Table 7.5).

The individual’s contribution to tax revenues during the 1970s was on average of about JD 40. However, the contribution jumped, on average, during the 1980s to about JD 100. Then, it amounted to two hundred JDs and over after 1992 (see Table 7.5). These figures reflect the expansion in the tax base and the development of the tax system (tax rates and bases subject to tax) during the period in the study. The lack of bases, as shown earlier, forces the government, through discretionary tax changes, to impose new taxes and raise the rates of the current taxes in order to generate more revenues to finance public expenditures, particularly during the first half of the 1990s (1990-95). This raises the individual’s contribution to tax revenues to high figures (see Table 7.5). The most important discretionary measures will be discussed later. Consequently, when the latter (individual’s contribution to tax revenues) is divided by the former (individual’s relative taxable capacity) to compute the tax effort for each year, this effort recorded high figures for 1992-95 as shown earlier.

The reason for the excess above integral one of the tax effort during the last four years of the first half of the 1990s is to be found in the denominator (individual’s relative taxable capacity) and in the numerator (individual’s contribution to tax revenues) of the tax effort identity. The denominator increased slightly for the period 1990-95. This reflects the developments which have taken place, particularly those which occurred in the variables included in the model. This also reflects the changing
Table 7.6
The Included Variables in the Individual's Relative Taxable Capacity Model for Jordan during 1973-95

(In JD)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax Revenues</th>
<th>Money Supply</th>
<th>Manufacturing Sector</th>
<th>Mining Sector</th>
<th>Exports Plus Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>20.4167</td>
<td>105.1281</td>
<td>21.4913</td>
<td>2.4476</td>
<td>78.7416</td>
</tr>
<tr>
<td>1974</td>
<td>25.1297</td>
<td>126.7435</td>
<td>15.4467</td>
<td>6.4553</td>
<td>118.4438</td>
</tr>
<tr>
<td>1975</td>
<td>32.1458</td>
<td>159.2930</td>
<td>18.7793</td>
<td>9.3344</td>
<td>155.7028</td>
</tr>
<tr>
<td>1976</td>
<td>47.1603</td>
<td>200.2858</td>
<td>25.0357</td>
<td>9.3156</td>
<td>215.6354</td>
</tr>
<tr>
<td>1978</td>
<td>59.9271</td>
<td>294.8724</td>
<td>33.7789</td>
<td>9.6719</td>
<td>267.2175</td>
</tr>
<tr>
<td>1979</td>
<td>70.8724</td>
<td>362.6173</td>
<td>55.7692</td>
<td>12.8987</td>
<td>332.6454</td>
</tr>
<tr>
<td>1980</td>
<td>78.8262</td>
<td>444.6050</td>
<td>60.1806</td>
<td>18.1490</td>
<td>400.1354</td>
</tr>
<tr>
<td>1981</td>
<td>101.3043</td>
<td>513.0000</td>
<td>82.5217</td>
<td>18.9565</td>
<td>560.4348</td>
</tr>
<tr>
<td>1982</td>
<td>110.1298</td>
<td>587.4006</td>
<td>88.9912</td>
<td>19.4224</td>
<td>588.3633</td>
</tr>
<tr>
<td>1983</td>
<td>116.1394</td>
<td>651.0278</td>
<td>82.3458</td>
<td>17.5333</td>
<td>529.0609</td>
</tr>
<tr>
<td>1984</td>
<td>118.5559</td>
<td>682.3370</td>
<td>95.8463</td>
<td>24.7283</td>
<td>527.9115</td>
</tr>
<tr>
<td>1985</td>
<td>118.6168</td>
<td>700.8598</td>
<td>76.7850</td>
<td>24.5234</td>
<td>517.1589</td>
</tr>
<tr>
<td>1986</td>
<td>111.3031</td>
<td>746.0043</td>
<td>69.7984</td>
<td>24.5860</td>
<td>397.3362</td>
</tr>
<tr>
<td>1987</td>
<td>112.7903</td>
<td>822.2530</td>
<td>74.0381</td>
<td>23.1889</td>
<td>425.7539</td>
</tr>
<tr>
<td>1988</td>
<td>113.2144</td>
<td>874.3971</td>
<td>65.0809</td>
<td>27.2217</td>
<td>462.9997</td>
</tr>
<tr>
<td>1989</td>
<td>117.2392</td>
<td>945.0064</td>
<td>81.0115</td>
<td>49.1412</td>
<td>591.7621</td>
</tr>
<tr>
<td>1990</td>
<td>141.8973</td>
<td>900.4037</td>
<td>99.5675</td>
<td>42.9066</td>
<td>698.0392</td>
</tr>
<tr>
<td>Year</td>
<td>Value 1</td>
<td>Value 2</td>
<td>Value 3</td>
<td>Value 4</td>
<td>Value 5</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>1991</td>
<td>143.3396</td>
<td>1004.5</td>
<td>92.8668</td>
<td>33.7476</td>
<td>685.0851</td>
</tr>
<tr>
<td>1992</td>
<td>211.9407</td>
<td>1090.8</td>
<td>105.6972</td>
<td>33.9490</td>
<td>811.7326</td>
</tr>
<tr>
<td>1993</td>
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<td>1122.4</td>
<td>107.0123</td>
<td>26.7719</td>
<td>830.1027</td>
</tr>
<tr>
<td>1994</td>
<td>213.3884</td>
<td>1169.6</td>
<td>119.0269</td>
<td>26.3323</td>
<td>809.9725</td>
</tr>
<tr>
<td>1995</td>
<td>233.7450</td>
<td>1202.5</td>
<td>121.8131</td>
<td>31.7875</td>
<td>892.4027</td>
</tr>
</tbody>
</table>

-This Table is entirely original and the sources of data are as given in section 2 of this Chapter.

-The computations of the variables which appear in this Table are as shown in sub-section 5.3 of this Chapter.
Figure 7.3: Per capita of each money supply (M2P) and merchandise exports plus imports (FP) for Jordan during the period 1973-95.

Figure 7.4: Per capita of each the mining sector (NP) and the manufacturing sector (MANP) for Jordan during 1973-95.
structure of the Jordanian economy, as mentioned earlier in this section.

Meanwhile, the numerator of the tax effort identity increased to about double during the period 1990-95 (see Table 7.5). Consequently, the explanations should focus on the latter (individual's contribution to tax revenues). There are several reasons for believing an increase of the individual's contribution to tax revenues was economically justified in Jordan for the period 1990-95, particularly 1992-95 (see Table 7.6).

There are several dimensions to the increase in tax burden in Jordan for the first half of this decade, particularly for 1992-95. Most significant is the increase in tax revenues (see Table 2.6 of Chapter 2). The increase in tax revenues reflected the effects of both growth in the GNP and discretionary measures (see footnote 10 for more detail). The former (economic growth [spontaneous growth]) relates to the rise in the revenues which simply result from the growth of the tax base. Meanwhile, there were the discretionary changes in the tax system, such as the modification of the tax rates applicable, or a more comprehensive base for a certain tax, or the imposition of new taxes.

It is impossible to separate the effect of each discretionary measure on the proceeds of tax revenues for Jordan for several reasons. Firstly, the tax system in Jordan suffers from rapid continuous amendment the legislation (sometimes, within the space of a single year). Secondly, it is very difficult to determine the tax base of each amendment correctly and precisely. Thirdly, there are several tax rates for some items subject to tax (such as refrigerators and cars). The tax rates depend on weight, size and height of the product as will be shown. Fourthly, the tax system in Jordan adopts two kinds of taxes: \textit{ad valorem} and specific taxes (see Chapter 2, section 6 for more details about these two kinds). Finally, the government always tries to estimate the effect on tax revenues of each measure to be adopted with relevance to its own experience. These estimations may be biased (under/overestimated). This maybe done to minimise the adverse response of citizens for political reasons and in that way to serve the government's tax policy. Consequently, these estimations are not reliable.
That said, the discretionary measures which have taken place during the period 1990-95 can be summarised as follows:-

1- The reduction of the budget deficit to maintain a balance between the demand for and the limited availability of resources in the future. This lies at the heart of the medium-term adjustment programme goals which have been adopted by the government. The programme covered the period 1989-93. This programme was followed by a comprehensive medium term growth-oriented adjustment programme for the period 1992-1998. These programmes have been designed by the government of Jordan in cooperation with the International Monetary Fund (IMF). Two-thirds of the fiscal consolidation was attributable to public expenditure restraint and the remainder to an increase in public revenues (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). This has required a modification and review of the tax system in Jordan. This is done by introducing new taxes and increasing the tax rates of some current taxes as well as adopting a series of fiscal discretionary measures. Further details were mentioned in Chapter 2.

2- A consumption tax was imposed in Jordan in late 1988 on domestic products. It is levied at different rates. This tax unified and re-organised what were previously the excise duties. It expanded their base to include additional products. The coverage of this tax was broadened in 1992, and with 21 items added in June 1993 the total number of items subject to it rose to 106 (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). This tax was replaced in June 1994 by the General Sales Tax (GST). The GST was imposed on all imports, all manufactured goods, and some services by a unified rate (7%). It expands the base to

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8 Jordan also has formulated a macroeconomic adjustment and structural reforms programme covers the period 1996-98 (IMF Survey, 1996). This programme which is supported by the IMF is based on the latest political and economic developments which have taken place during the last two years (see Chapter 6, section 4, footnote 1, for more details).
contain several items which were previously exempted and also brings in some services. The GST is a proportional tax. The current study shows that the GST is more efficient because it generates a lower excess burden than that of selective excise tax (Cullis and Jones 1992). It is also simple because it requires low administration and compliance costs (Musgrave and Musgrave 1989). However, it is less equitable because it is not based on the ability-to-pay principle (imposed on all goods at the same rate) (Cullis and Jones 1992) (see Chapter 1, section 3 for more detail).

To control consumption growth and strengthen domestic saving-oriented behaviour, the General Sales Tax Law was amended in September 1995. The standard rate of Sales Tax was raised from 7% to 10%. The present study shows that this increases, economically speaking, the excess burden. The burden, as mentioned in sub-section 3.4.2 in Chapter 1, increases as long as tax rate increases (Musgrave and Musgrave 1989). The amendment also aims to broaden the tax base through increasing the number of taxable services. Furthermore, the positive list of services subject to tax was replaced by a negative list with limited exemptions (Central Bank of Jordan, Annual Report, 1994 and 1995, Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). These amendments came into force as of the 2nd of October, 1995. The present study shows that the effect of this amendment (this expansion in the tax base) is to reduce the excess burden. It is well known that tax distorts the free choices of individuals. This is reflected in creating the excess burden. To reduce the excess burden, tax should be imposed on all goods at the same rate. This kind of tax is more efficient than selective excise tax in respect of minimising the consumer utility loss (Auerbach and Fieldstein 1985, Cullis and Jones 1992). This recommendation is not consistent with the equity principle (see Chapter 1, section 3 for more detail).

3- The devaluation of the exchange rate of the Jordan Dinar in 1988 to about one-third of its previous value was mentioned in Chapter 2 (Public Finance in
Jordan). The effect of the devaluation was to increase the prices of imports in term of JD. This then increased the proceeds of the customs duties as a later stage. On the other hand, devaluation also led to a monetary expansion which, in turn, raised the inflation rate in 1989 to double figures (i.e. to 25.8%). Consequently, this increased the consumption tax proceeds as well as the proceeds of income tax as a result of increasing nominal income. Income tax, during inflation, grows in importance as a generator of revenue since it is progressive. The basic starting point and the starting point of each higher rate bracket fall in real terms. Accordingly, the taxpayers may find themselves moving into higher brackets because an inflation-proofing of tax bands is not the practice in Jordan. Taxpayers find themselves paying at a higher marginal rate (Sandford 1992).

4- The increase in tax revenue was due to the removal of the ban in January 1990, imposed in November 1988, on imports of some high duty luxury items (such as cars, T.V sets...etc) (Central Bank of Jordan, Annual Report, 1990, Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996).

5- The sanctions which were imposed on Aqaba port from 1990 to late 1991, as a result of the Gulf Crisis, influenced the Jordanian economy, particularly the volume of imports and in turn the proceeds from customs duties. When the sanctions were lifted in late 1991, imports increased from JD 1764.8 million in 1991 to JD 2291.0 million in 1992. This therefore increased the customs duties from JD 136.1 million in 1991 to JD 286.4 million in 1992 (about JD 65 million of the latter statistic represents the customs duties collected on the cars of the Jordanian returnees from the Arab Gulf Countries in the aftermath of the regional crisis). As stated in Chapter 2, customs duties are imposed at different percentages on the goods values (ad valorem). The imposition of these taxes at different percentages creates, as shown in Chapter 1, section 3, excess burden because they distort the free choices of individuals.
6- In September 1995, the direct tax system was reformed by eliminating tax holidays (except for investment in less-developed regions) and by limiting tax deductibility to net interest payments (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). This contributed to the increase in taxation in Jordan in 1995. It is well known that narrowing exemptions and deductions (or expanding the base), as mentioned in Chapter 1, section 3, is in line with increasing efficiency (reducing excess burden) because the tax becomes more general than selective excise tax.

On the other hand, the spontaneous growth of the tax revenues during the period 1990-95 is represented by the growth of the comprehensive tax base (GNP). The GNP at current market prices has registered remarkable growth rates since 1990, two years after implementing the economic adjustment programme. It reached double figures during each year of the period 1990-95. The exception was for 1991 and 1994 which recorded a growth rate amounting to 8.4% and 8.2% respectively. In 1990, 1993 and 1995 the growth rate reached 11.4%, 12.9%, and 11.5% respectively. However, the growth rate jumped to more than one-fourth (25.5%) in 1992. This improvement was realised due to two main reasons: firstly, the strength of the sustained activity in the manufacturing, transport & communication, and construction sectors; secondly, the high inflation rates which were recorded during the period as a result of devaluing the exchange rate of the JD.

7.5.6. The Explanations of the Empirical Results:

The most important result of the second approach of this Chapter is represented by the fact that Jordan surpassed its individual’s relative taxable capacity during the period 1992-95. The explanation for the result can be shown by discussing the economic situation which was prevailing during the period from a public choice perspective. The fiscal illusion hypothesis is valid for explaining the empirical result of the current thesis for the period 1992-95.

The ability of bureaucrats to expand the budget beyond the amount the citizens
would ideally demand depends in part on its ability to misrepresent the true prices and quantities of publicly provided goods. This also depends on the size of the bureaucracy. The hypothesis that bureaucratic power increases the size of the government presumes that the bureaucracy can deceive the legislature about the true costs of supplying different levels of output. The fiscal illusion hypothesis presumes that the legislature can deceive the citizens about the true size of government. The fiscal illusion explanation for government size assumes that citizens measure the size of the government by the size of their tax bill (Musgrave and Musgrave 1989). The government, as shown earlier, did not attain its relative taxable capacity. However, an application to this can be found in Jordan after 1991. In order to show that its size is acceptable (within the preferred level of the median voter), the government estimates the effect on tax revenues of each discretionary measure to be adopted with reference to its own experience. These estimations are biased (underestimated). This is done to minimise the adverse response of citizens for political reasons and in that way to serve the government’s tax policy. Consequently, these estimations are not reliable. Many discretionary tax measures have been introduced since 1991. These measures were discussed in detail in sub-section 7.5.5. These mainly aim to increase tax revenues. This reflected, as discussed earlier, an increased tax burden in Jordan.

To bring about an increase in government size, for which the citizens are not willing to pay voluntarily, the legislative-executive entities must increase the citizens’ burden in such a way that citizens are unaware that they are paying more in taxes. The other choice is for the government to be willing to pay the price of citizen displeasure at the next election. If the tax burden can be disguised in this way, citizens have the illusion that the government is smaller than it actually is, and the government can grow beyond the levels citizens prefer (Mueller 1989, Cullis and Jones 1992). Therefore, direct taxes are more visible and government growth should have to rely on indirect taxes (Mueller 1989). In Jordan, between 1992-95, the proceeds of tax on income, profits, and capital gains formed about 15% of total tax revenues. The remaining percentage was raised by indirect taxes. This may confirm that the balance of revenue was raised by the government wanting the citizens not to notice the burden of indirect taxes because they are less visible. This is consistent
with the fiscal illusion hypothesis mentioned above.

Fiscal illusion can be divided into two main sub-hypotheses which are valid for Jordan. First, the more complex the tax system is, the more difficult it is to measure the tax burden (Mueller 1989). In Jordan, the government imposes many kinds of taxes in order to increase tax revenues to rely more on domestic resources after the Arab Gulf Counties stopped paying grants in 1990. These number more than twenty. This represents a complex tax system. These taxes have different names, different bases, different modes of collection and levies at different rates. This makes it difficult for the citizen to measure the tax burden he/she bears. Furthermore, this is not consistent with simplicity because it increases the collection and compliance costs. Therefore, this sub-hypothesis is met in Jordan.

The second sub-hypothesis for fiscal illusion is that the implicit future tax burdens as a result of a high debt service burden are more difficult to measure than increasing current taxes (Mueller 1989). This is exactly what happened in Jordan. The government maintained the direct tax rate relatively low in order to shift the burden from current to future generations. Past and current generations were prepared to fight a war to maintain freedom. After Jordan signed the peace treaty with Israel in 1994, future generations benefit from this and they are free riders. To make them pay some of the costs of the military expenditures over the past five decades, the current generation financed these expenditures with a budget deficit without relying on tax revenues. The government preferred to finance the budget deficit by external and internal (printing money) borrowing9 rather than exploiting its relative taxable capacity to the full for 1973-89 by increasing the current tax rates or imposing new taxes. However, the government has started to rely more on taxes since 1994. This led to it surpassing the relative taxable capacity.

The government resorted in early 1989 to requesting technical assistance from the

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9 The availability of financial assistance has contributed to financing part of the government expenditure. This reduces the government's need to increase taxes.
IMF to help in managing the economy (Maciejewski, E., Mansur, A., Gamo, P. A., Chauffour, J., Callatay, E., and McDermott, C., 1996). It, in co-operation with the IMF, adopted an economic adjustment programme covering the period 1989-93. The announced reason for doing this was to improve the economy. The true reason was because it could not find foreign lenders to finance its expenditures because of the economic situation prevailing during that period taking into account the decision of the Arab Gulf Counties not to offer Jordan grants in the aftermath of the regional crisis in 1990. Net foreign reserves at the Central Bank of Jordan reached critical levels. This may be interpreted as a kind of fiscal illusion.

7.6. The Third Approach: Income Tax Elasticity:

Income tax elasticity\(^\text{10}\) shows a comparison between the growth rates of tax revenues (TR) and the Gross National Product (GNP) by dividing the former by the latter. If the growth rate of the former (TR) exceeds that of the latter (GNP),

\[ \text{Elasticity} = \frac{\text{Growth rate of TR}}{\text{Growth rate of GNP}} \]

\(^\text{10}\) The increase in tax revenues during a certain period reflects the effects of both spontaneous growth and discretionary changes. The former represents the rise in the revenues which simply results from the growth of the tax base. Meanwhile, the discretionary changes represent the changes in the tax system, such as the modification of the tax rates, or the change of the scope of the comprehensiveness of a certain tax (tax base), or the imposition of new taxes. Therefore, the discretionary element reflects the government policy. The analysis of the tax revenue developments often requires a distinction between the above two components.

This distinction leads to two different concepts of elasticity. First, there is the comprehensive tax elasticity (buoyancy). It is defined as the percentage change in tax revenues related to the percentage change in the tax base. An alternative concept of elasticity is developed, which is called the built-in elasticity. This is the second kind. It compares the growth of the tax revenues with the rise in the tax base by adjusting the time series of total tax revenues for the effect of discretionary changes. This can be done by deducting from taxes the amount of revenue equal to the accumulated proportion of total annual revenue that results from each discretionary change. Thus, it generates a time series for the built-in growth element.

The buoyancy elasticity for Jordan was estimated in this Chapter, but the built-in elasticity was not. This is because it is difficult to estimate a quantitative effect of the discretionary measures in tax revenues besides the different effects of those changes on the different kinds of tax revenues (see sub-section 4.5 of this Chapter for reasons lie behind why this has been done). For more details see: (Byrne 1979, Chand 1975, Mansfield 1972).
elasticity will exceed unity. In contrast, if the opposite occurs, the elasticity will be less than one. The elasticity reflects the capacity to generate growth of tax revenue. Accordingly, the elasticity also reflects a dynamic tax performance measurement in the economy of a certain country.

Estimating the income tax elasticity is useful for displaying the extent of the sensitivity and response of the tax system to the changes that take place in the composition and value of the GNP. This gives a clear conception about the tax system and the need for tax reform if it is inelastic. With this reform, the tax system is quickly influenced and responsive to the changes happening to the GNP.

7.6.1. The Methodology of Model Estimation:-

This sub-section discusses the methodologies of model estimations. It also reviews the advantages and disadvantages of each. Subsequently, according to its advantages, one methodology will be adopted in this approach. It is well known when designing an econometric model that the model must serve a specific goal, established through economic and econometric theory and valid for policy analysis and forecasting. There are two methodologies for arriving at this model or what is called the preferred model. The "specific to general" procedure starts from the simplest model then goes further to the more general preferred model (Maddala 1992, Pagan 1987). In contrast, the "general to specific" methodology, which is suggested by Hendry (Hendry 1979, Maddala 1992), starts from the most acceptable general model and then moves to simplify the model: the model is narrowed down by imposing

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11 Income tax elasticity may also be used in addition to measuring the tax performance in the economy, in predicting the yield of the tax revenues when the growth rate of the GNP is known in advance.

12 The "specific to general" methodology starts from economic theory in designing an econometric model which reflects the economic relationship, then commences from a simple equation model to estimate the unknown parameters, assuming that the highly restricted model is correctly specified. Suitable diagnostic tests are used to move from this simple model to the general preferred model. This is done by adding explanatory variables or lags, revising the specification of the model in the light of test results, then re-estimating the model and so on until we arrive at the preferred model (Maddala 1992, Pagan 1987).
restrictions. The model is transformed and the specifications checked until the preferred model is arrived at (Cuthbertson and Taylor 1992, Gilbert 1986). The preferred model should pass the conventional diagnostic tests.

Since the latter methodology has more advantages than the former, the "general to specific" approach has a wide popularity in practical econometric studies. Imposing restrictions, transforming the model and going back to the previous step are some of these advantages. If any econometric problems arise in the model such as autocorrelation, then it may be corrected by using, for instance, the Cochrane-Orcutt transformation. However, this procedure may be not correct, since the cause of this problem may be due to the omitted variable or to the mis-specification of the model (Hendry and Mizon 1978). On the other hand, each test that should be done is conditional on the arbitrary assumption (for instance, common factor which may be tested later) provided these tests are rejected. Therefore, all the earlier inferences will be invalidated regardless of the decision. Thus, there is no exact definite path go through in moving from the simple to the general preferred model. Consequently, uniqueness is not guaranteed. This implies that if two econometricians start from the same point, they will not necessarily arrive at the same preferred model, and they may not end up with the best model (Cuthbertson and Taylor 1992, Gilbert 1986, Hendry 1979).

The methodology of econometric modelling consists of designing the most general model which achieves consistency with the economic theory then simplifying this model by transforming or imposing a set of restrictions. The general model to start with, is where the explanatory variables include a lagged endogenous variable and current and lagged exogenous variables. The number of lags is determined by taking into consideration the available degrees of freedom and the nature of the data, for instance, four lags for seasonally unadjusted quarterly data and two lags for annual data (Cuthbertson and Taylor 1992, Pagan 1987).

It is obvious that the advantages of the "general to specific" methodology or what is called the top-down approach are greater than those of the "specific to general"
approach or what is called bottom-up (Maddala 1992). One of these advantages is the imposition of economic restrictions, transformation and re-arrangement of the model. Each procedure is tested to see if it is acceptable or not by using suitable diagnostic tests to arrive at the preferred model. When the variables involved are integrated of order one, but are also cointegrated, the general to specific methodology can be conducted in a first difference formulation including a lag of the cointegrating vector. In this formulation, all variables will be stationary and so standard inference will be (asymptotically) valid (Cuthbertson and Taylor 1992, Engle and Granger 1987, Gilbert 1986, Hendry 1979, Maddala 1992, Pagan 1987).

The second advantage is represented by the possibility of going back to the previous step during the simplifying process when any econometric problems arise in a later. An autocorrelation problem may be caused by the variables that have been omitted during the last step rather than a serial correlated errors (Hendry 1979, Hendry and Mizon 1978). Thus we can go back to the previous step. Although the preferred model has passed all the diagnostic tests, it may be congruent in all evidence if more lags or explanatory variables are included (Hendry 1979, Maddala 1992, Pagan 1987). Therefore, the income tax elasticity approach adopted the latter methodology.

7.6.2. Model Estimation:

Income tax elasticity is estimated by regressing the tax revenues on the GNP after taking the natural logarithm for both variables\(^\text{13}\). The model may include other

\(^{13}\) It is worth saying that there are several methods to measure income tax elasticity. This can be done by calculating the annual growth rate for each of the tax revenues and the GNP. Then the former is divided by the latter to find out the income tax elasticity during a year. The average of that elasticity can also be computed during a time period. Owing to the criticism of using the mean, as it is affected by extreme values, the elasticity was estimated by taking the natural logarithm for both tax revenues and GNP. Then Ordinary Least Squares (OLS) is applied.

The elasticity during a period can be measured by taking the growth rate of both the tax revenues and the GNP at the end of the period compared to the beginning, then the ratio of
independent variables such as exports. There is a positive relationship between tax revenues and commodity exports. This was discussed in Chapters 1, 3 and 6. Merchandise exports is simple to tax because they pass through ports. Also the exporters’ profits are subject to income, profits & capital gains taxes. Before estimating the model, all series LT (LT: log [tax revenues at current prices] = log(TR)), LY (LY: log [Gross National Product at current market prices]), and LX (LX: log [merchandise exports at current market prices]) are tested for non-stationarity against the trend-stationary alternative. The Dickey-Fuller test for unit roots for each series is used. The following output is obtained:-

- ADF LT

```
Unit root tests for variable LT

<table>
<thead>
<tr>
<th>statistic</th>
<th>sample</th>
<th>observations</th>
<th>without trend</th>
<th>with trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF</td>
<td>1965</td>
<td>1995</td>
<td>31</td>
<td>-1.3699(  -2.9591) -1.4957(  -3.5615)</td>
</tr>
<tr>
<td>ADF(1)</td>
<td>1966</td>
<td>1995</td>
<td>30</td>
<td>0.045285(  -2.9627) -2.0202(  -3.5671)</td>
</tr>
</tbody>
</table>
```

95% critical values in brackets.

The null hypothesis [LT I(1)] is not rejected, since the calculated value of both DF and ADF(1) are not less than the critical values for a lower tail 5% test.

- ADF LY

```
Unit root tests for variable LY

<table>
<thead>
<tr>
<th>statistic</th>
<th>sample</th>
<th>observations</th>
<th>without trend</th>
<th>with trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF</td>
<td>1965</td>
<td>1995</td>
<td>31</td>
<td>0.44368(  -2.9591) -1.9812(  -3.5615)</td>
</tr>
<tr>
<td>ADF(1)</td>
<td>1966</td>
<td>1995</td>
<td>30</td>
<td>0.26235(  -2.9627) -1.8829(  -3.5671)</td>
</tr>
</tbody>
</table>
```

95% critical values in brackets.

The null of a unit root for LY is not rejected either. None of the calculated values are less than the critical values.

the former to the latter represents the income tax elasticity.
- ADF LX

<table>
<thead>
<tr>
<th>statistic</th>
<th>sample</th>
<th>observations</th>
<th>without trend</th>
<th>with trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF(1)</td>
<td>1966 1995</td>
<td>30</td>
<td>-2.9574( -2.9627)</td>
<td>-2.1072( -3.5671)</td>
</tr>
</tbody>
</table>

95% critical values in brackets.

Again the null of a unit root for LY is not rejected either. None of the calculated values are less than the critical values. Thus, all series (LT, LY, and LX) are non-stationary in their levels, but become stationary when one differences is taken. In other words, all series have the same order of integration I(1). The test for cointegration is also conducted. The cointegrating regression which regresses LT on an intercept, LY and LX is estimated. The unit root tests for residuals is obtained:-

<table>
<thead>
<tr>
<th>statistic</th>
<th>sample</th>
<th>observations</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF</td>
<td>1965 1995</td>
<td>31</td>
<td>-2.9511( -4.0263)</td>
</tr>
<tr>
<td>ADF(1)</td>
<td>1966 1995</td>
<td>30</td>
<td>-4.2014( -4.0362)</td>
</tr>
<tr>
<td>ADF(2)</td>
<td>1967 1995</td>
<td>29</td>
<td>-5.0508( -4.0468)</td>
</tr>
<tr>
<td>ADF(3)</td>
<td>1968 1995</td>
<td>28</td>
<td>-4.2643( -4.0583)</td>
</tr>
</tbody>
</table>

95% critical values in brackets when available.

Using DF, ADF(1), ADF(2) or ADF(3) statistics, the null of no cointegration is rejected, since we infer that LT and both LY and LX are cointegrated. Thus, there is evidence of a long run relationship between them (see Engle and Granger 1987, Mackinnon 1996). The short run dynamics can be described by the Error Correction Model (ECM) (Hendry 1996).

There are a number of methods to estimate the ECM. The most popular among them are: the Engle-Granger two-step estimation procedure and the unrestricted ECM
estimation (Maddala 1992, Mehra 1994, Stewart 1991). Engle and Granger (1987) suggest estimating the cointegrating regression first. This represents the long-run relationship in levels (Greene 1993). If one rejects the null of no cointegration, the estimate of the coefficient(s) of the independent variable(s) can be fed into a second equation to estimate the short-run dynamics through the ECM (Stewart 1991). In other words, the first step is to estimate the cointegrating regression to obtain the residuals. The second step is to substitute the first lag of the residuals (obtained from the first step) for first lags of the variables included in the ECM. The coefficient of the first lag of the residuals represents a measure of the speed of adjustment of the dependent variable to the last period. It is expected to be negative and significant. Each step requires a single least squares equation (Engle and Granger 1987). The unrestricted ECM estimation suggests to estimating the long-run coefficients and the short-run dynamics at the same time. In other words, one might consider estimating the long and the short run coefficients in a single equation (Stewart 1991). The current study will adopt the Engle-Granger two-step estimation procedure.

The cointegrating regression therefore which represents the first-step of the Engle-Granger estimation procedure and estimates the long-run relationship between the included variables is as follows:

\[
\begin{align*}
\text{LT} &= -0.83 + 0.53 \text{LY} + 0.44 \text{LX} \\
&\quad (5.07) (5.91) \\
R^2 &= 0.99
\end{align*}
\]

where:

- LT: log(tax revenues at current prices) = log(TR).
- LY: log (GNP at current market prices).
- LX: log (exports at current market prices).
- \(R^2\): the coefficient of determination which represents the explanatory power of the model. Figures in parenthesis represent t-statistics.
The relationship between LT and both LY and LX is positive as expected. The coefficient of the variables has the anticipated signs. These prove to be sensible magnitudes and all of them are significantly different from zero at the five percent level. The coefficient of determination is high. Further details are shown in Appendix E. The long-run income tax elasticity = the coefficient of LY = 0.53. The long-run exports elasticity = the coefficient of LX = 0.44. The model indicates that the long-run income tax elasticity in Jordan for the period 1964-1995 reached less than unit\(^{14}\). This means that total tax revenues grew at a rate less than that of both the GNP and exports for the period 1964-95. Accordingly, we can conclude, based on the previous footnote 14, that the tax system in Jordan is regressive. The regressive tax rate is not consistent with the ability-to-pay principle. This gives a clear conception about the tax system and the need for tax reform. With this reform, the tax system is quickly influenced and responsive to the changes happening to the GNP and its composition.

The coefficient estimates from the static regression are consistent but may be biased in small samples because of omitted dynamics (Banerjee, Dolado, Hendry and Smith

\[^{14}\text{When the income tax elasticity reaches the unit, this means that the marginal propensity to tax (MPT) equals tax ratio. The following mathematical derivation shows that:}\]

\[E = \frac{\text{(Percentage change in tax revenues (T))}}{\text{(Percentage change in the GNP)}}\]

That is:

\[E = \frac{(DT/T)}{(DGNP/GNP)}\]

By changing the division to multiplication:

\[E = (DT/T) \times (GNP/DGNP)\]

By rearranging terms:

\[E = \frac{(DT/DGNP)}{(GNP/T)}\]

By changing multiplication to division:

\[E = \frac{(DT/DGNP)}{(T/GNP)}\]

But:

\[\frac{(DT/DGNP)} = \text{MPT, } \frac{(T/GNP)} = \text{tax ratio.}\]

Where (E) represents income tax elasticity. The symbol (D) represents the first differences.

The last mathematical result shows that the income tax elasticity (E) equals the marginal propensity to tax (MPT) divided by the tax ratio (tax burden). Therefore, if the elasticity equals unity, the numerator must equal the denominator. Through that, we can say that the tax system (supposing that there are no discretionary procedures) is progressive when elasticity exceeds unity, or proportional when elasticity equals one, or regressive when elasticity reaches a value less than one.
1986, Maddala 1992). To allow for this, a dynamic specification is estimated using the ECM approach. An Error Correction Model (ECM) then is obtained using the "general to specific" methodology to explain the income tax elasticity. One lag for the general dynamic model is chosen. What was done was the residuals from the first-step of the Engle and Granger estimation procedure (cointegrating regression) are saved in order to employ the second step. This gives the unrestricted ECM reported in Appendix E. A test is then carried out to see whether the coefficients of the first lag for the three series are jointly zero. According to the F-statistic, the hypothesis that the first lag coefficients are jointly zero is accepted. Then a restricted Error Correction Model (ECM) is estimated. The model represents the second-step of the Engle-Granger estimation procedure.

Again the model indicates that the short-run income tax elasticity in Jordan for the period 1965-1995 reached less than unit. The short-run income tax elasticity = (the coefficient of DLY) = 0.29. Furthermore, the short-run exports elasticity = (the coefficient of DLX) = 0.28. This again means that total tax revenues grew at a rate less than that of both the GNP and exports for the period 1965-95. Further explanations were discussed earlier.

\[
\begin{align*}
DLT_t &= 0.05 + 0.29 \text{DLY}_t + 0.28 \text{DLX}_t - 0.64 \text{R}_{t-1} \\
R^2 &= 0.54
\end{align*}
\]

(3.17) (3.48) (-3.96)

where:

DLT: the first differences of LT.
DLY: the first differences of LY.
DLX: the first differences of LX.
R\(_{t-1}\): the coefficient of the first lag of the residuals obtained from the cointegrating regression (first step). It represents a measure of the speed of adjustment of the tax revenues to the last period. It is as expected (negative and significant).
$R^2$: the coefficient of determination. Figures in parenthesis represent t-statistics.

The relationship between DLT and both DLY and DLX is positive as expected. The coefficient of the variables has the anticipated signs. These prove to be sensible magnitudes and all of them are significantly different from zero at the five percent level. This model also passes the serial correlation test (using the LMF test, we have a P-value of 0.914. Thus, we do not reject the null of no autocorrelation) (see Appendix E). There is also no evidence of non normality or functional mis-specification.

7.7. Summary of the Chapter:-

In this Chapter, the relative taxable capacity of the Jordanian economy for the period 1973-95 was estimated by adopting the approaches which were developed by the researcher of the current study. The main objective of doing this is to reach an important result aiming at answering a question that has occupied the thinking of the citizen and the government of Jordan at the same time. This question is:- Have the taxes collected from the citizen exceeded his relative taxable capacity, or are they still below it?. Consequently, what is the fiscal policy that the government or the economic policy makers should adopt according to these results?. The empirical results were explained by connecting them with two concepts: economic structure and tax system. Furthermore, these results were also connected to public choice hypotheses (see sub-sections 7.4.6 and 7.5.6).

It is worth saying that the third approach (income tax elasticity) reflects a dynamic tax performance measurement in the Jordanian economy. It does not estimate the relative taxable capacity. However, estimating the income tax elasticity is, as mentioned earlier, useful for displaying the extent of the sensitivity and response of the tax system to the changes that take place in the composition and value of the GNP. This gives a clear conception about the tax system and the need for tax reform if it is, as in the case of Jordan, inelastic. With this reform, the tax system is quickly
responsive to the changes happening to the GNP and its composition. The main results which were reached were as follows:

1. The tax effort in Jordan during many years of the whole period in the study, according to the model used in the first approach, was still less than integral one. This means that the yield of the tax revenues did not exceed the relative taxable capacity in Jordan in these years. It is worth saying that the tax effort for the period 1973-89 recorded figures less than integral one for the model adopted in the first approach. Consequently, it became clear that the Jordanian economy did not reach the point of exploiting its relative taxable capacity to the full for this period (see Table 7.2). This means that there was room for imposing some taxes to exploit the relative taxable capacity to the full, but it seems to be relatively low (see Table 7.2). This result was connected to public choice hypotheses (see sub-section 7.4.6).

2. The tax effort recorded in Jordan for the last four years of the first half of the 1990s (1992-95) exceeds integral one for the adopted model of the second approach. This means that the yield of the tax revenues exceeds the relative taxable capacity according to this approach’s model. Consequently, it became obvious that the Jordanian economy surpassed its relative taxable capacity. This means that the government could, economically speaking, have reduced tax revenues in this period in order to hold tax levied down to the capacity. This indicates that it would be sensible for the Jordanian government to review its fiscal policy in order to reduce the overload burden of the taxes which exceed the relative taxable capacity of the individuals. This result means that the complaints of citizens recently are justifiable. The tax effort in the period 1992-95 is higher than that of the period 1973-91. It also exceeds integral one. This result was also connected to public choice hypotheses (see sub-section 7.5.6).

3. The years 1977 and 1992 recorded a relatively high tax effort compared with the remaining years of the period 1973-1979 for the former year and the
whole period (1973-95) for the latter. The year 1992 recorded the maximum tax effort for the first approach. The reason for this effort in 1992 is, mainly, an increase in total tax revenues as a consequence of including about 2% of the GNP as non-current revenues. This represents the customs duties collected on cars of the Jordanian returnees from the Arab Gulf Countries in the aftermath of the regional crisis. This was mentioned previously. Due admittedly to a one-off event, the actual tax burden in 1992 rose to record the highest level for the whole period (1973-95).

4. It is worth drawing more attention to the empirical results of the second approach in 1995 (the last year in the study). The actual contribution of the individual to tax revenues in this year (1995) amounted to JD 234. The individual’s relative taxable capacity, according the second approach’s adopted model, ranged between JD 180.4 - 208.6. Therefore, the tax effort recorded for this year (computed by dividing the former [individual’s contribution to tax revenues] by the latter [individual’s relative taxable capacity]) amounted to 1.12 - 1.30. This shows that Jordan exceeds the individual’s relative taxable capacity by about 12%. This figure, when it was converted into absolute figure for the whole economy amounts to JD 108.1 million or 2.9 of the GNP at current factor cost (GNP minus net indirect taxes).

5. The third approach which was adopted in this Chapter to measure tax performance is the income tax elasticity (ITE). This elasticity is estimated by regressing the tax revenues on the GNP after taking the natural logarithm for both variables. The model includes another explanatory variable (exports). The results of this approach indicate that the short-run and the long-run income tax elasticity in Jordan for the period 1965-1995 reached less than unity (0.29 and 0.53 respectively). This means that the GNP grew at a rate more rapidly than that of tax revenues for the period 1965-95. Therefore, we can say that the tax system in Jordan is inelastic. This means, as was shown in footnote 14, that the system is regressive. This is not consistent with the ability-to-pay principle. This gives a clear conception about the tax system and the need for
tax reform. With this reform, the tax system is quickly influenced and responsive to the changes happening to the GNP.
Chapter 8
Conclusions and Recommendations of the Study

8.1. Introduction:

The subject of relative taxable capacity has a place of special importance. The citizen and the government are trying to find an answer to the following question: Have the tax revenues actually exceeded the taxable capacity of the Jordanian economy? If they have, should the government try to decrease taxes? Or are taxes still below the capacity of the Jordanian economy and its ability to pay?. If the burden is sub-optimal, it enables the government to increase the current taxes and to reject the citizen continuous complaints about the rise of taxes and the increase of the burden. The government’s needs for tax revenues and the citizens’ complaints about tax payment are in contradictia. The former is based on the need of the government to finance public expenditures and reduce the budget deficit. The latter is not based on this. According to the citizens’ point of view, the less tax, the better in all cases. The present study is not based on these complaints. They are mentioned here to show that the subject is a timely research topic.

This Chapter is devoted to showing the main conclusions and recommendations of the thesis. It also shows the limitations of the study and the significance of the findings. The Chapter suggests areas of future research and study.

8.2. Conclusions:

Relative taxable capacity is defined as the ratio that the government deducts from the GNP (or individuals) through taxes by applying the tax rate averages. This is done by using arithmetic or econometric models. The latter can be computed through
applying regression equation analysis and finding the coefficient for each base or explanatory variable which represents the determinant factor of the relative taxable capacity. It is necessary to take into consideration the government need for tax revenues to finance its public expenditures and its willingness to impose and collect these revenues. No less relevant is the citizens’ ability to pay taxes and shoulder their burdens. The degree of economic development, the composition of the GDP, and the degree of economic openness are the most important factors which determine relative taxable capacity. In other words, relative taxable capacity depends on economic structure of each country. This means that each country has its own relative taxable capacity.

This study covers the period 1986-89, includes thirty-four developing countries, and uses pooled data. The pool is derived from both cross-sectional and time series data. The study also adopted three approaches out of six to estimate the relative taxable capacity of the Jordanian economy. These approaches are: econometric models, arithmetic approach, and income tax elasticity. The first approach has been divided in this study into two sub-approaches. The first is the whole economy’s relative taxable capacity. The second sub-approach is the individual’s relative taxable capacity.

The relative taxable capacity and tax effort for the developing countries including Jordan were estimated for the period 1986-89. This capacity was estimated by developing econometric model. The model was developed in this study by adding new explanatory variables. The whole economy’s and the individual’s relative taxable capacity are estimated using econometric approaches. The tax performance of the developing countries is also estimated in this study by an arithmetic approach. Several contributions have been made in this study relating to both theoretical and empirical aspects. These were shown earlier: see the Introduction to this thesis. The analysis was restricted to the empirical results pertaining to Jordan and the sub-sample taken from the thirty-four developing countries used in the study (Colombia, Tunisia, Turkey, and Yemen). The relative taxable capacity and tax effort were estimated for the thirty-four developing countries in the study. The relative taxable capacity was
estimated for the Jordanian economy according to the above-mentioned approaches for the period 1973-95.

Every Chapter of this study has been concluded by a summary. To avoid repetition, we shall limit ourselves here to mentioning the general results that realise the objective of the study. The most important of these results can be summarised in the following points:

1. Central government public expenditure averaged JD 820.8 million or 43.2% of the GDP during 1973-95. However, public revenues averaged JD 683.6 million or 34.6% of the GDP during the same period. This shows that the general budget has been suffering from a permanent deficit for the whole period under study. The ratio of this deficit (including foreign grants)\(^1\) to the GDP during the same period has averaged 8.6%. The percentage clearly indicates that public revenues failed to cover public expenditures. Consequently, the budget deficit has been financed by external and internal borrowing. The average of the outstanding balance of external and internal loan ratios to the GDP during 1973-95 was 167.3% and 23.0% respectively. This reflects a heavy public debt service burden.

2. Jordan has adopted continuous medium growth-oriented adjustment programmes starting from the programme covering the period 1989-93. These programmes have been designed by the government of Jordan in cooperation with the International Monetary Fund (IMF). At the heart of these programmes’ goals is the reduction of the budget deficit. Considerable effort has been made on both sides of the budget (taxes and public expenditures) since then. The tax burden increased, on average, from 17% of the GNP at current factor cost (GNP minus net indirect taxes) for the period 1973-89 to 26% of the GNP at current factor cost for the first six years of the 1990s. However, the ratio of

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\(^1\) Deficit (including foreign grants) is measured by the following: budget deficit = total government public expenditures - total public revenues. Total public revenues include foreign grants.
public expenditures to the GDP decreased, on average, from 44% for the period 1973-89 to 40.5% for the first six years of the 1990s. This reduction was due mainly to the reschedule of debt and debt service which accompanied the IMF programmes. This gives a clear indication that the focus was heavily on taxes to reduce the budget deficit. As a result of these efforts, the ratio of the budget deficit to the GDP decreased, on average, from 10.4% for the period 1973-89 to 3.3% for the first six years of the 1990s.

3. The results of the income tax elasticity (ITE) indicate that the short and the long run income tax elasticity in Jordan during the period 1964-95 was less than unity (0.29 and 0.53 respectively). This means that the GNP grew, on average, more rapidly than tax revenues during that period. This indicates that the tax system in Jordan is inelastic. The study showed, mathematically, that inelastic tax system is regressive (see footnote 14 in Chapter 7 for more details). This is not in line with equity. Equity is one of the important attributes of a good tax system. It reflects the ability-to-pay principle.⁴

4. The results of the arithmetic approach, which estimated the relative taxable capacity for the four tax revenue components, showed that Jordan focuses on taxes on international trade and other taxes. The results also showed that Jordan exploited taxes on income, profits & capital gains and the domestic taxes on goods & services less than the other thirty-three developing countries did. The computed tax effort (TE) for each of the taxes on international trade and the other taxes exceeded integral one, which denotes that Jordan exploits the bases of those two taxes at averages that exceed the average applicable in the group

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⁴ Equity is based on two alternative principles: the first is called the benefit principle. It relates to the supply of publicly-provided goods. The second is the ability-to-pay principle. This ability depends on the income and wealth of the taxpayer. In other words, the ability-to-pay principle means that the rich taxpayer should pay a higher marginal rate of tax than the poor one (equality of sacrifice). The ability-to-pay-equity is divided into two types: firstly, the horizontal equity means taxpayers with equal capacity should pay the same; secondly, vertical equity emphasises that people with greater ability should pay more taxes (Musgrave and Musgrave 1989).
of developing countries studied. This indicates that there is an excess in the exploitation of the relative taxable capacity. On the other hand, the results show that the TE measured for each of (i) the tax on income, profits & capital gains and (ii) the domestic taxes on goods & services did not reach integral one. The results also showed that Jordan did not exploit its relative taxable capacity concerning these two taxes.

5. The results of the individual’s relative taxable capacity approach for 1995, which represents the last year in the study, are very important. Fiscal policy planners can take it as a base year to design fiscal policy for the following years. We also observe that what we can say about this year is similar to that of the last four years of the first half of the 1990s. The results for each year of this period (1992-95) are very close to each other. The actual contribution of the individual to tax revenues in this year (1995) amounted to JD 234. The individual’s relative taxable capacity, according the second approach’s adopted model, ranged between JD 180.4 - 208.6. Therefore, the tax effort recorded for this year (computed by dividing the former [individual’s contribution to tax revenues] by the latter [individual’s relative taxable capacity]) amounted to 1.12 - 1.30. This shows that Jordan exceeds the individual’s relative taxable capacity by about 12%. This figure, when it was converted into absolute figure for the whole economy amounts to JD 108.1 million or 2.9 of the GNP at current factor cost (GNP minus net indirect taxes).

This shows that taxation could be reduced in Jordan. This means a reduction in the tax burden. The tax burden may be viewed as a tax rate. Consequently, the decreasing of tax revenues will decrease the excess burden (tax distortion). The best candidates for a reduction are taxes on international trade and other taxes\(^3\) (property taxes). This result is in line with both the World Trade

\(^3\) According to the classification of tax revenues in the previous studies (based on the classification of International Monetary Fund [IMF]) there are four major components of tax revenues. These are (i) the tax on income, profits & capital gains (ii) the taxes on international trade (iii) the domestic taxes on goods & services (iv) the other taxes (the
Organisation (WTO) (previously called General Agreement on Tariffs and Trade [GATT]) and the IMF's advice to the Jordanian authorities.

6. It is worth mentioning that the empirical results which were obtained in this study are directly related to the structure of the Jordanian economy as well as to the developments which have taken place during 1973-95. These results were connected, for the first time, with some public choice hypotheses.

7. The principal finding of the study, as shown earlier, is that there is no possibility for reducing the budget deficit by means of raising tax revenues. These revenues could be decreased. Consequently, the emphasis should be placed on reducing public expenditures. These results may be substantiated with reference to a historical example, namely the experience of the U.S.A. in the 1960s. The U.S.A. provides a good example of the positive effect of a tax cut on economic growth and employment. The Council of Economic Advisers suggested, during Kennedy's Presidency, that expansion of national income required a tax reduction. This led to a considerable cut in personal and corporate income taxes in 1964. These cuts aimed at stimulating expenditure on consumption and investment which in turn led to higher levels of income and employment. As anticipated, the tax cut was followed by an economic boom. The growth rate of the real GNP increased gradually during 1964 and 1965. The unemployment rate fell gradually during the same period (Mankiw 1994). Supply-side economists argued that the economic boom was due to the incentive effects created by the tax cuts. The economists showed that the supply of labour increased and then expanded the aggregate supply of goods and services. This was the result of allowing workers to keep a higher share of their income as a result of the tax cuts.

Further support for the results of the present study can be found in the IMF proceeds from taxes on payroll & the work force, and property taxes. In Jordan, "other taxes" usually means property taxes.
studies. An example will clarify the point. McDermott and Wescott (1996) showed that reducing the budget deficit should be achieved by government spending cuts. Further rises in tax revenues will be in danger of stifling growth. Hence, it is reasonable to suppose that reducing public expenditures offers the best means, if not the only means, to reduce the budget deficit. The reduction in government spending might lead to lower interest rates, currency depreciation, and positive expectational effects that might offset or even swamp the traditional, and undesirable, Keynesian effects of a reduction in the deficit, especially unemployment and an economic slow-down (McDermott and Wescott 1996).

8.3. Recommendations:-

The empirical studies showed that financing the budget deficit in the developing countries, whether by domestic or foreign borrowing, brings about imbalances in the money market which, in turn, lead to further disequilibrium in the external sector (BOP). Consequently, to reduce the adverse consequences of the budget deficit, the government should contemplate either curtailing and rationalising public expenditures or increasing public revenues in general, and taxation in particular. After measuring the relative taxable capacity of the Jordanian economy during the period 1973-95 using different approaches, the most important recommendations are as follows:-

1. The tax revenues could be reduced in order to ensure that exploitation does not proceed beyond the relative taxable capacity of the Jordanian economy (see sub-sections 7.4.6, 7.5.5 and 7.5.6). An example will clarify the point. In 1995, tax could have been lower to the value of 2.9 of the GNP at current factor cost (GNP minus net indirect taxes). This recommendation has positive effects on economic growth through the tax multiplier analysis.

2. According to the arithmetic approach (Chapter 6), the best candidate taxes for the reduction, among the four major tax revenue components, are taxes on international trade and property taxes. The decrease of tax revenues in general
and customs duties in particular is consistent with achieving a decrease in excess burden. The study showed that, as long as the tax rate is decreased, the excess burden will continue decreasing. This will increase the efficiency of the tax system (reducing welfare losses or excess burden). Efficiency is one of the most important attributes of a good tax system. It is also, in addition to equity, the target of optimal tax theory. Note that this recommendation will reduce the distortion in production, consumption, and distribution. Reducing customs duty rates is in line with the aims of WTO.

3. The efforts of the government to decrease the deficit of the general budget and its adverse consequences should be directed towards public expenditure. This necessitates reconsidering the amount and composition of public expenditures and reviewing the possibility of decreasing, rationalising, and directing them towards productive spending\(^4\). Military expenditures formed about a quarter of public spending, on average, during 1973-95. The government should revise these expenditures, particularly after the signing of the peace treaty with Israel in 1994. Reducing military spending will have no significant adverse effects on economic growth and other macroeconomic variables through the government purchase multiplier analysis, if this reduction is principally at the expense of imported weaponry. This will also improve the position of the balance of payments. In general, military spending cuts have a positive impact on long run economic growth performance (Knight, Loayza, and Villanueva 1996).

Efforts should be made to strengthen the financial operations and management of the major public institutions. This can be done by privatising these institutions and companies, especially since they are heavily subsidised by government. Privatising these institutions, together with the elimination of

\(^4\) The reduction in government spending might lead to lower interest rates, currency depreciation, and positive expectational effects that might offset or even swamp the traditional undesirable Keynesian effects of budget reduction, especially unemployment and an economic slow-down (McDermott and Wescott 1996).
financial support, based on the experience of Britain and other European countries, probably will reduce the budget deficit. It is intended that privatisation increases their commercial efficiency and improve their financial position. The most important among these are: the Royal Jordanian Airlines, the Water Authority of Jordan, the Jordan Electricity Authority, and the Jordan Valley Authority. If the government privatises all these candidates along with decreasing the military spending, it will run a surplus in its budget. This study advises the government to use the surplus to reduce the outstanding balance of external and internal borrowing. This will help in reducing debt service and in improving the balance of payments position. These recommendations reduce the role of the government in the economy and increase the opportunities for the private sector in Jordan.

8.4. The Limitations of the Thesis and the Significance of the Findings:

This thesis has its own limitations in both the theoretical and empirical areas. Concerning the theoretical side, the analysis of taxable capacity urges one to think about five major areas: optimal tax theory, smoothing tax theory, the effects of taxation on macroeconomic variables, generating more tax revenue for developing countries through revising their problems. In addition to this, it is necessary to look at the issue of relative taxable capacity and tax effort. These issues were discussed in Chapter 1. Only relative taxable capacity and tax effort are considered in the thesis. The main problem facing the translation of the first four concepts into their empirical counterparts is the availability of information and data. The following is a brief review under each heading:

1- Optimal tax theory: Taxes cause excess burden. Minimising this burden while the government raises revenues to finance public expenditure is the aim of optimal tax theory (Auerbach and Feldstein 1985). The theory is interested in the trade-off between equity and efficiency. This approach could not be applied in this study to Jordan. The main problem facing the translation of the optimal tax theory concept into its empirical counterpart is the availability of
information and data (Musgrave and Musgrave 1989). Applying the above-mentioned theory requires a significant amount of information which is usually not available (Auerbach and Feldstein 1985, Cullis and Jones 1992, Musgrave and Musgrave 1989). Furthermore, the optimal tax theory has its own limitations which were also discussed. Moreover, as shown in Chapter 1, the assumptions of the theory are not met in Jordan.

2- Tax smoothing theory: Some economists take a shortcut as a result of the difficulty associated with deriving optimal tax (Blanchard and Fischer 1993). They show that tax smoothing is optimal (Barro 1979 and 1987, Ingberman and Inman 1988, Stokey 1983). On average the general budget will be balanced. Taxes are set in such a way as to balance the budget. When production is high, tax revenues will be above average. When the production is low, the tax "take" will be below the average. In other words, tax smoothing means keeping tax rates smooth. This is done by running a budget deficit in unusually low income years (such as wars and recessions) and obtaining a surplus during economic booms. This would add up to a balanced budget over the economic cycle (Mankiw 1994).

The major conclusions of the tax smoothing theory as stated by Barro (1987) can be summarised as follows: transitory government expenditure will be financed during wartime by a budget deficit, then tax rates will be raised uniformly during and after the war. A permanent increase of government expenditure will lead to a matching increase in tax rates, the budget deficit remaining constant. There are deficits during depressions and surpluses in booms. This is in order to prevent tax rates from being high during depression and low during booms.

Obtaining empirical evidence for this theory requires collecting time series data for a long period as Barro and Horrigan did. This long series in not available for Jordan. The well organised and reliable data available for Jordan starts from 1960. The country has been suffering, as was shown in Chapter 2,
from a budget deficit since then. This may be, as mentioned earlier, because the
time series is very short in comparison with the data used in Barro’s study
(1987) which covered more than two centuries and about two centuries for
Horrigan’s study (Ingberman and Inman 1988). The short time series available
for Jordan reflects only one stage of the theory. That stage is represented by
financing expenditures through budget deficit because this period has witnessed
several wars.

3- The impact of taxes on macroeconomic variables: Both sides of the general
budget (taxation and government spending) influence the economy in several
There are impacts on the economic growth (Anton 1986, Cashin 1995),
consumption (Barro 1989, Bernheim 1989, and Yellen 1989), savings (Kotlikoff
1984, Smith 1989), investment, labour supply and the general price level (Zee
1996). There are also effects on the budget deficit and current account balance
(Barro 1987, Mankiw 1994). In order to decide what tax system should be
imposed, the effects of taxes on macroeconomic variables should be modeled
to see the disincentives which may arise as a result of any tax and to see how
to minimise the distortion of imposing this or that tax as was shown when the
efficiency principle was discussed. These effects depend mainly on the
elasticities of supply and demand of labour as well as commodities and on the
result of income and substitution effects.

Applying the econometric models to Jordan requires collecting data about the
variables for a certain period. However, data are not available for most of these
variables (such as the social security contributions). This is the main limitation
of applying several models to Jordan to estimate the effects of taxation on the
macroeconomic variables.

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5 Mankiw (1994) shows that the budget deficit leads to lower both investment and saving
and to increase current account deficit. The budget deficit also leads to higher foreign
borrowing and higher taxes on future generations.
4- Tax system design and use of tax instruments: Achieving economic objectives through adopting the most efficient use of taxes and incentives is the subject of recent tax studies which have reviewed some of the desired features of the tax system (Dajani and Hosny 1989). Unlike the literature on optimal tax theory, these studies show empirical experience of developing country problems and describe the administrative feasibility of various taxes (Tanzi 1990, Taube and Tadesse 1996).

The approach considered here as point 4 -tax system design and use of tax instruments- is adopted by the International Monetary Fund (IMF). The main aim of it is to generate more tax revenues for the developing countries to finance their public expenditures. This in turn reduces the budget deficit and its adverse consequences. The current study criticises the aim of this approach. This aim, according to these studies, should be achieved regardless whether the country exploits its relative taxable capacity to the full or it has surpassed it.

5- Taxable capacity: This is the last issue which is referred to above. This issue of taxable capacity is very relevant to tackle, especially in the present study, because the aims of this study are represented by answering the following questions: can tax revenues in Jordan be increased/decreased and by how much? Which taxes should be increased/decreased? Tax policy should be considered along with other aspects of economic policy. It must not be viewed as the dependent variable in the system which will respond to the requirements placed upon it automatically. This can be achieved by measuring taxable capacity. Consequently, the issue is considered in this thesis.

Regarding the empirical side, there are several limitations which affect the significance of the findings. These limitations are as follows:-

1. The lack of data on several independent variables. The factors which determine relative taxable capacity are: the degree of economic development, the composition of the GDP, and the degree of economic openness. These
factors were represented in the study by nine independent variables. However, there are other independent variables representing the factors which determine the capacity. These can be categorised into economic and social variables. Economic variables include distribution of income, because taxable capacity increases according to the increasing differences in income distribution. Besides, there is the extent of the productivity of public expenditures, monetary fluctuations, and political factors (Cullis and Jones 1992). Social variables are represented by demographic structure, the general consumption level and tax awareness. The lack of data is the reason behind excluding these from the models adopted in each approach to estimate the relative taxable capacity of the Jordanian economy.

2. Up-dated data are not available. The data were collected for a period of four years from 1986 until 1989. Owing to limited data and in the light of the comparatively large size of the sample and the differences across the years to which data is available for each country, the study does not extend beyond 1989. On the other hand, the relative taxable capacity of the Jordanian economy was estimated for the period 1973-95. This required time series data for the Jordanian economy. The study ends with data relating to the year 1995 for the same reason.

3. The significance of the findings depends on the empirical results. The results appearing in the thesis are based on both the theoretical framework and the econometric models developed in the study and run on the data collected by hand for the thirty-four developing countries. Consequently, all these results are correct if the economic theory is logical and if the data collection as well as the adopted econometric models are correct.

8.5. Areas for Future Research:-

In light of the limitations of the study, this leaves many areas for future research. One of the most fruitful is public expenditure. These expenditures should be reviewed
in order to identify more candidates for cuts and to show by how much they can be reduced. Rationalising and re-directing public expenditures towards productive spending are subjects for wide consideration. Studying the privatisation of public institutions is a related area of research. A especial problem is financial support to such institutions from the government. Privatising these institutions will save that support. It will *ceteris paribus* lead to reduce the budget deficit. Studying each tax in Jordan in order to make them more efficient, equitable and simple is also open for future research.

The recommendations of this thesis, which affect both taxation and government spending, influence the economy in several ways. There is an impact on economic growth (Anton 1986, Cashin 1995), consumption (Barro 1989, Bernheim 1989, and Yellen 1989), savings (Kotlikoff 1984, Smith 1989), investment, labour supply and the general price level (Zee 1996). There are also effects on the budget deficit and current account balance (Barro 1987, Mankiw 1994). These are also topics for wider consideration.
Appendices

Appendix A
(Appendix to Chapter 3)

The Computations of the Relative Importance of
the Major Tax Revenue Components and the Tax Burden

The relative importance of the major tax revenue components and the tax burden
for the thirty-four developing countries during the period 1986-89 which appears in
Table 3.3 of Chapter 3 are computed as follows:-

1- The proceeds of each kind of tax are divided over total tax revenue proceeds
   for each country.
2- The average of each tax for four years is computed by itself.
3- The developing countries are sorted in an ascending order according to the tax
   burden recorded in each country during the period using the "ORDER"
   command which is available in the Microfit package.
4. This has been done by using the "BATCH" file which is available in the MS-DOS
   Editor package and running this file with the "BATCH" command which is
   available in the Microfit package as follows:-

$ 
tr1=tr1-so1
tr2=tr2-so2
tr3=tr3-so3
tr4=tr4-so4
intb=((int1/tr1)+(int2/tr2)+(int3/tr3)+(int4/tr4))/0.04
domb=((dom1/tr1)+(dom2/tr2)+(dom3/tr3)+(dom4/tr4))/0.04
extb=((ext1/tr1)+(ext2/tr2)+(ext3/tr3)+(ext4/tr4))/0.04
worp=(worp1/tr1)+(worp2/tr2)+(worp3/tr3)+(worp4/tr4))/0.04
otherb=((other1/tr1)+(other2/tr2)+(other3/tr3)+(other4/tr4))/0.04
othb=worp+otherb
ty=((tr1/(gnp1-indn1))+(tr2/(gnp2-indn2))+(tr3/(gnp3-indn3))+(tr4/(gnp4-indn4)))/0.04
intb = order(intb, ty)
domb = order(domb, ty)
extb = order(extb, ty)
othb = order(otherb, ty)
ty = order(ty, ty)
$

The "BATCH" file is used to facilitate the computation editing process. The dollar sign appeared in the first and the last row of the above file and throughout each batch file does not refer to the dollar as a currency but it is necessary to run the file. All the abbreviations are as mentioned in section 2 of Chapter 3 except the following which refer to :-

intb: the relative importance of tax on income, profits & capital gains in tax revenues for each country among the sample during the period under study.
domb: the relative importance of domestic taxes on goods & services in tax revenues for each country among the sample during the period under study.
extb: the relative importance of taxes on international trade in tax revenues for each country among the sample during the era under study.
worpb: the relative importance of other direct taxes (taxes on payroll & work force and property taxes) in tax revenues for each country among the sample during the era under study.
otherb: the relative importance of other non-classified taxes in tax revenues for each country among the sample during the period 1986-89.
othb: the summation of worpb and otherb for each country among the sample during the period 1986-89.
ty: the tax burden for each country among the sample during the period under study.

The figure which appears at the end of the abbreviations in the above BATCH file refers to:-

1: 1986. 3: 1988
B.1. The Computations of the Variables of Chapter 4:

All the data which have been collected and described in Chapter 3 (section 2) represent the base for the variables of Chapter 4 as well as for their computations. All these variables are computed by adopting the following steps:

1- Some variables are divided by GNP, others by GDP, still others by the number of inhabitants in each country during each year of the period 1986-89. This is explained in section 4.3. These techniques were employed as a preventive measure to avoid any possible heteroscedasticity problem.

2- Then, the data are pooled for each variable for four years. The total observations number 136.

3- All the above-mentioned steps have been done by using the "BATCH" files which are available in the MS-DOS Editor package for the period. The files were run with the "BATCH" command which is available in the Microfit package to compute the variables of this approach. The "BATCH" files are used to facilitate the computation editing process.
B.2. The Estimation of the Whole Economy’s Relative Taxable Capacity Model and some Diagnostic Tests of this Model during the Period 1986-89:

Using Two Stage Least Squares (2SLS) (Instrumental Variable Estimation):

<table>
<thead>
<tr>
<th>Instrumental Variable Estimation</th>
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</thead>
<tbody>
<tr>
<td>Dependent variable is TRA</td>
</tr>
<tr>
<td>List of instruments:</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>NA</td>
</tr>
<tr>
<td>136 observations used for estimation from 1 to 136</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio(Prob)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>18.2082</td>
<td>7.2891</td>
<td>2.4980(.014)</td>
</tr>
<tr>
<td>GNPP</td>
<td>.0011881</td>
<td>.0043858</td>
<td>.27089(.787)</td>
</tr>
<tr>
<td>AA</td>
<td>-.088099</td>
<td>.20091</td>
<td>-.43850(.662)</td>
</tr>
<tr>
<td>WA</td>
<td>-.20507</td>
<td>.072001</td>
<td>-2.8482(.005)</td>
</tr>
<tr>
<td>MA</td>
<td>.10341</td>
<td>.083943</td>
<td>1.2319(.220)</td>
</tr>
<tr>
<td>NA</td>
<td>.030340</td>
<td>.037507</td>
<td>.80893(.420)</td>
</tr>
</tbody>
</table>

| R-Squared | .20668 | F-statistic F( 5, 130) 6.7738(.000) |
| R-Bar-Squared | .17617 | S.E. of Regression 4.5096 |
| Residual Sum of Squares | 2643.8 | Mean of Dependent Variable 17.5698 |
| S.D. of Dependent Variable | 4.9685 | Value of IV Minimand 23.8847 |
| DW-statistic | 2.1829 | Sargan’s CHI-SQ( 1) 1.1745(.278) |

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Serial Correlation</td>
<td>CHI-SQ( 1)= .57830(.447)*</td>
<td>Not applicable</td>
</tr>
<tr>
<td>B:Functional Form</td>
<td>CHI-SQ( 1)= .25806(.611)*</td>
<td>Not applicable</td>
</tr>
<tr>
<td>C:Normality</td>
<td>CHI-SQ( 2)= 2.6324(.268)*</td>
<td>Not applicable</td>
</tr>
<tr>
<td>D:Heteroscedasticity</td>
<td>CHI-SQ( 1)= 11.5646(.001)*</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey’s RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
## Instrumental Variable Estimation

**Dependent variable is TRA**

List of instruments:

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<tr>
<th></th>
<th>C</th>
<th>AA</th>
<th>WA</th>
<th>MA</th>
<th>M2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td></td>
<td>MANA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

136 observations used for estimation from 1 to 136

### Regressor Coefficient Standard Error T-Ratio[Prob]

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>20.1154</td>
<td>1.7060</td>
<td>11.7910[.000]</td>
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<tr>
<td>AA</td>
<td>-.14164</td>
<td>.032606</td>
<td>-4.3439[.000]</td>
</tr>
<tr>
<td>WA</td>
<td>-.19754</td>
<td>.060047</td>
<td>-3.2897[.000]</td>
</tr>
<tr>
<td>MA</td>
<td>.12470</td>
<td>.026652</td>
<td>4.6787[.000]</td>
</tr>
<tr>
<td>NA</td>
<td>.037157</td>
<td>.025145</td>
<td>1.4777[.142]</td>
</tr>
</tbody>
</table>

### Diagnostic Tests

- **Serial Correlation**: CHI-SQ(1) = 0.18354[.668]* Not applicable*
- **Functional Form**: CHI-SQ(1) = 5.0960[.024]* Not applicable*
- **Normality**: CHI-SQ(2) = 0.83193[.660]* Not applicable*
- **Heteroscedasticity**: CHI-SQ(1) = 1.9635[.161]* Not applicable*

- **A**: Lagrange multiplier test of residual serial correlation
- **B**: Ramsey's RESET test using the square of the fitted values
- **C**: Based on a test of skewness and kurtosis of residuals
- **D**: Based on the regression of squared residuals on squared fitted values
Using Ordinary Least Squares (OLS):

- Non-Nested Tests by Simulation Linear Form versus Logarithmic Form:

<table>
<thead>
<tr>
<th>Dependent variable in model M1 is TRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable in model M2 is LOG(TRA)</td>
</tr>
<tr>
<td>136 observations used from 1 to 136. Number of replications 500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimates of parameters of M1</th>
<th>Estimates of parameters of M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under M1</td>
<td>Under M2</td>
</tr>
<tr>
<td>C</td>
<td>19.3101</td>
</tr>
<tr>
<td>AA</td>
<td>-.12610</td>
</tr>
<tr>
<td>WA</td>
<td>-.17403</td>
</tr>
<tr>
<td>MA</td>
<td>.11769</td>
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<tr>
<td>D1</td>
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<td>D2</td>
<td>.96841</td>
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<tr>
<td>D3</td>
<td>.71494</td>
</tr>
<tr>
<td>D4</td>
<td>-.84165</td>
</tr>
<tr>
<td>D5</td>
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<tr>
<td>D6</td>
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<tr>
<td>D7</td>
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<tr>
<td>D8</td>
<td>.3.3109</td>
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<tr>
<td>D9</td>
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<tr>
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<td>D11</td>
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</tr>
<tr>
<td>D12</td>
<td>.48834</td>
</tr>
<tr>
<td>D13</td>
<td>1.0607</td>
</tr>
<tr>
<td>D14</td>
<td>2.9245</td>
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<td>D15</td>
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<tr>
<td>D16</td>
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</tr>
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<td>D17</td>
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<tr>
<td>D18</td>
<td>.030092</td>
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<td>D19</td>
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<tr>
<td>D20</td>
<td>.51432</td>
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<tr>
<td>D21</td>
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<td>D22</td>
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<tr>
<td>D23</td>
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<td>D25</td>
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<td>D26</td>
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<td>D27</td>
<td>3.3869</td>
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<tr>
<td>D28</td>
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<td>D29</td>
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</table>
Non-Nested Test Statistics and Choice Criteria

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>M1 against M2</th>
<th>M2 against M1</th>
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</thead>
<tbody>
<tr>
<td>S-Test (500 replications)</td>
<td><em>NONE</em></td>
<td>-11.8291 [.0001]</td>
</tr>
<tr>
<td>PE-Test</td>
<td>-2.9881 [.003]</td>
<td>6.7650 [.000]</td>
</tr>
<tr>
<td>BM-Test</td>
<td>-3.6423 [.000]</td>
<td>6.0256 [.000]</td>
</tr>
<tr>
<td>DL-Test</td>
<td>6.8736 [.000]</td>
<td>8.8056 [.000]</td>
</tr>
</tbody>
</table>

Sargan's Likelihood Criterion for M1 versus M2 = 18.4866 favours M1
Vuong's Likelihood Criterion for M1 versus M2 = 57.3259 [.000] favours M1

S-Test is the Cox test statistic computed by simulation.
PE-Test is the PE test due to MacKinnon, White and Davidson.
BM-Test is due to Bera and McAleer.
DL-Test is the double-length regression test statistic due to Davidson and MacKinnon. For references see the Manual.
- The Preferred Model with the Dummy Variables (Years and Countries):

Ordinary Least Squares Estimation

Dependent variable is TRA
136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>19.3101</td>
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<td>1.1994</td>
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<td>.605</td>
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<tr>
<td>D34</td>
<td>1.7310</td>
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<td>.61264 [.542]</td>
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</tr>
<tr>
<td>D35</td>
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<td>2.8190</td>
<td>-.45296 [.652]</td>
<td></td>
</tr>
<tr>
<td>D36</td>
<td>1.5668</td>
<td>2.8259</td>
<td>.55444 [.581]</td>
<td></td>
</tr>
</tbody>
</table>

R-Squared: .55812
F-statistic: F(39, 96) = 3.1091E-0001
R-Bar-Squared: .37861
S. E. of Regression: 3.9166
Residual Sum of Squares: 1472.6
Mean of Dependent Variable: 17.5698
S. D. of Dependent Variable: 4.9685
Maximum of Log-likelihood: -354.9596
DW-statistic: 2.3988

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>*CHI-SQ( 1) = .41940 [.517] <em>F( 1, 95) = .29387 [.589]</em></td>
<td></td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>*CHI-SQ( 1) = .63213 [.427] <em>F( 1, 95) = .44362 [.507]</em></td>
<td></td>
</tr>
<tr>
<td>C: Normality</td>
<td><em>CHI-SQ( 2) = .51648 [.772]</em> Not applicable</td>
<td></td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>*CHI-SQ( 1) = .0017319 [.967] <em>F( 1, 134) = .0017065 [.967]</em></td>
<td></td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
- Variable Deletion Test (Dummy Variables: Countries):

Variable Deletion Test (OLS case)

Dependent variable is TRA
List of the variables deleted from the regression:
D4   D5   D6   D7   D8
D9   D10  D11  D12  D13
D14  D15  D16  D17  D18
D19  D20  D21  D22  D23
D24  D25  D26  D27  D28
D29  D30  D31  D32  D33
D34  D35  D36

136 observations used for estimation from 1 to 136

Regressor Coefficient Standard Error T-Ratio[Prob]
C    18.0554  1.7576  10.2730[.0001
AA   -.12642  .030450 -4.1518[.0001
WA   -.17330  .056876 -3.0470[.0031
MA   .11907   .025510  4.6675[.0001
D1   .89232   .94625 . 94301[.3471
D2   .95025   .93371  1.0177[.3111
D3   .69901   .92950  .75203[.4531

Joint test of zero restrictions on the coefficient of deleted variables:
Lagrange Multiplier Statistic CHI-SQ(33)= 44.6245[.085]
Likelihood Ratio Statistic CHI-SQ(33)= 54.0841[.012]
F Statistic F(33,96)= 1.4207[.096]
The Preferred Model with the Dummy Variables (Years):

Ordinary Least Squares Estimation

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>19.4371</td>
<td>1.8921</td>
<td>10.2730</td>
<td>.0001</td>
</tr>
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<td>AA</td>
<td>-.13610</td>
<td>.032780</td>
<td>-4.1518</td>
<td>.0001</td>
</tr>
<tr>
<td>WA</td>
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<td>.061228</td>
<td>-3.0470</td>
<td>.0031</td>
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<tr>
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<td>.0001</td>
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<td>.9430</td>
<td>.3471</td>
</tr>
<tr>
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<td>D3</td>
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<td>.7520</td>
<td>.4531</td>
</tr>
</tbody>
</table>

R-Squared .34233  F-statistic F( 6, 129) 11.1910 [.000]
R-Bar-Squared .3174  S.E. of Regression 4.1219
Residual Sum of Squares 2191.7  Mean of Dependent Variable 17.5698
S.D. of Dependent Variable 4.9685  Maximum of Log-likelihood -.382.0016
DW-statistic 2.0741

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation*CHI-SQ( 1) = .20838[.648] F( 1, 128) = .19642[.658]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Functional Form *CHI-SQ( 1) = .35668[.550] F( 1, 128) = .33770[.562]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C: Normality *CHI-SQ( 2) = .85444[.652] Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D: Heteroscedasticity *CHI-SQ( 1) = 1.9116[.167] F( 1, 134) = 1.9103[.169]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
Variable Deletion Test (OLS case)

List of the variables deleted from the regression:
D1  D2  D3

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>20.2748</td>
<td>1.7102</td>
<td>11.8552 [.000]</td>
</tr>
<tr>
<td>AA</td>
<td>-.13490</td>
<td>.032430</td>
<td>-4.1596 [.000]</td>
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<tr>
<td>WA</td>
<td>-.19183</td>
<td>.060191</td>
<td>-3.1870 [.002]</td>
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<tr>
<td>MA</td>
<td>.12461</td>
<td>.026772</td>
<td>4.6544 [.000]</td>
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</tbody>
</table>

Joint test of zero restrictions on the coefficient of deleted variables:

Lagrange Multiplier Statistic  CHI-SQ(3)= 1.3577 [.715]
Likelihood Ratio Statistic  CHI-SQ(3)= 1.3645 [.714]
F Statistic  F(3, 129)= .43359 [.729]
- The Preferred Model without the Dummy Variables:

**Ordinary Least Squares Estimation**

Dependent variable is TRA

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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<td>-3.1870[.002]</td>
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<tr>
<td>MA</td>
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<td>.026772</td>
<td>4.6544[.000]</td>
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</tbody>
</table>

R-Squared .33569  F-statistic F(3, 132) 22.2346[.000]
R-Bar-Squared .32060  S.E. of Regression 4.0953
Residual Sum of Squares 2213.8  Mean of Dependent Variable 17.5698
S.D. of Dependent Variable 4.9685  Maximum of Log-likelihood -382.6839
DW-statistic 2.0541

**Diagnostic Tests**

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ(1) = .10869[.742]</td>
<td>F(1, 131) = .10478[.747]</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ(1) = .42237[.516]</td>
<td>F(1, 131) = .40891[.524]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ(2) = .69954[.705]</td>
<td>Not applicable</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ(1) = 1.9067[.167]</td>
<td>F(1, 134) = 1.9054[.170]</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
- Serial Correlation Test:-

We wish to test the null hypothesis of no autocorrelation (first order autoregressive process) against the alternative of autocorrelation. The LM is employed here because the study uses pooled data and as follows:-

1. Obtain the thirty-four lag of the residuals for the model.

2. Substitute zero for the missing values of this lag (the mean value of the residuals). The abbreviation R34 in the regression refers to lag (34).

3. Regress the residuals (R) from the model on the explanatory variables together with the 34 lag.

4. Compute the LM statistic for the model (LM=T*R²), where T is the number of observations, and R² is the explanatory power obtained from the last regression. Therefore, \( LM = 136 \times 0.013703 = 1.86 \).

5. The LM statistic has a \( \chi^2 \) distribution with 1 degree of freedom which equals 3.84 at 5% level.

6. According to the LM test statistic and the \( \chi^2 \) statistic, the null hypothesis is not rejected. This indicates that there is no autocorrelation problem in the model.
Ordinary Least Squares Estimation

Dependent variable is R
136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.084993</td>
<td>0.16283</td>
<td>0.52199[.603]</td>
</tr>
<tr>
<td>AA</td>
<td>-0.0033490</td>
<td>0.0030846</td>
<td>-1.0857[.280]</td>
</tr>
<tr>
<td>WA</td>
<td>0.1713E-3</td>
<td>0.0057180</td>
<td>0.029966[.976]</td>
</tr>
<tr>
<td>MA</td>
<td>-0.9113E-3</td>
<td>0.0025850</td>
<td>-0.35254[.725]</td>
</tr>
<tr>
<td>R34</td>
<td>0.066724</td>
<td>0.10093</td>
<td>0.66111[.510]</td>
</tr>
</tbody>
</table>

R-Squared 0.013703  F-statistic F( 4, 131) 0.45500[.769]
R-Bar-Squared -0.016413  S.E. of Regression 0.38903
Residual Sum of Squares 19.8261  Mean of Dependent Variable -0.0000
S.D. of Dependent Variable 0.38588  Maximum of Log-likelihood -62.0311
DW-statistic 1.9542

347
- Heteroscedasticity Test:-

We wish to test that the errors in the model have a constant variance (the null hypothesis) against the alternative hypothesis of their not having a constant variance. The calculations to carry out this test are as follows:-

1. The original preferred model was estimated by using ordinary least squares (OLS) in order to obtain the residuals, then moving in Microfit to the "Post Regression Menu" choosing option 3 (List/Plot/Save residuals and fitted values), then moving also to the "Display/Save Residuals and Fitted Values Menu" choosing option 7 (Save residuals values [and forecasts if any]) to save the residuals.

2. Compute (σ squared) for the adopted model which is equal to residual sum of squares (RSS) divided by the number of observations (T) (σ^2 = RSS/T). Therefore, σ^2 = (RSS/T) = (2213.8/136) = 16.278.

3. Generate the variable Z = (U2/ σ^2) for the adopted model where the abbreviations are as shown in step 2.

4. The original preferred model is re-estimated by using ordinary least squares (OLS) after replacing the dependent variable by Z for the model.

5. Compute the Breusch-Pagan test statistic based on the results of the previous step. This statistic equals the result of dividing the explained sum of squares (ESS) by 2. ESS is computed by this identity ESS = (RSS*R^2)/(1-R^2). All the abbreviations are as shown earlier except R^2 which represents the coefficient of determination. Therefore, ESS = (RSS*R^2)/(1-R^2) = (196.913*0.073356)/(1-0.073356)
0.073356 = (14.44475/0.926644) = 15.588. The B-P test statistic equals ESS/2, therefore it equals 7.79 (15.588/2).

6. This statistic has a \( \chi^2 \) distribution with degrees of freedom \( k-1 \), where \( k \) represents the number of regressors in the model. Therefore, \( \chi^2 \) distribution with degrees of freedom 3 at 5% level equals 7.82.

7. According to the Breusch-Pagan test statistic for the model and the \( \chi^2 \) statistic, the null hypothesis is not rejected. This indicates that there is no heteroscedasticity problem in the model.

### Ordinary Least Squares Estimation

**Dependent variable is Z**

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2.5003</td>
<td>.51005</td>
<td>4.9022 [.000]</td>
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<tr>
<td>AA</td>
<td>-.025743</td>
<td>.0096719</td>
<td>-2.6616 [.009]</td>
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<tr>
<td>WA</td>
<td>-.043990</td>
<td>.017951</td>
<td>-2.4505 [.016]</td>
</tr>
<tr>
<td>MA</td>
<td>-.012082</td>
<td>.0079843</td>
<td>-1.5132 [.133]</td>
</tr>
</tbody>
</table>

**R-Squared**  
**R-Bar-Squared**  
**Residual Sum of Squares**  
**S. D. of Dependent Variable**  
**DW-statistic**  

<table>
<thead>
<tr>
<th>Value</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>196.9130</td>
<td>Mean of Dependent Variable  .97117</td>
</tr>
<tr>
<td>1.2546</td>
<td>Maximum of Log-likelihood  .218.1429</td>
</tr>
<tr>
<td>1.7396</td>
<td></td>
</tr>
</tbody>
</table>

All the abbreviations are as mentioned in section 3 and Appendix B of Chapter 4.
B.3. The Computations of Table 4.3 of Chapter 4:-

The Table has been obtained by using different commands and facilities available in the Microfit package as follows:-

1- After the adopted model is estimated, a move was made in Microfit to the "Post Regression Menu" choosing option 8 (Forecast) to obtain the predicted values and the standard errors for the dependent variable in the model. The predicted values represent the whole economy’s relative taxable capacity for the thirty-four developing countries under study. Then the standard error for each observation is used to obtain a 95% confidence interval for the whole economy’s relative taxable capacity. The observations 1-136 were repeated and combined with the same file in order to obtain the predicted values and the standard errors.

2- The tax effort of the developing countries for the model during the same period (1986-89) is computed by dividing the tax burden over the whole economy’s relative taxable capacity which is obtained from the previous step. As a result of obtaining a 95% confidence interval for the whole economy’s relative taxable capacity, two figures for the tax effort were computed.

3- A sample covering the observations 239-272 is selected. This sample represents the data relate to 1989.

4- Therefore, the developing countries are sorted in an ascending order according to the tax burden recorded in each country using the "ORDER" command which is available in the Microfit package.

5- The BATCH file is used to obtain the results of all the previous steps except the first one.
Appendix C
(Appendix to Chapter 5)

C.1. The Computations of the Variables of Chapter 5:-

All the variables are computed by adopting the following steps:-

1- All the data have been converted from the local currency of each country to US$ by using the average of exchange rate (RF) during each year of the period under study (1986-89). This has been done in order to ensure that all data are presented in the same currency. Two exchange rates are used to convert the local currency of each country in the study to the US$ in order to compute the second approach variables. The first is the exchange rate at the end of the year (AE). The second is the annual average exchange rate (RF). The "Price Quotation System" is used for the local currencies against the dollar. The exchange rate of some countries such as Ghana, Zambia, Fiji, Cyprus and Jordan is converted from the "Volume Quotation System" to the "Price Quotation System" in order to have a unified standard. This has been done by dividing the integral one on the volume quotation of the exchange rate for those countries currencies. The study adopted the annual average exchange rate. This is employed because it reflects the fluctuation during the year, while the exchange rate at the end of the period reflects one value that might be extreme¹.

2- All the variables are divided by the number of inhabitants in each country for each year of the period 1986-89. This was explained in section 5.3. These techniques were employed as a preventive measure to avoid any possible heteroscedasticity problem.

¹ For further information about those two systems see: Awad 1993.
3- The data, then are pooled for each variable for four years. The total observations number 136.

4- All the above-mentioned steps have been done by using the "BATCH" files. These files are available in the MS-DOS Editor package. The files were run with the "BATCH" command which is available in the Microfit package to compute the variables of this approach. The "BATCH" files are used to facilitate the computation editing process.
C.2. The Estimation of the Individual's Relative Taxable Capacity Model and some Diagnostic Tests of this Model during the Period 1986-89:-

Using Two Stage Least Squares (2SLS) (Instrumental Variable Estimation):

Instrumental Variable Estimation

<table>
<thead>
<tr>
<th>Dependent variable is</th>
<th>LTRP</th>
</tr>
</thead>
</table>

List of instruments:

<table>
<thead>
<tr>
<th>C</th>
<th>LM2P</th>
<th>LNP</th>
<th>LMANP</th>
<th>LFP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.91706</td>
<td>.82098</td>
<td>1.1170[.266]</td>
</tr>
<tr>
<td>LGNPP</td>
<td>-.10588</td>
<td>.36903</td>
<td>-.28692[.775]</td>
</tr>
<tr>
<td>LM2P</td>
<td>.31780</td>
<td>.14333</td>
<td>2.2172[.028]</td>
</tr>
<tr>
<td>LNP</td>
<td>.098569</td>
<td>.027559</td>
<td>3.5766[.000]</td>
</tr>
<tr>
<td>LMANP</td>
<td>.14065</td>
<td>.11856</td>
<td>1.1863[.238]</td>
</tr>
<tr>
<td>LFP</td>
<td>.28617</td>
<td>.063821</td>
<td>4.4839[.000]</td>
</tr>
</tbody>
</table>

R-Squared: .82925  F-statistic F(5,130) 126.2668[.000]
R-Bar-Squared: .82268  S.E. of Regression: .36782
Residual Sum of Squares: 17.5881  Mean of Dependent Variable: 4.8744
S.D. of Dependent Variable: .87349  Value of IV Minimand: .31793
DW-statistic: 2.0145  Sargan's CHI-SQ(1): 2.3499[.125]

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td><em>CHI-SQ(1)= .010020[.920]</em></td>
<td>Not applicable</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td><em>CHI-SQ(1)= .30654[.580]</em></td>
<td>Not applicable</td>
</tr>
<tr>
<td>C: Normality</td>
<td><em>CHI-SQ(2)= 48.7179[.000]</em></td>
<td>Not applicable</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td><em>CHI-SQ(1)= 1.7808[.182]</em></td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
Using Ordinary Least Squares (OLS):

- Non-Nested Tests by Simulation Linear Form versus Logarithmic Form:

Non-Nested Tests by Simulation
Linear Form versus Logarithmic Form

Dependent variable in model M1 is TRP
Dependent variable in model M2 is LOG(TRP)
136 observations used from 1 to 136. Number of replications 500

<table>
<thead>
<tr>
<th>Estimates of parameters of M1</th>
<th>Estimates of parameters of M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under M1</td>
<td>Under M2</td>
</tr>
<tr>
<td>C</td>
<td>45.0276</td>
</tr>
<tr>
<td>M2P</td>
<td>.099955</td>
</tr>
<tr>
<td>NP</td>
<td>.12979</td>
</tr>
<tr>
<td>MANP</td>
<td>.18143</td>
</tr>
<tr>
<td>FP</td>
<td>.031102</td>
</tr>
<tr>
<td>D1</td>
<td>-13.4873</td>
</tr>
<tr>
<td>D2</td>
<td>-23.8054</td>
</tr>
<tr>
<td>D3</td>
<td>-11.0240</td>
</tr>
<tr>
<td>Standard Error</td>
<td>60.0741</td>
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<tr>
<td>Adjusted Log-L</td>
<td>-745.9744</td>
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</table>

Non-Nested Test Statistics and Choice Criteria

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>M1 against M2</th>
<th>M2 against M1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-Test (500 replications)</td>
<td><em>NONE</em></td>
<td>-7.0141 [.000]</td>
</tr>
<tr>
<td>PE-Test</td>
<td>3.8724 [.000]</td>
<td>.70094 [.483]</td>
</tr>
<tr>
<td>BM-Test</td>
<td>3.4362 [.001]</td>
<td>.21843 [.827]</td>
</tr>
<tr>
<td>DL-Test</td>
<td>6.4979 [.000]</td>
<td>4.7070 [.000]</td>
</tr>
<tr>
<td>Sargan's Likelihood Criterion for M1 versus M2= -34.3984 favours M2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vuong's Likelihood Criterion for M1 versus M2= -36.4554 [.000] favours M2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S-Test is the Cox test statistic computed by simulation.
PE-Test is the PE test due to MacKinnon, White and Davidson.
BM-Test is due to Bera and McAleer.
DL-Test is the double-length regression test statistic due to Davidson and MacKinnon. For references see the Manual.
- The Model with the Dummy Variables (Years and Countries):-

Ordinary Least Squares Estimation

Dependent variable is LTRP
136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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<td>.26323</td>
<td>3.8947 [.000]</td>
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<tr>
<td>LM2P</td>
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<td>.047343</td>
<td>3.9882 [.000]</td>
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<td>LNP</td>
<td>.12640</td>
<td>.028096</td>
<td>4.4987 [.000]</td>
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<tr>
<td>LMANP</td>
<td>.11224</td>
<td>.038771</td>
<td>2.8950 [.005]</td>
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<tr>
<td>LFP</td>
<td>.29705</td>
<td>.040834</td>
<td>7.2746 [.000]</td>
</tr>
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<td>-1.0623 [.535]</td>
</tr>
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</tr>
<tr>
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</tr>
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<td>.23062</td>
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<td>.85380 [.395]</td>
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<td>.24298</td>
<td>.22682</td>
<td>1.0713 [.287]</td>
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<td>.25419</td>
<td>-2.7990 [.006]</td>
</tr>
<tr>
<td>D18</td>
<td>-.13403</td>
<td>.22624</td>
<td>.59243 [.555]</td>
</tr>
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<td>.23749</td>
<td>-2.9646 [.004]</td>
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<td>.23524</td>
<td>-.20504 [.838]</td>
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<td>-.37966 [.705]</td>
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<td>.19001</td>
<td>.23040</td>
<td>-.82469 [.412]</td>
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<td>D26</td>
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<td>1.5471 [.125]</td>
</tr>
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<td>D27</td>
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<td>.60159 [.549]</td>
</tr>
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<td>D28</td>
<td>.30556</td>
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<td>1.3419 [.183]</td>
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<td>D29</td>
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<td>.22657</td>
<td>-.21839 [.828]</td>
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<td>.19100</td>
<td>.22614</td>
<td>.84458 [.400]</td>
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<td>.17968</td>
<td>.22811</td>
<td>.78770 [.433]</td>
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<td>D36</td>
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<td>.22502</td>
<td>-.44105</td>
</tr>
</tbody>
</table>

R-Squared: .91029  F-statistic F(40, 95) = 24.0985 [p < .000]
R-Bar-Squared: .87251  S.E. of Regression: .31188
Residual Sum of Squares: 9.2407  Mean of Dependent Variable: 4.8744
S.D. of Dependent Variable: .87349  Maximum of Log-likelihood: -10.1208

DW-statistic: 2.1526

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ(1) = .95985 [p &lt; .327]</td>
<td>F(1, 94) = .66814 [p &lt; .416]</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ(1) = .87453 [p &lt; .350]</td>
<td>F(1, 94) = .60837 [p &lt; .437]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ(2) = .10449 [p &lt; .949]</td>
<td>Not applicable</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ(1) = 2.4387 [p &lt; .118]</td>
<td>F(1, 134) = 2.4467 [p &lt; .120]</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
- Variable Deletion Test (Dummy Variables: Countries):

**Variable Deletion Test (OLS case)**

Dependent variable is LTRP

List of the variables deleted from the regression:

<table>
<thead>
<tr>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>D8</th>
</tr>
</thead>
<tbody>
<tr>
<td>D9</td>
<td>D10</td>
<td>D11</td>
<td>D12</td>
<td>D13</td>
</tr>
<tr>
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<td>D15</td>
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<td>D18</td>
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<tr>
<td>D19</td>
<td>D20</td>
<td>D21</td>
<td>D22</td>
<td>D23</td>
</tr>
<tr>
<td>D24</td>
<td>D25</td>
<td>D26</td>
<td>D27</td>
<td>D28</td>
</tr>
<tr>
<td>D29</td>
<td>D30</td>
<td>D31</td>
<td>D32</td>
<td>D33</td>
</tr>
<tr>
<td>D34</td>
<td>D35</td>
<td>D36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

136 observations used for estimation from 1 to 136

---

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.79537</td>
<td>.18264</td>
<td>4.3549[.000]</td>
</tr>
<tr>
<td>LM2P</td>
<td>.28289</td>
<td>.040461</td>
<td>6.9919[.000]</td>
</tr>
<tr>
<td>LNP</td>
<td>.13091</td>
<td>.028170</td>
<td>4.6473[.000]</td>
</tr>
<tr>
<td>LMANP</td>
<td>.084032</td>
<td>.038786</td>
<td>2.1666[.032]</td>
</tr>
<tr>
<td>LFP</td>
<td>.26448</td>
<td>.035990</td>
<td>7.3488[.000]</td>
</tr>
<tr>
<td>D1</td>
<td>-.074950</td>
<td>.088994</td>
<td>-.84219[.401]</td>
</tr>
<tr>
<td>D2</td>
<td>-.26688</td>
<td>.097200</td>
<td>-.7457[.007]</td>
</tr>
<tr>
<td>D3</td>
<td>-.10500</td>
<td>.086641</td>
<td>-.12119[.228]</td>
</tr>
</tbody>
</table>

---

Joint test of zero restrictions on the coefficient of deleted variables:

Lagrange Multiplier Statistic CHI-SQ(33)= 43.4462[.105]
Likelihood Ratio Statistic CHI-SQ(33)= 52.3416[.018]
F Statistic F(33, 95)= 1.3513[.131]

---

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- The Preferred Model with the Dummy Variables (Years):

Ordinary Least Squares Estimation

Dependent variable is LTRP
136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.79637</td>
<td>0.18264</td>
<td>4.3549[.000]</td>
</tr>
<tr>
<td>LM2P</td>
<td>0.28289</td>
<td>0.040461</td>
<td>6.9919[.000]</td>
</tr>
<tr>
<td>LNP</td>
<td>0.13091</td>
<td>0.028170</td>
<td>4.6473[.000]</td>
</tr>
<tr>
<td>LMANP</td>
<td>0.084032</td>
<td>0.038786</td>
<td>2.1666[.032]</td>
</tr>
<tr>
<td>LFP</td>
<td>0.26448</td>
<td>0.035990</td>
<td>7.3488[.000]</td>
</tr>
<tr>
<td>D1</td>
<td>-.074950</td>
<td>0.088994</td>
<td>-.84219[.401]</td>
</tr>
<tr>
<td>D2</td>
<td>-.26688</td>
<td>0.097200</td>
<td>-2.7457[.007]</td>
</tr>
<tr>
<td>D3</td>
<td>-.10500</td>
<td>0.086641</td>
<td>-1.2119[.228]</td>
</tr>
</tbody>
</table>

R-Squared .84217    F-statistic F( 7,128) 97.5677[.000]
R-Bar-Squared .83353    S.E. of Regression .35639
Residual Sum of Squares 16.2575    Mean of Dependent Variable 4.8744
S.D. of Dependent Variable .87349    Maximum of Log-likelihood -.48.5368
DW-statistic 2.1256

Diagnostic Tests

** Test Statistics **    LM Version **    F Version **

**   **    **   **

* A:Serial Correlation*CHI-SQ( 1)= 0.58207[.446]*F( 1, 127)= 0.54589[.461]*
* B:Functional Form *CHI-SQ( 1)= 0.31661[.574]*F( 1, 127)= 0.29634[.587]*
* C:Normality *CHI-SQ( 2)= 0.14267[.931]* Not applicable *
* D:Heteroscedasticity*CHI-SQ( 1)= 2.9740[.085]*F( 1, 134)= 2.9958[.086]*

A: Lagrange multiplier test of residual serial correlation
B: Ramsey’s RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
Variable Deletion Test (Dummy Variables: Years):

Variable Deletion Test (OLS case)

Dependent variable is LTRP

List of the variables deleted from the regression:

<table>
<thead>
<tr>
<th>D1</th>
<th>D2</th>
<th>D3</th>
</tr>
</thead>
</table>

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.68712</td>
<td>.17591</td>
<td>3.9062[.000]</td>
</tr>
<tr>
<td>LM2P</td>
<td>.27845</td>
<td>.041162</td>
<td>6.7646[.000]</td>
</tr>
<tr>
<td>LNP</td>
<td>.095468</td>
<td>.025028</td>
<td>3.8145[.000]</td>
</tr>
<tr>
<td>LMANP</td>
<td>.10850</td>
<td>.038258</td>
<td>2.8361[.005]</td>
</tr>
<tr>
<td>LFP</td>
<td>.27113</td>
<td>.035953</td>
<td>7.5412[.000]</td>
</tr>
</tbody>
</table>

Joint test of zero restrictions on the coefficient of deleted variables:

Lagrange Multiplier Statistic CHI-SQ( 3)= 7.9893[.046]
Likelihood Ratio Statistic CHI-SQ( 3)= 8.2336[.041]
F Statistic F( 3, 128)= 2.6629[.057]
## The Preferred Model without the Dummy Variables:

### Ordinary Least Squares Estimation

Dependent variable is LTRP

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.68712</td>
<td>0.17591</td>
<td>3.9062</td>
<td>0.0001</td>
</tr>
<tr>
<td>LM2P</td>
<td>0.27845</td>
<td>0.041162</td>
<td>6.7646</td>
<td>0.0001</td>
</tr>
<tr>
<td>LNP</td>
<td>0.095468</td>
<td>0.025028</td>
<td>3.8145</td>
<td>0.0001</td>
</tr>
<tr>
<td>LMANP</td>
<td>0.10850</td>
<td>0.038258</td>
<td>2.8361</td>
<td>0.0051</td>
</tr>
<tr>
<td>LFP</td>
<td>0.27113</td>
<td>0.035953</td>
<td>7.5412</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

R-Squared: 0.83231  F-statistic: F(4, 131) = 162.5560 [0.000]
R-Bar-Squared: 0.82719  S.E. of Regression: 0.36311
Residual Sum of Squares: 17.2722  Mean of Dependent Variable: 4.8744
S.D. of Dependent Variable: 0.87349  Maximum of Log-likelihood: -52.6536
DW-statistic: 1.9816

### Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ(1) = 0.0089944[.924]</td>
<td>F(1, 130) = 0.0085981[.926]</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ(1) = 0.39377[.530]</td>
<td>F(1, 130) = 0.37749[.540]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ(2) = 0.22562[.893]</td>
<td>Not applicable</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ(1) = 2.2713[.132]</td>
<td>F(1, 134) = 2.2759[.134]</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values
Testing the Hypothesis of Homogeneity in Population:

- Running log (TR) on the logs of all the independent variables (non-per-capita model) after adding log (POP) as a regressor as follows:

### Ordinary Least Squares Estimation

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.94136</td>
<td>.23008</td>
<td>4.0914[.000]</td>
</tr>
<tr>
<td>LM2</td>
<td>.25885</td>
<td>.042470</td>
<td>6.0950[.000]</td>
</tr>
<tr>
<td>LN</td>
<td>.093074</td>
<td>.024890</td>
<td>3.7394[.000]</td>
</tr>
<tr>
<td>LMAN</td>
<td>.12936</td>
<td>.039924</td>
<td>3.2401[.002]</td>
</tr>
<tr>
<td>LF</td>
<td>.25050</td>
<td>.037710</td>
<td>6.6429[.000]</td>
</tr>
<tr>
<td>LPOP</td>
<td>.22871</td>
<td>.031332</td>
<td>7.2993[.000]</td>
</tr>
</tbody>
</table>

- R-Squared: .94144  F-statistic: F( 5,130) = 417.9746[.000]
- R-Bar-Squared: .93919  S.E. of Regression: .36053

According to the P-value, we reject the null hypothesis (the coefficient of log (POP) = 0) at 5% significance level.
- Testing Whether the Coefficient of Log (POP) Equals One:-

Ordinary Least Squares Estimation

Dependent variable is LTR
136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.94136</td>
<td>.23008</td>
<td>4.0914 [.000]</td>
</tr>
<tr>
<td>LM2P</td>
<td>.25885</td>
<td>.042470</td>
<td>6.0950 [.000]</td>
</tr>
<tr>
<td>LNP</td>
<td>.093074</td>
<td>.024890</td>
<td>3.7394 [.000]</td>
</tr>
<tr>
<td>LMANP</td>
<td>.12936</td>
<td>.039924</td>
<td>3.2401 [.002]</td>
</tr>
<tr>
<td>LFP</td>
<td>.25050</td>
<td>.037710</td>
<td>6.6429 [.000]</td>
</tr>
<tr>
<td>LPOP</td>
<td>.96049</td>
<td>.023275</td>
<td>41.2665 [.000]</td>
</tr>
</tbody>
</table>

R-Squared .94144  F-statistic F(5,130) 417.9746 [.000]
R-Bar-Squared .93919  S.E. of Regression .36053
Residual Sum of Squares 16.8977  Mean of Dependent Variable 7.6503
S.D. of Dependent Variable 1.4620  Maximum of Log-likelihood -51.1630
DW-statistic 1.9908

Analysis of Function(s) of Parameter(s)

Based on OLS regression of LTR on:
C LM2P LNP LMANP LFP LPOP
136 observations used for estimation from 1 to 136

Coefficients A1 to A6 are assigned to the above regressors respectively
List of specified functional relationship(s):
fl=a6-1

<table>
<thead>
<tr>
<th>Function</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fl</td>
<td>-.039508</td>
<td>.023275</td>
<td>-1.6974 [.092]</td>
</tr>
</tbody>
</table>

According to the P-value, we cannot reject the null hypothesis (the coefficient of log (POP) = 1) at 5% significance level. This shows that the log per-capita model is preferable.
**Serial Correlation Test**

To avoid repetition, the same procedures followed in Chapter 4 were employed here.

### Ordinary Least Squares Estimation

Dependent variable is $R$

136 observations used for estimation from 1 to 136

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C$</td>
<td>$-0.0067209$</td>
<td>$0.17685$</td>
<td>$-0.03803 [0.970]$</td>
</tr>
<tr>
<td>$LM2P$</td>
<td>$0.0016094$</td>
<td>$0.041389$</td>
<td>$0.03885 [0.969]$</td>
</tr>
<tr>
<td>$LNP$</td>
<td>$0.0016864$</td>
<td>$0.025301$</td>
<td>$0.066653 [0.947]$</td>
</tr>
<tr>
<td>$LMANP$</td>
<td>$0.0014168$</td>
<td>$0.038458$</td>
<td>$0.036841 [0.971]$</td>
</tr>
<tr>
<td>$LFP$</td>
<td>$-0.0029156$</td>
<td>$0.036475$</td>
<td>$-0.079934 [0.936]$</td>
</tr>
<tr>
<td>$R34$</td>
<td>$-0.055437$</td>
<td>$0.10525$</td>
<td>$-0.52670 [0.599]$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$R$-Squared</th>
<th>$0.0021294$</th>
<th>F-statistic F(5, 130)</th>
<th>$0.055482 [0.998]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R$-Bar-Squared</td>
<td>$-0.036250$</td>
<td>S.E. of Regression</td>
<td>$0.36412$</td>
</tr>
<tr>
<td>Residual Sum of Squares</td>
<td>$17.2354$</td>
<td>Mean of Dependent Variable</td>
<td>$-0.0000$</td>
</tr>
<tr>
<td>S.D. of Dependent Variable</td>
<td>$0.35769$</td>
<td>Maximum of Log-likelihood</td>
<td>$-52.5086$</td>
</tr>
<tr>
<td>DW-statistic</td>
<td>$1.9445$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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- **Heteroscedasticity Test:**

To avoid repetition, the same procedures followed in Chapter 4 were employed here.

Ordinary Least Squares Estimation

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.15350</td>
<td>.13118</td>
<td>1.1701[.244]</td>
</tr>
<tr>
<td>LM2P</td>
<td>-.048184</td>
<td>.030697</td>
<td>-1.5697[.119]</td>
</tr>
<tr>
<td>LNP</td>
<td>-.024809</td>
<td>.018664</td>
<td>-1.3292[.186]</td>
</tr>
<tr>
<td>LMANP</td>
<td>-.10372</td>
<td>.028531</td>
<td>-3.6353[.000]</td>
</tr>
<tr>
<td>LFP</td>
<td>.14571</td>
<td>.026812</td>
<td>5.4344[.000]</td>
</tr>
</tbody>
</table>

R-Squared  .27733  F-statistic F( 4, 131)  12.5680[.000]
R-Bar-Squared  .25526  S.E. of Regression  .27079
Residual Sum of Squares  9.6056  Mean of Dependent Variable  .13700
S.D. of Dependent Variable  .31378  Maximum of Log-likelihood  -12.7544
DW-statistic  1.5302

All the abbreviations are as mentioned in section 3 and Appendix C of Chapter 5.
C.3. The Computations of Table 5.3 of Chapter 5:-

The Table has been obtained by using different commands and facilities available in the Microfit package as follows:-

1- After the adopted model is estimated, a move was made in Microfit to the "Post Regression Menu" choosing option 8 (Forecast) to obtain the predicted values and the standard errors for the dependent variable in the adopted model. The observations 1-136 were repeated and combined with the same data file in order to obtain the predicted values and the standard errors. Then a 95% confidence interval for the log of the individual's relative taxable capacity was computed. The figures (lower and upper limits) for each country were then converted from log per-capita to per-capita. These values represent the individual's relative taxable capacity for the developing countries in the study. This was done by using the exponentiation operator command which is available in the same package.

2- The tax effort of the developing countries for the model in the period 1986-89 was computed. This has been done by dividing the actual contribution of the individual to tax revenues over the individual's relative taxable capacity which is obtained from the previous step. Two figures for the tax effort were computed as a result of obtaining a 95% confidence interval for the individual's relative taxable capacity.

3- A sample covering the observations 239-272 is selected. This sample represents the data relate to 1989.

4- The developing countries therefore, are sorted in an ascending order according to the contribution of the individual to tax revenues recorded in each country. This has been done by using the "ORDER" command which is available in the Microfit package.
5- The BATCH file is used to obtain the results of all the previous steps except the first one.
The BATCH File for Computing the Arithmetic Approach

The BATCH file for computing the tax effort (TE) approach for each country and for every kind of taxes for the period 1986-89:-

```
$ tr1=tr1-so1
tr2=tr2-so2
tr3=tr3-so3
tr4=tr4-so4

ty=((tr1/(gnp1-indn1))+(tr2/(gnp2-indn2))+(tr3/(gnp3-indn3))+(tr4/(gnp4-indn4)))/.04

inty=((int1/(gnp1-indn1))+(int2/(gnp2-indn2))+(int3/(gnp3-indn3))+(int4/(gnp4-indn4)))/.04

exty=((ext1/(x1+m1))+(ext2/(x2+m2))+(ext3/(x3+m3))+(ext4/(x4+m4)))/.04

domy=((dom1/(gnp1-x1-indn1))+(dom2/(gnp2-x2-indn2))+(dom3/(gnp3-x3-indn3))+(dom4/(gnp4-x4-indn4)))/.04

othery=((oth1/(gnp1-indn1))+(oth2/(gnp2-indn2))+(oth3/(gnp3-indn3))+(oth4/(gnp4-indn4)))/.04

sty=ty/17.5698
sinty=inty/5.8916
sexty=exty/9.0357
sdomy=domy/9.0310
sothery=othery/1.4253

sty=order(sty,ty)
sinty=order(sinty,ty)
sexty=order(sexty,ty)
sdomy=order(sdomy,ty)
sothery=order(sothery,ty)
rsty=rank(sty)
rsinty=rank(sinty)
```
$rs_{\text{exnty}} = \text{rank}(sexty)$
$rs_{\text{sdomy}} = \text{rank}(sdomy)$
$rs_{\text{sothery}} = \text{rank}(sothery)$

where:

ty: the tax burden (TB) of total tax revenues (excluding social security contributions) measured by the ratio of total tax revenues (excluding social security contributions) to the GNP at current factor cost (GNP minus net indirect taxes). This is also called the tax burden.

inty: the TB of tax on income, profits & capital gains measured by the ratio of tax on income, profits & capital gains to the GNP at current factor cost (GNP minus net indirect taxes).

exty: the TB of taxes on international trade measured by the ratio of taxes on international trade to merchandise exports plus imports.

domy: the TB of domestic taxes on goods & services measured by the ratio of domestic taxes on goods & services to the GNP at current factor cost (GNP minus net indirect taxes) minus merchandise exports.

othery: the TB of other taxes measured by the ratio of other taxes to the GNP at current factor cost (GNP minus net indirect taxes).

sty: the TE of total tax revenues (excluding social security contributions) measured by the ratio of the TB to the relative taxable capacity (RTC) of these revenues.

sinty: the TE of tax on income, profits & capital gains measured by the ratio of the TB to the RTC of this tax.

sexty: the TE of taxes on international trade measured by the ratio of the TB to the RTC of these taxes.

sdomy: the TE of domestic taxes on goods & services measured by the ratio of the TB to RTC of these taxes.

sothery: the TE of other taxes measured by the ratio of the TB to the RTC of these taxes.
ry: the rank of the TE of total tax revenues (excluding social security contributions) for each developing country.

riny: the rank of the TE of tax on income, profits and capital gains for every developing country.

rexty: the rank of the TE of taxes on international trade for each developing country.

rdomy: the rank of the TE of domestic taxes on goods & services for every developing country.

rothery: the rank of the TE of other taxes for each developing country.

The figure which appears at the end of each variable in the above BATCH file refers to:


All the other abbreviations are as shown in Chapter 3, section 2.
Appendix E
(Appendix to Chapter 7)
Income Tax Elasticity in Jordan

The main aim of this Appendix is to test for non-stationarity of the following series and, subsequently, to test whether there is evidence of cointegration between the I(1) series. If the series are found to be cointegrated, then we will need to employ an Error Correction Model (ECM), using the "general to specific" methodology to explain the income tax elasticity in Jordan. Finally we also wish to discuss the short-run and the long-run elasticities.

1. The observations on the following series are given:-

- TR: tax revenues in Jordan at current market prices.
- GNP: Gross National Product at current market prices.
- X: merchandise exports at current market prices.

The data are annual and cover the period 1964-1995. This period was chosen since it was one of political and economic stability (see Chapter 2).

2. The following variables are formed:-

\[
\begin{align*}
LT & : \log \text{(tax revenues in Jordan at current market prices)} = \log(TR). \\
LY & : \log \text{(Gross National Product at current market prices)} = \log(GNP). \\
LX & : \log \text{(merchandise exports at current market prices)} = \log(X).
\end{align*}
\]

and set the sample to cover the period 1964-1995.

3. We wish to know whether the series (LT, LY and LX) are stationary in their levels or have to be differenced one or more times before becoming stationary. The plot of the series LT, LY and LX indicates that all of them are trending. To test each series for non-stationarity against the trend-stationary alternative, the first differences
of each series have been formed as follows:

\[ DLT = LT - LT(-1) \]
\[ DLY = LY - LY(-1) \]
\[ DLX = LX - LX(-1) \]

and consider the following model for each series, for instance LT:

\[ DLT_t = \alpha + \delta t + (\beta - 1)LT_{t-1} + u_t \]

and test \( H_0: \beta = 1 \) against \( H_1: \beta < 1 \)

In Microfit, the ADF command to carry out Dickey-Fuller test for unit roots for each series is used, the following output is obtained.

- **ADF LT:**

  Unit root tests for variable LT

  ************************************************************
  statistic   sample    observations    without trend with trend
  DF          1965 1995   31             \(-.13699\) \(-2.9591\) \(-1.4957\) \(-3.5615\)
  ADF(1)      1966 1995   30             \(.045285\) \(-2.9627\) \(-2.0202\) \(-3.5671\)

  95% critical values in brackets.

  To test the null hypothesis that LT is I(1) against the trend-stationary alternative, the with trend column in the above result is examined. Using DF and ADF(1) (Augmented Dickey-Fuller test), the null hypothesis is not rejected, since the calculated value of both DF and ADF(1) are not less than the critical values for a lower tail 5% test. The last row gives the critical values and the test statistics for the Augmented Dickey-Fuller test with one extra lag.

- **ADF LY:** carrying out the same procedure for LY:

  Unit root tests for variable LY

  ************************************************************
  statistic   sample    observations    without trend with trend
  DF          1965 1995   31             \(-.44368\) \(-2.9591\) \(-1.9812\) \(-3.5615\)
  ADF(1)      1966 1995   30             \(.26235\) \(-2.9627\) \(-1.8829\) \(-3.5671\)

  95% critical values in brackets.
The null of a unit root for LY is not rejected either. None of the calculated values are less than the critical values.

- ADF LX: carrying out the same procedure for LX:

<table>
<thead>
<tr>
<th>statistic</th>
<th>sample observations</th>
<th>without trend</th>
<th>with trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF 1965 1995 31</td>
<td>-0.59068( -2.9591)</td>
<td>-2.2165( -3.5615)</td>
<td></td>
</tr>
<tr>
<td>ADF(1) 1966 1995 30</td>
<td>-0.29574( -2.9627)</td>
<td>-2.1072( -3.5671)</td>
<td></td>
</tr>
</tbody>
</table>

95% critical values in brackets.

Again the null of a unit root for LX is not rejected either. None of the calculated values are less than the critical values. Thus, all series (LT, LY, and LX) are non-stationary in their levels, but become stationary when one differences is taken.

4. As we have seen all series have the same order of integration I(1). To test for cointegration, the cointegrating regression which regresses LT on an intercept, LY and LX is estimated.
Ordinary Least Squares Estimation

Dependent variable is LT
32 observations used for estimation from 1964 to 1995

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-.82732</td>
<td>.36542</td>
<td>-2.2640[.031]</td>
</tr>
<tr>
<td>LY</td>
<td>.53335</td>
<td>.10514</td>
<td>5.0726[.000]</td>
</tr>
<tr>
<td>LX</td>
<td>.44388</td>
<td>.075124</td>
<td>5.9086[.000]</td>
</tr>
</tbody>
</table>

R-Squared .99349  F-statistic F( 2, 29) 2213.4[.000]
R-Bar-Squared .99304  S.E. of Regression .11569
Residual Sum of Squares .38812  Mean of Dependent Variable 4.8080
S.D. of Dependent Variable 1.3870  Maximum of Log.likelihood 25.1889
DW-statistic 1.6004

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>*CHI-SQ(1)= 1.1464[.284]<em>F( 1, 28)= 1.0404[.316]</em></td>
<td></td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>*CHI-SQ(1)= 3.5610[.059]<em>F( 1, 28)= 3.5061[.072]</em></td>
<td></td>
</tr>
<tr>
<td>C: Normality</td>
<td><em>CHI-SQ(2)= 1.2850[.526]</em> Not applicable</td>
<td></td>
</tr>
<tr>
<td>D: Heteroscedasticity*CHI-SQ(1)= 1.2272[.268]<em>F( 1, 30)= 1.1964[.283]</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

It is worth mentioning that the Engle-Granger two-step estimation procedure will be employed here. The above-model therefore represents the first-step of the Engle-Granger estimation procedure which measures the long-run relationship between the included variables as will be shown later. The coefficient of the variables has the anticipated signs. These prove to be sensible magnitudes and all of them are significantly different from zero at the five percent level. These estimates are consistent although they may be biased in small samples because of omitted dynamics.
The coefficient of determination is high. Then moving to Hypothesis Testing in the Post Regression Menu choosing option 3 (the unit root tests for residuals) and obtaining:-

<table>
<thead>
<tr>
<th>statistic</th>
<th>sample</th>
<th>observations</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF</td>
<td>1965</td>
<td>31</td>
<td>-4.5511(-4.0263)</td>
</tr>
<tr>
<td>ADF(1)</td>
<td>1966</td>
<td>30</td>
<td>-4.2014(-4.0362)</td>
</tr>
<tr>
<td>ADF(2)</td>
<td>1967</td>
<td>29</td>
<td>-5.0508(-4.0468)</td>
</tr>
<tr>
<td>ADF(3)</td>
<td>1968</td>
<td>28</td>
<td>-4.2643(-4.0583)</td>
</tr>
</tbody>
</table>

95% critical values in brackets when available.

Using DF, ADF(1), ADF(2), or ADF(3) statistics, the null of no cointegration is rejected, since we infer that LT and both LY and LX are cointegrated. Thus, there is evidence of a long run relationship between them. The long-run elasticities therefore are represented by the coefficients of variables included in the cointegrating regression. The short run dynamics can be described by the Error Correction Model (ECM).

5. Using the "general to specific" methodology to estimate an Error Correction Model (ECM) to explain the income tax elasticity in Jordan, one lag for the general dynamic model using data up to 1995 is chosen. The residuals from the first step of the Engle and Granger estimation procedure (cointegrating regression) are saved in order to employ the second step as follows:-
Ordinary Least Squares Estimation

Dependent variable is DLT
30 observations used for estimation from 1966 to 1995

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.059946</td>
<td>0.028997</td>
<td>2.0673</td>
<td>0.050</td>
</tr>
<tr>
<td>DLT(−1)</td>
<td>0.16208</td>
<td>0.18314</td>
<td>0.88500</td>
<td>0.385</td>
</tr>
<tr>
<td>DLY</td>
<td>0.32774</td>
<td>0.10942</td>
<td>2.9952</td>
<td>0.006</td>
</tr>
<tr>
<td>DLY(−1)</td>
<td>−0.063243</td>
<td>0.12024</td>
<td>0.3851</td>
<td>0.604</td>
</tr>
<tr>
<td>DLX</td>
<td>0.26011</td>
<td>0.087556</td>
<td>2.9708</td>
<td>0.007</td>
</tr>
<tr>
<td>DLX(−1)</td>
<td>−0.15580</td>
<td>0.10736</td>
<td>1.4512</td>
<td>0.160</td>
</tr>
<tr>
<td>R(−1)</td>
<td>0.83582</td>
<td>0.21779</td>
<td>3.8377</td>
<td>0.001</td>
</tr>
</tbody>
</table>

R-Squared: 0.58124
F-statistic: F(6, 23) = 5.3206, Prob = 0.001
R-Bar-Squared: 0.47200
S.E. of Regression: 0.097497
Residual Sum of Squares: 0.21863
Mean of Dependent Variable: 0.12964
S.D. of Dependent Variable: 0.13418
Maximum of Log-likelihood: 31.2553
DW-statistic: 2.0465
Durbin’s h-statistic: *NONE*

Diagnostic Tests

<table>
<thead>
<tr>
<th>* Test Statistics *</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>* A: Serial Correlation</td>
<td>CHI-SQ(1) = 0.83005, F(1, 22) = 0.62603, Prob = 0.437</td>
<td></td>
</tr>
<tr>
<td>* B: Functional Form</td>
<td>CHI-SQ(1) = 0.35999, F(1, 22) = 0.26720, Prob = 0.610</td>
<td></td>
</tr>
<tr>
<td>* C: Normality</td>
<td>CHI-SQ(2) = 0.82336, Not applicable</td>
<td></td>
</tr>
<tr>
<td>* D: Heteroscedasticity</td>
<td>CHI-SQ(1) = 0.65767, F(1, 28) = 0.62759, Prob = 0.435</td>
<td></td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey’s RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

Then a test is carried out to see whether the coefficients of the first lag for DLT, DLY, and DLX are jointly zero by using the F-test which is given by:

\[ F = \frac{(RSS_r - RSS_u)/q}{RSS_u/T-K} \]
which has an F-distribution with degrees of freedom q,T-K where:

- \( \text{RSS}_r \) : residual sum of squares from restricted model.
- \( \text{RSS}_u \) : residual sum of squares from unrestricted model.
- \( q \) : number of linear restrictions.
- \( T \) : number of observations.
- \( K \) : number of parameters in the unrestricted model.

We can directly carry out this test by moving in Microfit to the Hypothesis Testing in the Post Regression Menu choosing option 5 (variable deletion test):

```
Variable Deletion Test (OLS case)

Dependent variable is DLT
List of the variables deleted from the regression:
DLT(-1) DLY(-1) DLX(-1)
30 observations used for estimation from 1966 to 1995

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.052463</td>
<td>.023742</td>
<td>2.2097[.036]</td>
</tr>
<tr>
<td>DLY</td>
<td>.28227</td>
<td>.090274</td>
<td>3.1268[.004]</td>
</tr>
<tr>
<td>DLX</td>
<td>.26878</td>
<td>.081758</td>
<td>3.2875[.003]</td>
</tr>
<tr>
<td>R(-1)</td>
<td>-.65384</td>
<td>.16261</td>
<td>-4.0209[.000]</td>
</tr>
</tbody>
</table>

Joint test of zero restrictions on the coefficient of deleted variables:
Lagrange Multiplier Statistic \( \text{CHI-SQ}(3)= 2.6687[.446] \)
Likelihood Ratio Statistic \( \text{CHI-SQ}(3)= 2.7949[.424] \)
F Statistic \( F(3, 23)= .74859[.534] \)
```

According to the F-statistic, the hypothesis that the first lag coefficients are jointly zero is accepted. Then the restricted Error Correction Model (ECM) is estimated.
Ordinary Least Squares Estimation

Dependent variable is DLT
31 observations used for estimation from 1965 to 1995

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>.053158</td>
<td>.023691</td>
<td>2.2438</td>
<td>.033</td>
</tr>
<tr>
<td>DLY</td>
<td>.28563</td>
<td>.090053</td>
<td>3.1718</td>
<td>.004</td>
</tr>
<tr>
<td>DLX</td>
<td>.28059</td>
<td>.080678</td>
<td>3.4779</td>
<td>.002</td>
</tr>
<tr>
<td>R(-1)</td>
<td>-.63968</td>
<td>.16166</td>
<td>-3.9569</td>
<td>.000</td>
</tr>
</tbody>
</table>

R-Squared: .53778
F-statistic F(3, 27): 10.4712
R-Bar-Squared: .48642
S.E. of Regression: .095911
Residual Sum of Squares: .24837
Mean of Dependent Variable: .13383
Maximum of Log-likelihood: 30.8286
DW-statistic: 1.9902

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ(1) = .014223</td>
<td>F(1, 26) = .011935</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ(1) = 2.5274</td>
<td>F(1, 26) = 2.3080</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ(2) = 2.7874</td>
<td>Not applicable</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ(1) = 1.0579</td>
<td>F(1, 29) = 1.0247</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

Therefore, this is the second-step of the Engle-Granger estimation procedure. The coefficient of the first lag of the residuals [R(-1)] represents a measure of the speed of adjustment of the tax revenues to the last period. It is as expected (negative and significant).

6. The properties of the final model can be summarised as follows:-

- **Serial correlation**: using the LMF test, we have a P-value of 0.914. Thus,
we do not reject the null of no autocorrelation. There is also no evidence of non normality or functional misspecification.

In general, the coefficient of the variables has the anticipated signs. These prove to be sensible magnitudes and all of them are significantly different from zero at the five percent level.

7- Income Tax Elasticity and Exports Elasticity:

7.1. The First-Step of the Engle and Granger Estimation Procedure (Cointegrating Regression):

- The long-run income tax elasticity = the coefficient of \( LY = 0.53 \).
- The long-run exports elasticity = the coefficient of \( LX = 0.44 \).

7.2. The Second-Step of the Engle and Granger Estimation Procedure (ECM):

- The short-run income tax elasticity = (the coefficient of \( DLY \)) = 0.29.
- The short-run exports elasticity = (the coefficient of \( DLX \)) = 0.28.
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