LDC EXTERNAL DEBT, TRADE AND SOLVENCY OF A NATION: TIME-SERIES EVIDENCE FOR TURKEY

by

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Utku Utkulu

ABSTRACT

For over a decade after Mexico's announcement of repudiation in 1982, the LDC external debt problem is far from over, even though we may be less aware of it. Initially, the debt crisis was commonly considered as a liquidity problem arising from extremely unusual and unexpected combinations of worldwide recession and high interest rates. However, since 1982 to date, events have proved that this initial assessment was rather optimistic. Recently, it has become increasingly clear that the LDC debt problem goes beyond a pure liquidity problem. In this respect, we (like many others) acknowledge that many LDC debtors have a situation closer to insolvency rather than pure illiquidity. The lack of clear solvency criteria, however, makes it rather difficult, if not impossible, to distinguish between insolvency and illiquidity although, in theory, they differ fundamentally. In this regard, country specific factors appear to play a major role in determining whether or not countries escape from this crisis.

Turkey experienced an external debt crisis in 1978. In fact, it was the first major crisis to surface. By the time, the LDC external debt became a widely known issue in 1982, Turkey had already re-entered the international credit markets and been acknowledged as an 'example' for other debtor countries. Since the introduction of a major policy reform program (which marks the switch from an inward-oriented economy based on import-substitution (ISI) to an outward-oriented one based on export-promotion), the macroeconomic performance of Turkey improved remarkably during the worldwide recession. The years from 1986 onwards, however, have been marked by uncertainty in macroeconomic policies. These developments in the second half of the 1980s, as a whole, have raised some doubts about Turkey's solvency and sustainability of the export-led growth (ELG) in general.

The two main objectives of this thesis are as follows: first, to build a foreign trade model, and to estimate some income and price elasticities (employing recent time-series techniques such as 'cointegration analysis') for Turkey by using this model so as to serve the purposes of debt service and trade policy prospects. Second, to develop an intertemporal external solvency model for an indebted country, and to apply it to Turkey. The bulk of the empirical work lies in the form of estimating a set of long-run elasticities which enable us to calculate a reliable proxy for resources, and also to calculate the solvency index for Turkey.

According to our results, Turkey is proved to be 'solvent' in the intertemporal sense although still suffers from a high debt burden. Besides which, our trade elasticity estimates for Turkey suggest that ELG strategies are preferable compared to the alternative of ISI strategies.

DEDICATION

To my wife, Serpil, for all her devotion

and

To my mother and father for all their love and prayers

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ABBREVIATIONS

Abbreviations used include:

ADF	- augmented Dickey-Fuller
ADL	- autoregressive distributed lag
AOM	- additive outlier model
CRDW	- cointegrating Durbin-Watson
DF	- Dickey-Fuller
DHSY	- Davidson, Hendry, Srba and Yeo (1978) [consumption model]
DP	- Dickey-Pentula
DSC	- debt servicing capacity
DSP	- difference-stationary process
EC	- European Community
ECM	- error-correction mechanism
ECMOD	- error-correction model
EG	- Engle-Granger
EGM	- Engle-Granger two-step method
ELG	- export-led growth
EY	- Engle-Yoo
EYM	- Engle-Yoo three-step method
G-7	- Group of Seven
GDP	- gross domestic product
GNP	- gross national product
GRT	- Granger Representation Theorem
IDW	- integration Durbin-Watson
IMF	- International Monetary Fund
IMW	- invariant measure of wealth
IOM	- innovational outlier model
ISI	- import-substitutionist industrialisation
IV	- instrumental variables
LDC	- less-developed country

LMIC	- lower-middle-income country
LR	- likelihood ratio
MIC	- middle-income country
ML	- maximum likelihood
NIC	- newly-industrialized country
NICA	- non-interest current account
OECD	- Organisation for Economic Corporation and Development
OLS	- ordinary least squares
PDA	- Public Debt Administration
PO	- Phillips-Ouliaris
PP	- Phillips-Perron
RB	- resource base
RCO	- residual correlogram
SAL	- structural adjustment lending
SDRs	- special drawing rights
SEE	- state economic enterprise
SIC	- severely indebted country
SILIC	- severely indebted low-income country
SIMIC	- severely indebted middle-income country
SITC	- standard international trade classification
SPO	- State Planning Organisation
TL	- Turkish Lira
TSP	- trend-stationary process
UMIC	- upper-middle-income country
UN	- United Nations
US	- United States
VAR	- vector autoregression

In addition, for abbreviations, definitions and data sources of the variables used in the empirical applications, see the Appendix. For those abbreviations and definitions of various diagnostic tests, see pages 198-199. Finally, notations used in the formulas are described in the text at the relevant page.

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CHAPTER ONE

GENERAL INTRODUCTION

1.1. The Main Problem

More than a decade after Mexico's announcement of default, the external debt problem is far from over although it is not as pressing as it used to be in the 1980s. The collapse of the Soviet Union, the transition of those ex-central planned countries from central-planned economy to market economy, and possibly the deepest recession in the industrialized world since the 1930s have shifted the common interest from "LDC (less-developed country) debt problem" to others in the early 1990s. As a result, not only newspapers and practitioners but also many academics have changed their field of study in that direction.¹

The total external debt of the LDCs came from 100 billion dollars in the early 1970s to the trillion-dollar mark by the end of the 1980s. Total debt was 1.2 trillion-dollar in 1990 (see Table 2.1). Indicators of indebtness such as debt/GDP and debt/exports ratios suggest that the external debt burden still remains high for especially indebted LDCs (see Tables 2.3 and 2.5). Moreover, adjustments (both external and internal) required by debtor countries were made at a high price: investment and output levels have fallen due to massive resource transfers to creditors (i.e. "debt overhang"), domestic consumption and real wages have been compressed, and budgets have frequently been financed by inflationary means.

¹For the same point, see, e.g., Bird (1992).

Initially, the debt crisis was commonly considered as a problem of lack of "liquidity" arising from extremely unusual, unexpected, and unfavourable combination of worldwide recession and high interest rates. Accordingly, the debtor countries were either given rescheduling agreements or, on rare occasions, new loans. Apparently, the initial aim was to prevent the world financial system from collapsing coupled with involuntary lending and new money with conditionality by international financial institutions. This diagnosis of the problem, naturally, tried to encourage new lending to debtors and called for major structural economic reforms in debtor countries in exchange for new lending. These are the main features of the approach, i.e. the Baker Plan, which has been followed by official authorities like IMF and World Bank.

However, since 1982 to date, events have proved that this initial assessment was rather optimistic. It has recently become increasingly clear that the debt problem also involves the issue of "solvency", not just a liquidity problem. It is now widely accepted that the Baker Plan which endorsed the liquidity view, have not worked satisfactorily due to misleading "diagnosis" of the 1980s' debt crisis.

There is some evidence that the problem of LDC debt goes beyond a pure liquidity problem. Now it is acknowledged by many researchers that the external debt of the severely indebted countries (SICs) cannot be repaid in full. This point is also confirmed by quite high discount rates of these countries on the secondary foreign debt market. At present, most debtor countries sell their debts at large discounts, showing the creditors' belief that debtors are not likely to meet their obligations in full. It is also acknowledged by some academics that a number of debtor countries are on the right-side of the "Debt Relief Laffer Curve"² which also

²See Figure 2.3. For the definition and more information, see also pp.26-7.

confirms the need for "debt reduction"³ and debt restructuring policies.

As a response to this outcome, the Brady Plan came into effect in 1989 recognizing the need for debt relief policies rather than perceiving the problem as a short-run repayment difficulties. This might be viewed as the turning point in dealing with the debt problem since the long-run dimension of the problem is also taken into account effectively together with the short-run aspects.

Stressing the importance of insolvency together with illiquidity does not, necessarily, imply that we ignore the possibility of unwillingness of the debtors to repay their debts. On the contrary, there is little doubt that the willingness of the debtor country to repay the debt should be taken into account when assessing the debt problem. In that sense, the international debt is said to be "sovereign debt". A debtor country's decision simply involves comparing the direct cost of debt repudiation to the service of the debt. This is a one-shot decision. If the cost of debt repudiation is smaller than servicing it, then a default decision is made. In practice, however, the problem is not that simple: First, the borrower can ask for new loans (if it cannot get any) or it can ask rescheduling of its debt falling due. That is, the main problem is postponed to a later time: pay or default! Generally speaking, the unwillingness of the debtor is the bottleneck restriction if it ends well before the debtor's ability-to-pay comes to an end.⁴

 $^{^{3}}$ The term "debt reduction" includes any technique that leads to a reduction in the present value of payments due to creditors.

⁴In most cases, however, the cost of default is high enough to prevent the debtor country from defaulting. The cost of default includes the following: a) seizure of assets; b) exclusion from future borrowing; c) reduction of the gains from international trade, d) decline in the trustworthy reputation, e) retaliation by creditor governments. For a comprehensive evaluation of indirect and direct costs of default sea Kaletsky (1985). See also Krugman and Obstfeld (1991). Accordingly, the incentive of default by a LDC depends on a number of factors: a) the ratios of external indebtness, such as debt/GDP, debt/exports, debt service/exports; b) the cost of default [see Kaletsky (1985)]; the monetary and fiscal policies of the creditor countries; d) the nature and impact of the demand and supply shocks; e) the nature of domestic budget and external solvency constraints in the borrowing country [Buiter and Patel (1992), Ghatak and Levine (1994)]. Bulow and Rogoff (1986) postulates that the total cost of default is a major factor in deciding the final outcome of a bargaining model between debtors and creditors.

In our view, each of these different approaches, namely liquidity, ability-to-pay (solvency), and willingness-to-pay, has, to a certain extent, logical explanations for the occurrence of the debt crisis. While they share some qualitative implications, on balance they point to very different policy strategies for debtor countries, creditors and policy-makers.

Turkey experienced an external debt crisis in 1978 unlike those Latin American countries facing the crisis in 1982, and rescheduled a large amount of its external debt between 1978 and 1980. In fact, the debt crisis of Turkey was the first major crisis to surface. By the time the external debt of the LDCs became widely known issue in 1982, Turkey had already re-entered the international credit markets and been acknowledged as an example for other debtor countries (for details and references, see esp. Chapter Two). Since the introduction of a major policy reform program in 1980, the macroeconomic performance of Turkey improved considerably during the worldwide recession (esp. in the first half of the 1980s). The years since 1986, however, have been marked by uncertainty in macroeconomic policies. During the last years of this period, real wages increased, the Turkish lira appreciated in real terms and exports stagnated. The inconsistency of the underlying fiscal policy with the exchange rate policy and other fields of liberalisation program became increasingly obvious after 1986 when Turkey started to transfer net income abroad. It is also true that compared with the first half of the 1980s, the economy has been less stable in terms of macroeconomic performance of the economy during the second half especially after 1987. Real GNP slowed down in 1988 and 1989, as a result of a tightening of economic policy in 1988 aimed at containing rasing budget deficits and strongly increasing inflation. In 1990, however, economic growth recovered to about 9 per cent largely due to relaxing the monetary and fiscal policies in 1989. Economic expansion came to a halt by the end of 1990 owing to the shock events of the Persian Gulf [OECD (1992)]. Foreign borrowing and foreign debt of Turkey increased remarkably in the second half of the decade (see Chapter Two). Foreign exchange and gold reserves, however, reached an all-time high in the late 1980s (see Table 4.16). These developments in the second half of the 1980s, as a whole, raised some doubts about Turkey's solvency and the sustainability of the export-led growth in general.

It is also true that country-specific factors need to be taken into account since these factors may be decisive in determining which countries escaped the debt crisis and which could not [see, e.g., Krueger (1992)].⁵ For instance, it is likely that some Latin American countries and most of the low income African debtors experience a situation closer to insolvency rather than pure illiquidity. However, Turkey have followed a different path and, <u>possibly</u> has not been subject to insolvency during the crisis period. That is, each country has its own characteristics and story as far as the debt crisis of the 1980s is concerned. Thus, a strategy dealing with the LDC debt problem should take into account those country specific factors is also recognized by the Brady Plan. This explanation naturally justifies any study, such as ours, which aims to assess the debt problem of any specific indebted country, such as Turkey. Besides, Turkey is one the major examples which has recovered from the debt crisis of the 1980s, and thus some of its lessons may well be of help for other debtor countries.

As far as designing appropriate policy responses to the present LDC debt crisis is concerned, knowledge of income and price effects (i.e. through elasticities) in foreign trade (esp. exports) is crucial, in addition to their traditional role in

⁵In this context, it is often the case that two groups of countries are compared: Latin American countries such as Mexico, Brazil, and Argentina as examples of failure and South-East Asian Countries such as Korea, and Taiwan as examples of success.

analyses of international linkages and trade policies [see e.g. Bond (1985), Cline (1984), Dooley et al. (1986), Dornbusch (1985), Goldstein and Khan (1982, 1985), Marquez and McNeilly (1986, 1988), Riedel (1984)]. From the debtor countries' standpoint, both adjustment policies and debt rescheduling agreements hinge on current account projections that are crucially dependent on the choice of elasticity estimates. Furthermore, whether these countries (including Turkey) will, in general, be able to service their external debt depends on the response of their exports to growth in the export markets (i.e. industrial countries' markets, or the OECD market, for most indebted LDCs such as Turkey), a response that is determined by, in the first place, income and price elasticities for exports. In addition, knowledge of these elasticities is also relevant for policy making in the industrial world (i.e. mainly OECD countries). For instance, pursuit of a restrictive monetary policy in the industrialised countries makes it more difficult for debtor countries to service their external debt. Both the increase in interest rates and the induced decrease in the OECD imports would jeopardize the solvency of debtor countries. This might even feed back to the OECD markets as a decline in exports and as a disruption in financial markets.

1.2. Objectives of the Study

It is, thus, our aim to develop foreign trade and solvency models by taking those mentioned issues into consideration. Using recently developed robust time series methods (such as "cointegration analysis"), we then apply the trade and the intertemporal solvency models to Turkey and evaluate its foreign trade sector, external solvency and creditworthiness. Based on the findings, some theoretical and policy implications are also drawn.

Accordingly, the main objectives of this thesis are as follows: first, to

provide a general perspective for the LDC external debt crisis of the 1980s in which Turkey, as an indebted middle-income country, plays its own part. In this respect, attention is focused on origins, dimensions, some distinctive characteristics and future prospects of the LDC external debt problem. Turkey's external debt problem, its origins, timing, dimensions and future prospects are also discussed. This analysis is mostly descriptive supported by relevant Tables and Figures.

Second, to survey the literature on the solvency approach. In this regard, attention is concentrated on the three main approaches, namely liquidity, ability-to-pay (solvency) and willingness-to-pay, that enjoy some status in the literature as far as the occurrence of the LDC external debt problem is concerned. The main task of the survey is, first, to describe the approaches in terms of their main philosophy and present a comparative evaluation, and second, to provide a comprehensive coverage of the solvency approach which will be the main theme of this thesis.

Third, to analyse the background, structure, and main developments in the Turkish economy in retrospect. The focus is, mainly, based on an interpretive evaluation of the influential macroeconomic policies implemented in the post-War era. The questions are primarily centred around two main themes: what is the stage of industrial development that Turkey had reached under the planned inward-oriented policy (pre-1980 era)? What are the main outcomes of the economic policy switch from an inward-looking import-substitution industrialisation (ISI) to an outward-oriented export-led growth (ELG) strategy? The methodology is mostly descriptive. An additional task is to set the essential stage in which we examine the external solvency and the trade sector issues of Turkey.

Fourth, to present an empirical model building strategy of (especially) the long-run with nonstationary macroeconomic time series data in the light of recent developments in the area. This is the model building strategy that is employed through the empirical sections of this thesis. Since nonstationary time series data may cause spurious regression results, an appropriate long-run modelling strategy, namely "cointegration analysis", should be employed to make sure that the longrun relationship, under consideration, is a "genuine" one. To be able to justify the use of the cointegration analysis, we also test and show that most Turkish macroeconomic data are nonstationary. It is also our objective to review the literature as regards modelling cointegrated series.

The most important themes of this thesis are to be found in the fifth and sixth objectives. Fifth, to build a foreign trade model, and to estimate some income and price elasticities for Turkey by using this model so as to serve the purposes of evaluation of debt service and trade policy prospects for Turkey.

Sixth, to develop an external solvency model for an indebted country, and to apply the model to Turkey. The empirical work estimates the essential long-run elasticities which enable us to calculate the "proxy" for resources (we call this "resource base") available for servicing the debt, and also to calculate the solvency index proposed for Turkey. The calculation, naturally, depends on the model and its assumptions as well as the availability of data. Some theoretical and policy implications are also drawn from these empirical findings.

1.3. Methodology

This thesis is an application of time series econometrics for evaluation of external debt burden and solvency to Turkey. The bulk of the application lies in the form of estimating a set of long-run elasticities so as to develop a framework for evaluation of external solvency of an indebted country. In this framework, the relationship between the growth and real interest rates is the central point. Since the solvency requires calculation of the ability-to-pay in the long-run, we are, necessarily, concerned with the "intertemporal budget constraint" of an indebted nation. According to this methodology, to be declared "solvent", future resources of the country in net present value terms should, at least, be equal to the present outstanding external debt. A general methodological discussion of the solvency approach together with liquidity and willingness-to-pay views are provided in Chapter Three. Some methodological aspects of our foreign trade and solvency models are discussed in detail in Chapters Six and Seven respectively.

1.4. Organisation of the Study

As usual, the analytical background for the thesis is presented first (i.e. Chapters Two and Three). Chapter Two focuses on origins, dimensions, some distinctive characteristics and future prospects of the external debt problem for the LDCs in general, and Turkey in particular. This analysis is mostly descriptive supported by relevant Tables and Figures. A simple theoretical framework, which illustrates how external debt may become a threat for the borrowing countries, is also presented.

The literature review in Chapter Three contains both the discussion of three approaches namely liquidity, ability-to-pay (solvency) and willingness-to-pay, and a more detailed review of the solvency approach. To an extent, each of these theoretical views has logical validity. While they share some implications, as a rule, they point to different policy strategies for debtor countries, creditors, and the relevant international institutions.

It is important to note that the analytical part of this thesis is mostly descriptive and included in different chapters. This structure is simply a matter of organisational judgement and it is our opinion that the inclusion of each descriptive analysis, either in "background discussion" form or in "review" form, within the

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chapters that include the relevant empirical work helps to understand the latter.

Chapter Four embodies the development and the transformation of the Turkish economy in retrospect. Its focus is on an interpretive evaluation of the economic policies implemented during the post-War era. The main aim is to set the stage for the following chapters where we examine the external solvency and the trade sector issues of the Turkish economy. The Chapter presents the economic aspects of the development strategies that are adopted during the post-War era. It also introduces the 1980 reform and liberalisation package and evaluates the economic performance during the post-liberalisation era.

Chapter Five presents an empirical model building strategy with nonstationary macroeconomic time series data in the light of recent developments in the area. This Chapter provides not only an overview of the "cointegration analysis" and a guide to current practice, but also some practical applications as regards the Turkish macroeconomic data. It is important to note that we base our empirical studies in Chapters Six and Seven on the empirical time series models built in Chapter Five.

The main themes of this thesis are laid in Chapters Six and Seven. As known, the effectiveness of foreign trade policy is, among other things, dependent on the significance and the size of the income and price elasticities of foreign trade. Besides this traditional role in the examination of international linkages and trade policies, any knowledge of these elasticities is vital to designing policy responses to deal with the existing external debt problem. Similarly, the question whether the debtor countries are solvent or not depends on their competitiveness level and the sensitivity of their exports to growth in the world export markets. Accordingly, Chapter Six deals with the foreign trade issues of the LDCs as far as the income and price effects are concerned. It also provides an evaluation of the Turkish foreign trade sector during the post-liberalisation period (i.e. post-1980 era). The Chapter, then, develops a foreign trade model and the same model is applied to Turkey. The resulting income and price elasticities, accordingly, have some important implications for both Turkish foreign trade policy and the solvency prospects of the country.

Chapter Seven develops an external solvency model for an indebted country, and applies the model to Turkey. As far as the empirical work is concerned, we attempt to estimate the essential long-run elasticities which enable us to calculate the resource base (RB) available for servicing the debt, and also to calculate the solvency index proposed for Turkey. By going one step further, we also evaluate the creditworthiness of the country. Accordingly, a feasible external debt strategy is proposed for Turkey. Some important implications are also drawn according to the findings.

The thesis culminates in Chapter Eight, where summary of the results, conclusions drawn, various implications of the findings, some shortcomings and areas of further research are presented.

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CHAPTER TWO

THE LDC EXTERNAL DEBT CRISIS IN PERSPECTIVE AND

THE TURKISH CASE

2.1. Introduction: A Brief Framework of External Debt

There is said to be an external debt problem when a country cannot service its debt on the contracted timetable. Let us focus here on debt difficulties where interest cannot be paid.¹ Concentrating on interest payments, the current account of the balance of payments can be separated into two elements: a) the noninterest current account (NICA), which includes trade in goods and all services except interest payments on the external debt, and b) interest payments. Interest payments can be financed by noninterest surpluses or by net capital inflows [see, e.g., Dornbusch (1993, pp.206-30):

Interest Payments = Noninterest Current Account

The category "net capital inflows" includes four elements: reserve decumulation,

¹The reason is that difficulties in paying principal, when interest is regularly paid, would not pose serious problems since rolling over is a routine operation. However, one may, alternatively, focus on total debt service.

direct foreign investment inflows, long-term portfolio inflows, and short (or medium) term borrowing abroad which is often called "new money".

Table 2.1 shows the turn in the noninterest current account from a series of deficits until 1982 to a series of surpluses. During the time period up to 1982, both interest payments and the noninterest deficit needed financing and thus reflected a rapidly rising debt. After 1983, however, a large part of interest was paid by noninterest surpluses and hence the growth of debt was sharply reduced. Table 2.1 reveals that the total external debt of the countries with debt-servicing difficulties continued to rise, reflecting the financing of the remaining interest payments not met by the current account surplus.

Deficits in the noninterest current account reveal the typical pattern for LDCs in which saving is low relative to investment. In this sense, noninterest deficits are the channel through which resources are transferred from developed countries to LDCs to support capital formation and growth. Ironically, after 1982, the direction of the resource transfer changed in favour of creditor countries. This change of direction of the net resource transfers is the key distinction between pre-crisis and post-crisis era.

Employing the national accounting identities, one can show the financing of investment from the resource point of view as follows:

Investment = Saving + Real Resource Transfer from Abroad (2.2)

Table 2.2 illustrates the real resource transfer and the investment rates for Latin American debtors. It shows a striking decline in investment as a counterpart of the real resource transfer abroad. The most interesting feature of the table is the fact that the shift in resource transfers is matched by a decline in investment (see also "debt overhang" argument in Section 2.3.). Together with the noninterest surplus figures after 1983 of Table 2.1, this evidence shows the high level of adjustment that took place in the debtor countries.

This simple analysis illustrates how external debts may become a serious problem for the borrowing countries. It also explains in a simple way how the LDC debtors experienced a debt crisis during the 1980s. The aim of this chapter is to outline the external debt crisis of the 1980s in general and the Turkish experience in specific. The chapter is organised as follows. Next section describes the debt crisis of the 1980s. Section 2.3. reviews the official strategy and some future prospects. The general characteristics of the Turkish external debt is examined in Section 2.4. The final section offers a brief discussion.

Years	Noninterest current account deficit (resource transfer)	Interest payments	Current account deficit	External debt
1978	17.1	14.8	31.9	242
1979	10.1	21.8	31.9	292
1980	5.0	34.3	39.3	356
1981	20.2	47.5	67.7	430
1982	5.4	57.5	62.9	494
1983	-30.2	52.1	21.9	514
1984	-48.6	57.2	8.6	534
1985	-50.5	53.6	3.1	553
1986	-32.7	50.2	17.5	573
1987	-27.8	45.7	17.9	586

Table 2.1 Current Account Deficit and External Debt: Countries with Debt-servicing Difficulties (billions of US\$)

Source: Dornbusch (1993, p.207).

Table 2.2 Resource Transfers and Investment (% of GDP): Latin American Debtors

VARIABLES	1973-82	1983-85	
Gross investment	24.3	18.5	
Noninterest surplus	-0.6	4.7	

Source: Dornbusch (1993, p.208).

2.2. The Debt Crisis of the 1980s: Origins, Dimensions and Characteristics

On August 12, 1982, Mexico declared that its central bank had nearly run out of reserves and that it could no longer meet previously planned payments on its external debt. This was the beginning of a worldwide debt crisis [Cohen, B. (1986)]. The announcement of Mexico has been followed by several other major debtor countries, especially by those Latin American ones.

The reaction of commercial banks to those announcements of nonrepayment was quick. They promptly cut their new lending to all debtor countries regardless of their particular repayment or nonrepayment decisions. Accordingly, "credit rationing" became a real threat not only for defaulters but also those debtors which have not defaulted at the time. This was due to negative perception of the banks about the creditworthiness of the debtors as a whole. This particular decision of cutting new lending by the banks made a contribution to the spread of the problem to other Latin American countries.

The global economic environment of the 1980s were completely different from those 1970s: the worldwide recession coupled with high real interest rates above the growth rates of the debtor countries' economies implied that rescheduling the debt would trap the debtor through the law of compound interest. This swift switch in the hierarchy between growth and interest rates seems to be the major factor causing the debt crisis of the 1980s. New loans between the years 1980 and 1982 rapidly dried up and most debtor countries were soon out of cash, and as a result, Mexico stopped its repayment [Cohen, D. (1991)].

Apparently, the debt crisis imposed important policy challenges to all the sides involved (i.e. the debtors, banks, governments of creditor countries, and relevant international institutions). Basically, the crisis threatened not only debtor countries' economies but also international finance system in general. International finance system was under threat for two main reasons, as Kapstein (1991, p.9) points out: " ...first, it threatened to bring trade, investment, and financial flows between the industrial and developing countries to a halt; second, the amounts of sovereign debt owed to the banks were so large that, if the banks were forced to write them off, they would be declared insolvent. The banks lacked sufficient capital to absorb the losses, and, as depositors become aware of that fact, they would withdraw their funds, causing the banks to collapse...".

Following the Mexican announcement, a two-sided strategy for dealing with the debt problem was declared by the US authorities, namely Secretary of the Treasury Donald Regan. This strategy consisted of "short-term crisis management and longer-term stabilisation" which formed the main theme of the strategy of the relevant international institutions afterwards [Cohen, B. (1986)]. The broad aim of the official strategy was, in the first place, to maintain the international payment system. In the short-term, the requirement was to inject enough liquidity into the payment system to keep its operation going through. In the longer-term, however, the requirement was to restore the debtor countries' economies on the one hand while strengthening the international payment system on the other [Kapstein (1991)].

Initially, not only the relevant Bretton Woods institutions, i.e. IMF and World Bank, but also most researchers believed that the debt problem of the LDCs would be a short-term "temporary" problem arising from very unusual and unfavourable combination of worldwide recession and high interest rates, and thus creditworthiness and normal growth of most debtor countries would be resumed in several years. However, events have proved that this initial assessment was too optimistic.

The consensus among practitioners and academics suggest that the assessment of the debt problem as a "temporary" one by the relevant international institutions has continued until the Brady Plan. The Brady Plan, however, accepted that rescheduling and new loans were not good enough to deal with the debt problem efficiently. Rather, it recognized the need for debt reduction and restructuring. By doing that, it also recognized the long-run character of the LDC debt problem.

During the 1980s, the commercial banks were unwilling to put up new money for most debtor countries but willing to reschedule the debt. Under these circumstances, the debtors had no choice but to follow strong adjustment policies in association with the IMF and the World Bank to be able to service their debt and to stabilize their economies. These adjustments were, however, made at a high price: investment and output levels have fallen, domestic consumption and real wages have been compressed, and debtor governments have frequently financed their budgets through inflationary means. As a result, the 1980s has been a decade of lost growth [see Singer (1989)].

The cut-off of external finance and the need for transferring the debt service merely required two type of adjustments in the debtor economies (for further information, see Chapter Three):

a) external adjustment (external transfer problem);

b) internal adjustment (fiscal-budgetary problem).

The first one can be explained by the increased transfer of the resources from debtors to creditor countries in the 1980s. Aggregate net transfers from creditor countries to LDCs have been negative between 1984 and 1988 (see Table 2.3). Similarly, Figure 2.1 illustrates that the IMF has been a net recipient of money for six times in last seven years. As a result, it is no wonder that most of the years during the 1980s, capital have not flown to countries where it was relatively scarce! The second type of adjustment reflects the fiscal adjustment from private sector to the public one. This also requires budgetary balances of the public sector to be

maintained. In many debtor countries, especially those severely indebted ones, the required increase in the internal financing could not be managed without experiencing a serious macroeconomic crisis (for the basic macroeconomic indicators of the severely indebted countries, see Table 4.1).

Due to an overall consideration, a diagnosis of the debt crisis of the 1980s reveals three major reasons:²

a) initial excessive borrowing by debtor countries and domestic mismanagement;

b) initial overlending by banks that acted on the belief that sovereign debt need not meet ordinary banking tests and the persistent credit rationing strategy of the banks after 1982;

c) a sharp deterioration in the world economic environment with a fall in commodity prices, strengthening of the dollar until 1986, a record high interest rates, and a decline in demand for manufactured goods.

Although these major reasons are generally acknowledged by most researchers, they differ from each other when it comes to pointing out the core of the problem. Some observers especially focus on global macroeconomic considerations such as the oil price shocks and the global recession. For them, unfavourable world economic environment played the major role for the debt crisis to occur [for good representative examples, see, esp. Cline (1983, 1984, 1985)]. Their prediction was that the problems of the early 1980s were temporary and the results of a transitory liquidity crisis. Accordingly, they evaluated the problem as an "illiquidity", and thus rescheduling and new loans would be expected to solve the problem because of its short-run character.

²Although there are quite a few reviews on the causes and the origins of the debt problem of the 1980s, see esp. Cuddington (1989), Dornbusch (1993, Part IV), Sachs (1989b, 1989c).
Some other investigators, however, believe that the nature of the problem is "insolvency" rather than "illiquidity" [see, e.g., Cohen, B. (1989a), Furtado (1989), Hellwig (1986), Sachs (1989a, 1989b)]. Sachs (1989b), for instance, in evaluating Cline's prediction (1984), stresses the misplaced emphasis in Cline's model on external factors, and the neglect of the internal economic effects of the external debt crisis. Thus, debt reduction and restructuring are the more likely answers to the problem rather than rescheduling. According to this view, the debtor countries do not repay their debt just because they are not "able-to-pay".

Others, in tradition of Eaton and Gersovitz (1981a), assess the issue as a problem of "willingness-to-pay", rather than ability-to-pay [see also Eaton and Gersovitz (1981b), Eaton *et al.* (1986), Mohr (1991)]. That is, a debtor may choose not to repay its debt even though it is able-to-pay. Under this scenario, a debtor country will compare the perceived costs and benefits associated with the repayment.

Country-specific factors are also taken into account by some researchers [see, e.g., Krueger (1992)]. To their views, country-specific factors were decisive in determining which countries escaped the debt crisis which could not.³

³In this context, it is often the case that two groups of countries are compared: Latin American countries such as Mexico, Brazil, and Argentina as examples of failure and South-East Asian Countries such as Korea, and Taiwan as examples of success.

Table 2.3 LDC External Debt, 1981-90 (US\$ billions)

Category	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total Debt ⁴	668	760	826	862	966	1.062	1.194	1,182	1.199	1.281
ANT(long-term) ^b	46.5	29.2	13.6	-0.2	-4.6	-7.3	-12.4	-5.8	4.0	16.0

^a Countries reporting to World Bank Debtor System (DRS) and World Bank estimates. Debt includes officially supported export credit.
 ^b Aggregate net transfers (long-term) to LDCs. This equals aggregate net resource flows less interest payments.
 Source: World Bank (1991), World Debt Tables, 1991/92.

Table 2.4 A Comparison of Some External Debt Ratios: Turkey, SICs and LMICs

	Total Debt to Exports of Goods and Serv. Ratio [®] (1990)	Total Debt t GNP Ratio (1990)	o Debt Service Ratio ^b (1990)	Interest Paym. to Exports of Goods and Serv. Ratio ⁴ (1990)
Turkey	195	46.1	28.2	11.3
SIC°	273	46.4	25.3	11.8
LMICª	179	53.3	20.3	8.4

" including workers' remittances

and services ratio ° severely indebted countries ⁴ lower-middle income countries **Sources:** World Bank, World Development Report (1992) and various issues; State Planning Organisation Statistics.

Figure 2.1 IMF LENDING Loans Outstanding, August 1992 (SDR in billions)

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CONTENT CN FIGURE 21 Except 1991, IMF has been a net recipient of credit for the last seven years.Lending by IMF decreased sharply to an annual rate of SDR4.2 billion (\$6 billion) during the first eight months of 1992. This implies a 43% fall from 1991 (SDR7.4 to SDR4.2 billion).

* First eight months of 1992 at annual rate.

Sources: IMF and The Economist (1992, October, 24th-30th, p.154).

2.3. Official Strategy, Proposed Solutions and Prospect for Future

Since the emergence of the crises in 1982 to date, there have been different official strategies imposed by the relevant international institutions during different time periods. In what follows, the major characteristics of the three periods are summarized [Husain and Diwan (1989b, p.4)]:

- a) first period (1982-1985);
- b) second period the Baker Plan (1986-1988);
- c) third period the Brady Plan (1989 to date).

The first period is characterized by the new money with conditionality by the relevant international financial institutions. Involuntary lending has been in process. The main aim was to prevent the world financial system from collapsing.

The Baker Plan rejected write-offs and debt reduction strategy. Instead, it encouraged new lending to debtor countries and called for major structural economic reforms in debtor economies in exchange for this financing. In that sense, the Baker Plan viewed the debt crises mainly as a "liquidity" crises and endorsed rescheduling rather than relieving. Concerted "involuntary" lending has stayed as the main feature of the lending strategy also during the Baker Plan years same as the years 1982 to 1985. However, the official strategy endorsing the concerted lending have not worked for satisfactorily. To be more specific, collective action failure of the commercial banks due to "free-rider"⁴ problem prevented the official strategy from working efficiently. As a result, with the breakdown of involuntary lending, the attention has shifted to debt reduction.

The Brady Plan may be characterized as all of the foregoing plus official

⁴For further information, see pp. 27-8.

support and funding for debt reduction. The Brady Plan, in general terms, is a series of measures to encourage commercial banks to exchange debt either for cash or for secure liquid assets on better terms. Presumably, the most important difference between the Brady and the Baker Plans is that the need for debt reduction is recognized only by the Brady Plan. Within the Brady Plan, the debt reduction and the debt relief strategies have the official support of the IMF and the World Bank, as long as it goes hand in hand with robust adjustment policies. Progress since 1989 have shown that the Brady Plan has been slow to get going although it may be early to judge. Nevertheless, Figure 2.2 illustrates that compared to the average of SIMICs (i.e. "severely indebted middle-income countries" according to the World Bank classification) the Brady Countries have shown better performance in the secondary market between 1988 and 1991. This suggests that the creditworthiness of the Brady Countries have increased slightly. In short, there has been three important developments since 1989 as far as the debt reduction operations are concerned. First, since the announcement of the Brady Initiative in 1989, five countries-Costa Rica, Mexico, the Philippines, Uruguay, and Venezuela- have now completed debt reduction operations, which has resulted in total debt reduction of about US\$ 20 billion (or a quarter) of their commercial bank debt. Second, a small but relatively important group of heavily indebted middle income countries (i.e. Chile, Mexico and Venezuela) has emerged from debt reduction operations with renewed access the private credit markets. Third, two lower middle income countries (i.e. Egypt and Poland) have been granted very substantial and exceptional debt forgiveness, amounting to 50 per cent in net present value terms, by official bilateral creditors (the so-called Paris Club creditors) due to political as well as economical reasons. The evidence for Mexico, Chile, and Venezuela suggest that the major benefit of the debt reduction packages has not been the reduction in net external transfers on the existing commercial debt, but rather an increase in private investor confidence (both domestic and foreign), and a resulting renewed access to private external credit markets [see World Bank (1991)].

A recent evidence on the macroeconomic impact of Mexico's Brady deal by Claessens et al. (1994) suggest that the likely impact of debt service relief can be much larger than the magnitude of the relief and the subsequent effects. The secondary effects on private investment through reduced future policy uncertainty are likely to be more important than the direct amount of the relief itself. In other words, they conclude that the impact of debt relief on uncertainty is the most important channel through which debt relief influences the macroeconomy. Clark (1993) concludes that, designed to address the shortcomings of the earlier official strategies, the Brady approach has achieved impressive results. Although the Brady restructuring did not achieve remarkably more cash flow relief for debtors than the previous approach, they did provide a more stable long-run financial framework that, together with structural reforms by debtors and a favourable environment of lower global interest rates, helped to restore market access. Clark also warns that debt service obligations still remain heavy for the Brady countries. While the restoration of credit market access is helpful, the key to sustained growth and creditworthiness continues to be sensible and stable macroeconomic policies complemented where needed with further structural reforms.

On the other hand, the external debt burdens of a large number of poorest LDCs remain pretty high (see Table 2.5). In this regard, further official action is urgently needed to restore their creditworthiness at the private credit markets. There has actually been two important initiatives to date. First, the call made by the Group of Seven (G-7) summit in July 1991 for additional debt relief beyond the Toronto terms for the poorest countries. Second, implementation of the so-called

Trinidad terms, which grants two-thirds debt reduction for those heavily indebted poorest countries, would result in a promising prospect for many of them [see World Bank (1991)].

Quite a few researchers support the idea that a debt reduction can raise economic efficiency in a debtor country.⁵ In effect, this increases the debtor's real income, reducing the probability of default. In some situations, creditors as well as debtors would be better off with the implementation of debt reduction strategy. The idea is actually based on the fact that the attempt of the debtor countries to service their foreign debts in the 1980s have created substantial domestic pressures that eventually brought down investment and the growth rate of the debtor economies.

In the LDC foreign debt literature, this negative correlation between foreign debt and growth rate is known as the "debt overhang"⁶ problem. It is best explained by analogy with the famous Laffer Curve. The Laffer Curve suggests that governments may sometimes increase tax revenue by reducing tax rates. By analogy, creditors in the international debt market may increase expected payment by forgiving a part of a country's foreign debt. The argument is that many severely indebted countries are on the wrong side (downward) of the " Debt Relief Laffer Curve" (see Figure 2.3).⁷

As regards Figure 2.3, If the foreign debt levels exceed point A, a debt reduction will provide the required incentive to encourage indebted countries to fulfil their remaining debt obligations. This also implies a raise of the present value of expected future debt service. A relevant question is whether the most debtors (or some of them) are on the wrong side of the Debt Relief Laffer Curve or not. If the

⁹For evaluation of alternative solutions to LDC debt problems, see, among others, Corden and Dooley (1989), Dornbusch (1993, Part IV), Dornbusch *et al.* (eds.) (1989), Husain and Diwan (eds.) (1989a), Rogoff (1990).

^{&#}x27;For the original ideas, see Krugman (1988), Sachs (1989a).

⁷For some estimates of the Debt Laffer Curve, see Claessens (1990), Cohen, D. (1989, 1991).

answer is "yes", a debt reduction is said to be mutually beneficial to both debtors and creditors.

Over the years 1983-90, the SIMICs transferred about 3 percent of their GDP to their creditors instead of repudiation [Cohen, D. (1994, p.489)]. This can give us a general idea about the likely value of the cost of debt repudiation. Recent evidence by Cohen, D. (1993) suggests that the actual service of the external debt crowded out investment. For the rescheduling countries, he shows that 1 percent of GDP paid abroad reduced domestic investment by 0.3 percent of GDP. In his very recent paper, Afxentiou (1993) examines the Granger causality between GNP growth and foreign indebtness⁸ in middle-income LDCs over the period 1971-88. The evidence for an external debt overhang is found to be stronger in two out of four cases when debt service and interest service ratios are used as indicators of indebtness. It is also pointed out that the results would have been statistically stronger if several countries had not rescheduled their debts. Based on the results, which indirectly point to an overall mismanagement of foreign resources by borrowing countries, Afxentiou concludes that a valid argument can be made for country-specific writedowns of debt.

As examined in detail in the relevant literature, there are still two main difficulties which jeopardise the stability and the effectiveness of the foreign debt market, and thus the success chance of the debt reduction strategy:

a) free-rider problem (collective action failure of the commercial banks),

b) enforcement problem of the contract.

First, in order to get the best of a debt relief strategy, a coordinated policy

[§]Four different types of ratios of indebtness are used in the study: a) Debt service/exports, b) interest payment/exports, c) interest payment/GNP, and d) debt service/GNP.

response by creditors is needed. However, it is quite likely that they fail to do sobecause of a free-rider problem: i.e. each bank is better off if all others continue lending to debtor countries while it lends nothing or reduces its loans. That is to say, each has an incentive to take a free-ride on the continued lending of other banks. As a result, no new lending occurs. Apparently, this is a collective market failure for which economic theory recommends an intervention to the market. This might be viewed as the starting point of the need for an independent international institution to overcome the difficulty mentioned.⁹

The second problem is the enforcement of the international debt contract. Since international debt is "sovereign debt", there is no effective legal mechanism which forces repaying.¹⁰ Countries are not subject to bankruptcy laws. That's why, lenders want to be sure that the debt will be repaid.

The need to overcome the difficulties of free-rider and enforcement problems made it possible to organize a symposium about new institutions for LDC debt in 1990.¹¹ The possible role of these institutions would be to facilitate negotiations between creditors and debtors on a fair and equitable ground [Cohen, B. (1989a and 1989b)]. Sachs (1990) and Kenen (1990) suggest the creation of a new international lending institution to buy up deeply-discounted LDC debt and pass the discounts on to troubled middle income debtors. Kenen (1990), especially, notes that this new institution would issue its own long-term obligations to commercial banks in exchange for their claims on debtor countries. Eaton (1990), however, emphasizes

⁹Cohen, B. (1989a, 1989b) give detailed accounts of why official intervention may be needed. ¹⁰However, this does not imply that a default decision has no cost. In practice, during the 1980s, the cost of default, which may include seizure of assets, exclusion from future borrowing, reduction of the gains from international trade, decline in the trustworthy reputation and retaliation by creditor governments, has <u>often</u> been high enough to prevent debtors from defaulting.

¹¹It was called "Symposium on New Institutions for Developing Country Debt". The authors in this symposium discussed whether new institutions were needed for dealing with the LDCs' debt problem. For the papers presented in the seminar, see Bulow and Rogoff (1990), Eaton (1990), Kenen (1990), Rogoff (1990), Sachs (1990).

that adding a new international organization will not itself do much to improve the present situation mainly due to contract enforcement problem.

Despite all these recommendations and other serious efforts, a new institution to deal with the LDC debt problem has yet to be established.

This brief overview shows that more than a decade after Mexico's financial collapse, the external debt problem is far from over. The total external debt of LDCs came from 100 billion dollars in the early 1970s to the trillion-dollar mark by the end of the 1980s. In 1990, the total debt was 1.2 trillion-dollar (see Table 2.3 and Table 2.4). Debt/exports ratio has worsened (see Table 2.5, esp. those LDCs with debt-servicing difficulties) and debt service ratio still remains as high as %30 for countries with debt-servicing difficulties (see Table 2.5). Table 2.5 also suggests that the external debt indicators of the SILICs are especially worrying, since they have worsened substantially during the 1980s. This should be the main reason that adjustment problems are likely to be most pronounced in low-income (mostly African) countries where supply-side weaknesses are often fundamental. Bird (1992), among many others, suggests that if a serious step is to be taken to prevent further declines in the living standards of the SILICs, more debt relief will have to be provided by the governments of richer countries. This especially seems to be the case since it is in the poorer primary product producing economies that the terms of trade have declined most remarkably.

So far the debtor countries have generally been reluctant to invoke total repudiation because of its high cost. Instead, they have been willing to get rescheduling. Secondary market¹² prices for various debtors are shown in Figure 2.2. Clearly, it illustrates that many debtor countries sell their debts at large discounts, reflecting the creditors' belief that debtors are not likely to meet their

¹²It is a market in which LDC external debt can be transferred to banks or other institutions.

obligations in full.

Due to overall evaluation of the LDC debt problem, concluding remarks and prospects for the future may be put as in the following:¹³

a) there is little evidence to suggest that the LDC debt problem is over;

b) the good news is that (perhaps the only good news!) after years of steady decline in the exposure ratios of the heavily exposed banks, the threat of a widespread banking crisis is not existent now due to a strengthened balance sheets of the banks;

c) the bad news is that the debt strategy pursued during the 1980s, combining rescheduling with economic adjustment in the debtor economies, has mainly failed and most of the indebted countries still continue to stagnate under the burden of their outstanding debt obligations; in this regard, the Brady Plan has been very slow to get going;

d) a new independent international institution to deal with the problem has yet to be established;

e) the loss of interest in the subject in the early 1990s will presumably make the required changes less likely;

f) if further relief for especially SIMICs is not provided it is likely that the probability of default will increase or, more likely, the 1990s will be another "lost decade" similar to those 1980s for the severely indebted countries;

g) widespread recession effects the industrialized world in the early 1990 and unless the recovery is forthcoming soon, it would create additional problems for the LDC debtors.

¹³For the prospects of future of the international capital markets, see, e.g., IMF (1991).

Table 2.5 Some External Debt Indicators' of Indebted LDCs, 1985-91

Country Group	Share of 1990 total debt	<u>Debt</u> 1985	-expc 1987	ort r 1989	<u>ratio</u> 9 1991	<u>Debt</u> 1985	<u>serv</u> 1987	ice 1989	<u>ratio</u> 1991
All DCs ^b	100.0	209	228	185	176	30	29	24	21
Without DSD°	18.1	108	92	71	69	21	21	14	12
With DSD°	81.9	270	338	280	275	35	35	32	30
Severely Indebte	ed 52.4	295	394	328	309	38	37	34	30
Middle-income	39.5	288	366	296	280	40	40	34	30
Low-income	12.9	321	521	480	442	31	24	30	31
Moderately Indep	ot. 29.5	228	261	219	233	30	33	29	30

^a Debt indicators are based on total external debt (long-term debt, short-term debt, and use of IMF credit) and associated payments of debt service.
 ^b LDCs reporting to the World Bank Debtor Reporting System (DRS).
 ^c DSD: Debt-servicing difficulties.
 Source: World Bank (1991), World Debt Tables, 1991/92.



Figure 2.2 SECONDARY MARKET PRICES FOR SOME SELECTED COUNTRIES^a (Percentage of par)

Source: World Bank, World Debt Tables, 1991-92

a Varying secondary market prices in the Figure reflect varying perceptions of creditworthiness.

Figure 2.3 The Debt Relief Laffer Curve



2.4. Turkey's Foreign Debt Problem: Origins, Dimensions and Characteristics

Foreign debt phenomenon is not a new issue for Turks. The Ottoman state incurred a large foreign debt in the 1854-1914 period. 15 loan agreements amounting to 220 million British pounds were made, mainly to finance budget deficits, convert internal liabilities to external liabilities and pay back old loans. From 1860s onward, the foreign debt burden increased rapidly. In 1860, the state defaulted on its foreign debt and in 1881 the Public Debt Administration (PDA) was established by which Europeans directly administrated and collected some part of the tax revenues to service the foreign debt. As Kiray (1990) notes, 26 more loans amounting 93 million British pounds were issued for consolidation, conversion, repayment of old loans and for financing railroads. Most of these loans were administrated by the PDA. Perhaps, the most interesting aspect is that the final repayment on the Ottoman debt of the 1854-1914 period was made by Turkey in 1954 - just a century after the first loan.¹⁴

The Republic of Turkey experienced a debt crisis in 1978 unlike those Latin American countries faced the crisis in 1982, and rescheduled a large amount of its external debt between 1978 and 1980. As a matter of fact, the debt crisis of Turkey was the first major crisis to surface. The important point here is that by the time the external debt of the LDCs became widely known issue in 1982, Turkey had already re-entered the international credit markets and commonly acknowledged as a "success story" [see, among others, Riedel (1991), Baysan and Blitzer (1991), Krueger (1992)]. In this respect, some researchers see Turkey as a typical Baker

¹⁴For a comparison of the 1980s with the 1860s, see Kiray (1990). For Ottoman external debts, see also Boratav (1988), Issawi (1966), Kiray (1987), Pamuk (1984).

Plan example before the Baker Plan [see, e.g., Aricanli and Rodrik (1990b)].¹⁵

Due to the 1980 policy reform program, Turkish economic performance improved considerably during the worldwide recession of the early 1980s. The country has frequently been referred to as an example for other debtor countries. For instance, according to Krueger (1992), the Turkish economic reform program must be judged already to have been reasonably successful.

Broadly speaking, the Turkish debt crisis can be attributed to both external and internal factors, although internal developments were more to blame. The sharp rise in oil prices after 1973 (i.e. first and second oil shocks) and the subsequent increase of other major import prices deteriorated Turkey's terms of trade (see Figure 2.4).¹⁶

Unlike many other oil-importing LDCs, Turkey stepped up its economic growth after the oil price shock instead of curbing it. Inward-looking growth strategy has been continued and increasing utilization of external debt has been followed during the 1970s. As a result, Turkey's import requirements were almost tripled between 1973 and 1977 without any remarkable increase on its exports. In the meantime, the country's exchange rate remained fixed in nominal terms. Moreover, continuation of an expansive fiscal and monetary policy resulted in substantial budget deficits. Simultaneously, the inflation rate accelerated sharply

¹⁵There is a wide range of literature on the debt crisis of Turkey and its aftermath. See, esp., Aricanli and Rodrik (eds.) (1990a), Celasun and Rodrik (1989a, 1989b), Ceyhun (1992), Kazgan (1988), Lavy and Rapoport (1992), Rodrik (1988), TUSIAD (1987), van Wijnbergen (1990), van Wijnbergen *et al.* (1992), World Bank (1990).

¹⁶Potential terms of decline, export instability and infant industries have been main arguments in the literature for intervention and import protection. For a comprehensive evaluation on trade as a source of enrichment or impoverishment, see Greenaway and Milner (1993, esp. Chapter Three). Bleaney and Greenaway (1993) confirms the long-run terms of trade decline with a smaller time trend. However, they argue that [see also Greenaway and Milner (1993, p.54)] even if a long-run terms of trade decline is found, its welfare implications are not clear for some reasons: at the simplest, many price indices are in aggregate form. Even if they are in disaggregated form, quality changes are not taken into account. The evidence is at best inconclusive. Analogously, our terms of trade of Turkey in Figure 2.4 are in aggregated form and does not take quality changes into consideration; thus, needs cautious evaluation.

reaching triple digits by the end of the 1970s. Two thirds of the total budget deficit between 1970 and 1979, were financed by the central bank resources.

In the 1970s, the exchange rate has often been adjusted only after considerable lags. Not surprisingly, the result was a remarkable overvaluation of the Turkish Lira, and thus falling export earnings. Briefly, exports and workers' remittances stagnated while imports continued to go up. This process again fed back on remittances negatively owing to the overvalued Turkish Lira which discouraged theirs inflow. In order to finance the current account deficits, a plan came into effect whereby Turkish companies provided short-term debts from European banks under the Turkish government's exchange rate guarantee. In Aricanli and Rodrik's (1990b, p.1344) words: "...This proved to be a highly destabilizing policy, as it not only subsidized foreign borrowing, but did so at an increasing rate as the overvaluation of the currency progressively worsened...".

As Wolff (1987, page i of the summary) put it: "...Given its relatively favourable starting position in the early 1970s, Turkey would have been quite capable of at least partly absorbing these external shocks. However, the lack of continuity in the economic policy pursued by successive coalition governments, the lack of consensus among the fragmented interest groups over the course Turkey should follow in its development and the inertia of a bureaucracy that was traditionally etatist¹⁷ and inward-oriented in its thinking prevented the economic policy from reacting appropriately to changed world economic conditions...".

The increasing domestic absorption of resources after 1973 resulted in very rapid growth in the external debt from about 3 billion US dollar in 1973 to about 15 billion US dollar in 1978. In fact, the country's unfavourable foreign debt

 $^{^{\}rm 17}{\rm In}$ short, the 'etatism' refers to the 'state-led industrialisation'. For more information on the Turkish experience, see Chapter Four.

structure was the main cause for the inability to meet its external obligations: in 1977, over half of its external debt was a short-term one which amounted to three times of its export earnings. In due course, Turkey experienced a debt crisis in 1978 and rescheduled its debt between 1978 and 1980.¹⁸

Finally, an international rescue operation was launched to end the crisis. The attitudes of the creditor countries were, on this specific case, mainly determined by their political interests rather than economical since Turkey, at a time, was not very significant for both OECD and EC countries in terms of foreign trade level, foreign direct investment level and also as a raw materials supplier. The main factor was Turkey's political and geopolitical importance as a member of NATO.¹⁹ The main participants in the rescue operation were the IMF, the World Bank, and OECD's Turkey consortium. The commercial banks were also willing to reschedule the external debt conditional on the stand-by agreement being reached with the IMF. However, they also made it clear that further new loans were not going to be provided for the time being.

Two devaluations and stabilization packages were already announced and implemented. However, both were unsuccessful. Due to the overall failure of the economy, inflation continued to accelerate, and the global economic situation worsened.²⁰

A turning point in Turkish economic policy came in January, 1980. At the time, the government announced an economic reform program, after several

¹⁸For details of the rescheduling agreements of Turkey, see, e.g., Hardy (1982).

¹⁹At the time, the cold war was not over. First, Iranian Revolution and afterwards Iran-Irak War worried the NATO members and increased Turkey's political and geopolitical importance.

²⁰There were also some serious political difficulties in the late 1970s which led to military takeover in 1980. The existence of a military administration (in the sense of political autonomy) between 1980 and 1983 worked in favour of the Reform Program. Implementation of austerity policies in this favourable environment with no political opposition have, no doubt, encouraged the Reform Program.

unsuccessful attempts in 1978-1979 and two failed IMF programs. Inward-looking ISI strategy was replaced by an outward-oriented growth strategy based on export promotion (ELG) (for details, see Chapter Four).

Let us now briefly articulate some factors which play important role in building, shaping and managing external debt strategies. Overall, three major factors appear to be essential to building, shaping and managing external debt strategies.²¹ First, the noninterest current account (NICA) is the fundamental measure of the net transfer of resources between a borrowing country and the rest of the world. It naturally equals the difference between total expenditure (net of interest payments on external debt) and nationally generated income. As long as there is a surplus on the NICA, external borrowing will be less than the interest paid to foreigners; in other words, the growth in external borrowing will be less than the rate of interest, and this will imply a net transfer of resources to the rest of the world. The opposite will occur when there is a deficit on the NICA. In this case, the external debt will grow faster than the rate of interest, which will, in due course, lead to insolvency. The second factor is to do with the real interest rates paid on external debt. For instance, if the real interest rate exceeds (falls short of) the growth rate of the economy, the debt/output ratio will rise (fall) if the NICA is zero. Accordingly, if real interest rate exceed the growth rate by a significant margin, there will be some contribution to increase the debt/output ratio; the room for a NICA deficit will be limited accordingly. The third factor measures the capital loss a country faces on its external debt when the exchange rate depreciates in real terms. Exchange rate developments can happen both between the borrower and its trading partners (the

²¹In formulating an external debt management strategy, Cohen, D. (1988b) points out four policy recommendations: a) stretch out the repayment of debt; b) monitor both exports and GDP; c) ignore the capital loss of the creditors; and d) watch the domestic deficit. The aim of his recommendations is the maximization of the intertemporal welfare of the country under the constraint that the debt is serviced. For a review of external debt strategies, see, e.g., Corden and Dooley (1989).

real exchange rate) and between the country's trading partners and the creditors themselves (the cross-currency exchange rates). An increase in the debt/output ratio can be attributed to these three factors [for more details of the issue, see, e.g., van Wijnbergen *et al.* (1992, esp. Chapter One), and references therein]. Accordingly, an external debt strategy involves making choices in two areas: how to accomplish a sustainable ratio of external debt/output ratio and the role of the real exchange rate. The first choice is between two means of restraining the debt/output ratio: a) transfer net resources to creditors through sufficiently high surpluses on the NICA; b) follow a policy of high growth of output (high growth slows the extent to which external debt feeds on itself through escalating debt service costs. The second choice determining an external debt strategy is concerned with the role of the real exchange rate. A real depreciation of the currency raises the debt/output ratio but lowers the ratio of debt/exports.

As far as the first choice is concerned, Turkey had a much lower surplus on its NICA than especially the severely indebted countries (SICs) of Latin America had after their respective debt crises. Turkey's debt/output ratio followed a path similar to that of the SIC, not because the surpluses on its NICA were large, but because its output growth was high (5.2 percent annual average growth rate in the 1980s). This is why Turkey's external debt strategy is referred to as "growth-oriented debt strategy" in the literature [see, e.g., van Wijnbergen *et al.* (1992, p.160)]. This is where Turkey differs most from the SICs. However, even in Turkey, where output has grown much faster than in most SICs, real interest rates on external debt have been (in average) below the growth rate of the economy (esp. in the first half of the 1980s). Besides, by debt/exports ratio measure, Turkey has been much more successful than the SICs. Turkey was the only debtor country whose debt/exports ratio fell after 1980 (see Tables 2.4 and 2.5). The empirical

analysis presented in Chapter Six of this thesis shows that the depreciation of the real exchange rate was a major factor contributing the success of Turkey's export drive in the 1980s. The counterpart to this real depreciation of the Turkish Lira, however, was a substantial capital loss on Turkey's external debt.²² This loss contributed remarkably to the increase in the debt/output ratio.23 As known, a real devaluation causes a capital loss on external debt, and thus reduces national wealth. Higher exports cannot reverse this, but increased export-orientation eases access to foreign credit markets. Turkey most probably would not have had the access to external credit markets that it had if the reform program implemented since 1980 had not produced successful export performance. In brief, Turkey successfully reached a balance between external restraint and continued output growth. The country adopted a growth-oriented external debt strategy rather than sustaining high surpluses on its NICA to keep the debt/output ratio in check. The internal policies that formed the counterpart to this external debt strategy, however, give some reason for concern. Sustainability of the current fiscal policy is thus an issue in Turkey [see van Wijnbergen (1990).

One of the questions van Wijnbergen *et al.* (1992) raise and try to answer is that whether the external balance and the output growth of Turkey be reconciled, or whether there is a conflict between them [see also Anand *et al.* (1990, pp.157-182)]. Their projections illustrate the need for additional external borrowing coupled with adjustments in fiscal policy to restore consistency with a growth-oriented debt strategy. There are simply two alternatives of external

²²As Buiter (1990a, p.433) put it: "...This confronts debtor countries with the unpleasant dilemma that they must achieve an improved level of competitiveness in order to generate the trade surpluses required to service their debt, while the very process of improving their competitiveness increases the real burden of that debt...".

²³According to calculations of van Wijnbergen *et al.* (1992), between 1980 and 1986, the capital loss accounted for more than half of the increase in the debt/output ratio.

financing (i.e., no external funds are forthcoming). First, a decrease in output growth if the public sector manages adjusting to slumped external financing or, second, shifting the burden of adjustment to the private sector by issuing more internal debt rather than by adjusting its fiscal deficits would result in macroeconomic instability. That is, external restraint comes at the very high cost of lost GDP growth. Both van Wijnbergen et al. (1992) and Anand et al. (1990) come to the conclusion that the secondary market indicators of Turkey's external debt, suggest that its outstanding external debt does not jeopardize Turkey's creditworthiness at current levels or at higher anticipated levels. Fiscal adjustment is essential to keep consistency with inflation and other macroeconomic targets. However, going for tighter external policies (i.e. less new foreign borrowing) does not seem necessary and might be highly jeopardizing to the country's prospects of output growth and fiscal balance. This sounds realistic since Turkey has already entered (in the second half of the 1980s) a period of remarkably increased external debt repayment obligations. Furthermore, since the amortization of rescheduled debt is occurring at a fast pace, this may easily lead to a liquidity problem if the additional external financing is not forthcoming due to a loss of confidence of the foreign creditors based on the possible deterioration of the fiscal balances.²⁴

Turkey is one of the few countries that managed to maintain high GNP growth after rescheduling their debts in a rather unfavourable global economic environment of the 1980s. Its real GNP grew by 5.2 per cent on average between 1981 and 1990. The country has now gone through more than ten years of uninterrupted debt service which kept the secondary market discounts on its foreign

²⁴It may be useful to remind the reader at this stage that here in this study (in both the empirical and the theoretical sections) we wish to evaluate the nation's ability-to-pay not the government's as far as the concepts of solvency and creditworthiness are concerned. However, this does not imply that we totally ignore the importance of government. On the contrary, we stress the importance of fiscal adjustment as well as external one when the whole economy matters.

debt only 2-3 per cent for the late 1980s. It is by its interrupted debt service that Turkey set its record apart from those severely indebted countries. In addition, its remarkable success on the export growth and on the reorientation of the economy toward a market driven system are worth mentioning as the main aspects why Turkey enjoys considerably positive rating in the international credit markets. Furthermore, Turkey's rejection of any thoughts of calling for an additional rescheduling has also been welcomed by the markets. There are, however, some question marks on whether continued export performance on its own will be sufficient to sustain external debt service since the external transfer problem and the budgetary problem are linked with each other. In Machlup's (1976, p.416) words: "...either both problems are solved or neither...". The substitution of domestic debt for foreign debt would worsen the budgetary position of the government provided that the domestic real interest exceeds the foreign real interest rate corrected for real exchange rate depreciation [Buiter (1990a)]. In evaluating the foreign debt of an indebted nation, Cohen, D. (1987, 1991) also points out the importance of the domestic debt (i.e. a secondary burden) together with the external debt. Since the external debt is, in most cases, government debt, domestic taxes must be raised in order to repay it. By analogy with Buiter's (1990a) statement, Cohen, D. (1987, 1991) also agrees that if the budgetary problem cannot be solved properly, domestic debt will simply replace external debt and this process, if pushed too far and too fast, may seriously damage the economy. D. Cohen concludes that in 1985, Brazil reached the point where repaying more external debt became potentially extremely damaging to its domestic economy and became counterproductive. Similarly, there is some evidence that Turkey have in recent years pursued such a strategy [see Buiter (1990a), Anand and van Wijnbergen (1988, 1989), Aricanli and Rodrik (1990b)]. It is, however, important to note that here in this thesis it is our aim to assess only the external solvency aspects of the foreign debt of Turkey but not the internal debt and solvency aspects. Thus, our empirical results on external solvency of the Turkish economy (see Chapter Seven) would need cautious evaluation when both the external and internal debt are taken into account.

A considerable amount of external adjustment has apparently taken place since the crisis of 1978-1980. First, the noninterest current account, the fundamental measure of the net transfer of resources between Turkey and the rest of the world [i.e. measure of a country's external (im)balance], has been positive, i.e., a surplus, every year after 1981 (except 1983). This is especially true in the late 1980s (see Table 2.6). However, Turkey had a lower noninterest current account surplus as a percentage of GNP than severely indebted countries in general did after their debt crises (-0.25 per cent of GNP for Turkey between 1980 and 1986 compared with an average 2.6 per cent between 1982 and 1986 for the severely indebted countries). However, the debt/GDP ratio has not risen more rapidly in Turkey than in the severely indebted countries. A reasonable explanation of this inconsistency might be that Turkey managed to sustain much higher growth rate in the 1980s.

Turkey's total external debt, in the 1980s, appear to have risen much faster than one would expect from the current account indicators alone. One possible answer would be Turkey's real exchange rate depreciation over the period. van Wijnbergen *et al.* (1992) note that capital losses on Turkey's external debt which explain more than half of the increase in the debt/GDP ratio can be attributed this factor alone. The total debt which rose from about 19 billion US\$ in 1980 to about 49 billion US\$ in 1990, can be explained by the continuity of the new loan arrangements on the one hand, and the real exchange depreciations of the Turkish Lira on the other (for the external debt indicators of Turkey, see Table 2.4, Table 2.6 and Table 7.1). Apparently, with a real depreciation, the debt/GDP ratio will increase for a given value of the real debt (in foreign goods) and real GNP.

The level of real interest rates also affects the burden of foreign debt of an indebted nation. Higher real interest rates refer to more serious foreign debt burden. One of the reasons for Turkey's worsening foreign debt indicators during the second part of the 1980s is that the real interest rates on its foreign debt rose from 3-4 per cent in average in the early 1980s to 6-8 per cent in the late 1980s. In addition, 1985 and 1986 are the years in which Turkey began to repay its debt to the creditors. Thus, relatively high real interest rates and the beginning of the repayment process in the second half of the 1980s had negative effects.²⁵

Although Turkey is classified as a moderately indebted middle income country by the World Bank, its external debt indicators are in line with the ones of those severely indebted countries except the debt/exports ratio. According to 1990 figures (see Table 2.4), its debt/GDP and interest payments/exports ratios are nearly the same. Its debt service ratio is even higher than the average of the severely indebted countries (SICs). The short-term debt/total debt ratio rose from 13 per cent in 1980 to about 20 per cent in 1990. This might be an indication of some future payment difficulties if the process continues in the same direction. In that respect, it is worth noting again that in 1977, just a step before the debt crisis of 1978, over half of the country's external debt was a short-term debt which amounted to three times of its export earnings. The good news is that, due to a remarkable increase of exports in the 1980s, debt/exports ratio shows a better position compared to the average of the SICs. To overall consideration, what Table 2.4, Table 2.6 and Table 7.1 suggest is that the external debt burden still remains high for Turkey. Whether

²⁵In a recent paper on SICs, Demirguc-Kunt and Detragiache (1994) suggests that evaluation of SICs policy response to the debt crisis should place <u>more</u> emphasis (compared to some other factors such as the currency composition and the fixed or floating nature of the debt) on the different burden of interest payments that countries had to bear.

or not the country is still solvent will be one of the contributions of this thesis (see Chapter Seven).

There is also some evidence in the literature that Turkey, as an indebted nation, is suffering from a "debt overhang" problem. Cohen, D. (1989, 1991) estimate the elasticities of the price of the foreign debt for different indebted countries in order to understand the impact of a debt write-off (i.e., an empirical estimate of the debt-laffer curve argument). His findings show that at the 95% degree of confidence, from the group of highly indebted countries, only Turkey and Colombia could benefit from a write-off. Similarly, Bauernfreund (1989) estimates the debt overhang impediment to Turkish economic growth, and his related conclusions are the following:

a) the burden of foreign debt to the Turkish economy goes beyond the direct burden as traditionally measured by the amount of debt servicing obligations;

b) foreign debt obligations reduce investment levels;

c) the cost of the external debt raised from capital taxation, in 1985, represents forgone output growth of six percentage points.

A World Bank Country Study on Turkey [World Bank (1990)] states that the presence of a very little discount at the secondary market on Turkey's external debt makes it quite unlikely to realize the options of a debt reduction strategy (partial write-off, debt-equity swaps or any other). The study notes that (pp.124-125): "...Again, under the Brady Plan List, Turkey is not considered to be in need of debt reduction measures, on account of its more favourable outlook generally. Also, its external debt is not traded at much of a discount. Debt reduction schemes make little sense in this case. Turkey should not want its debt to trade at a discount, as this affects market confidence, and therefore the ability to raise voluntary borrowing ... ".

Even though the World Bank Report suggests that Turkey is not in need of debt reduction measures, as mentioned above, there is some evidence of literature that recognize Turkey as a debtor suffering from "debt overhang" problem. Cohen, D. (1989, 1991) points out that Turkey can benefit from a partial debt write-off. During the 1980s, especially late 1980s, more money have flown out than the fresh loans have come in. According to World Debt Tables (1989/90 issue), net transfers (outflows) from 1982-88 totalled to \$3.1 billion. In other words, total exports plus external borrowing amounts to less than total imports plus debt service payments. This suggests that Turkey's external refinance requirements are still high. Taken altogether, this implies a dilemma for the country: It presumably needs a debt reduction scheme, but this would unlikely to reduce the discounts at the secondary market since the discount is already so little. However, if a debt reduction scheme is not implemented, then, this might also be costly for the country and the present situation could worsen provided that the present fiscal imbalances continues in the future. The country's high level of vulnerability to external shocks (i.e. very negative and unexpected events in world oil prices, world interest rates, and world trade) has also to be evaluated in the same direction. First, Turkey is an oil importer (generally speaking, four in five of the total oil consumption is imported each year). Second, a large and increasing part of Turkey's total external debt is of a floating interest rate character (i.e. variable rate debt or short term debt that is rolled over). It is worth noting that Turkey's floating rate debt as a percentage of total debt rose from 11 per cent in 1984 to 48.8 at the end of 1988.²⁶ Last but not the least, a probable future recession in the world trade might easily bring costly effects to the economy due to its outward-oriented character.

²⁶For the figures and an evaluation, see World Bank (1990).

Table 2.6 Turkey's External Debt Position, 1970-90, (millions of dollars)

VARIABLE	1970	1975	1980	1985	1987	1990
Total Debt Stock(EDT)	1,960	3,585	19,119	26,010	40,800	49,149
Total Debt Service(TDS) 170	262	1,607	4,574	5,957	7,102
Principal	158	157	750	2,615	3,493	3,758
Interest (INT)	12	105	857	1,959	2,464	3,344
Exports (XGS)*	1,049	3,330	5,743	13,131	16,538	25,205
Imports (MGS)*	1,150	5,103	9,251	14,414	17,713	29,086
CAB ^b	-44	-1,648	-3,408	-1,013	-806	-2,616
NICAB°	-32	-1,543	-2,551	946	1,658	728
GNP	12,574	35,785	55,801	51,476	66,218	106,100
Internat.Reserves(RES)	440	1,419	3,298	2,318	3,631	7,626
EDT/GNP (%)	15.6	10.0	34.3	50.5	61.6	46.3
TDS/GNP (%)	1.4	0.7	2.9	8.9	9.0	6.7
EDT/XGS (%)	186.8	107.7	332.9	198.1	246.7	195.0
TDS/XGS (%)	16.2	7.9	28.0	34.8	36.0	28.2
INT/XGS (%)	1.1	3.2	14.9	14.9	14.9	13.3
INT/GNP (%)	0.001	0.003	1.5	3.8	3.7	3.2
RES/EDT (%)	22.4	39.6	17.3	8.9	8.9	15.5
Short-term/EDT (%)			13.0	18.3	18.7	19.3
Average Maturity ^d	19.0	14.2	16.4	11.1	11.4	10.3
Interest on all loans(%) 3.6	7.1	8.3	8.6	7.0	8.9

^a Both goods and services.
^b Current account balance.
^c Noninterest current account balance.
^d For all loans (years).
Sources: OECD Economic Surveys: Turkey, various years; World Tables, 1988/89 and 1991 issues; World Debt Tables, 1988/89, 1989/90, and 1991/92 issues, vol.1&2.

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2.5. Discussion

There is little evidence to suggest that the external debt problem of LDCs is over. The Brady plan is slow to get going, and it is now too early to evaluate the full consequences of the Brady deals. However, recent evidence reveal results in favour of the deal especially in terms of achieving market access and reducing future uncertainty. The present situation urgently requires some effective solutions to overcome the fundamental problems of the sovereign debt, such as "enforcement" and "free-rider" problems. In this regard, creation of an independent international institution [in the lines of Cohen, B. (1989a, 1989b), Kenen (1990), and Sachs (1990)] to cure the present market failure is worth considering.

As regards Turkey, evidence suggests a dilemma. Its growth-oriented external debt strategy can be regarded as a success case due to uninterrupted repayment, decreasing debt/exports ratio, and high creditworthiness at the international credit markets. However, a more gloomy picture would emerge if external debt indicators were examined more closely. This picture might easily worsen when some unfavourable developments of the country's fiscal position are taken into account.

To overall consideration, Turkey is still one of the indebted countries which recovered from the debt crisis of the 1980s. To be objective, this success is not only due to the economic reform program itself, but also due to the early and favourable timing of Turkey's debt crisis (in 1978), a favourable political environment (political autonomy) during 1980-1983 period, and a generous international loan package which has been launched in the early 1980s²⁷ by the creditors to Turkey.

 $^{^{27}}$ It is worth noting that during the period 1978-1979, that is, before the economic reforms of 1980, the economic performance of Turkey was not much different from the typical pattern of a severely indebted country after 1982.

CHAPTER THREE

LDC EXTERNAL DEBT AND SOLVENCY: A REVIEW OF THE LITERATURE

3.1. Introduction

There is little doubt that a correct diagnosis is the essential part of any strategy or policy. That is, if the diagnosis is wrong, the medicine could kill the patient. By analogy, a correct diagnosis of the debt crisis of the 1980s is needed to produce a lasting solution. There are different views about the diagnosis of the debt problem of the 1980s. This implies that there are different reasons for nonrepayment of the external debt. Mainly, three reasons are mentioned in the literature [see, e.g., Eaton (1989, pp. 1348-52)]:

- a) illiquidity,
- b) insolvency (inability-to-pay),
- c) unwillingness-to-pay (insufficient incentive to repay).

Based on these three reasons, different theoretical models have been developed to explain the occurrence of recent external debt problems of the LDCs. Accordingly, Section 3.2 presents a comparative and general introduction and evaluation of the different approaches. Section 3.3 provides a review of the literature as far as the ability-to-pay view is concerned. The last section include a discussion and some conclusions.

3.2. Illiquidity, Inability-to-pay or Unwillingness-to-pay?

One view holds that the debt crisis is a temporary one, and should be met by new financing arrangements designed to buy time until the situation improves. In this case, the debtor country may be considered suitable for additional loans because of the short-run character of the difficulties, and also because its long-run prospects are bright. This approach to the debt problem of the 1980s is referred to as "illiquidity approach" in the debt literature.¹ To put it other way, the debtor will eventually have resources with value in excess of current debt, and has the incentive to repay the debt, but current resources fall short of current debt service obligations.

Well presented expression of liquidity crisis is given by Glick (1987, p.62): "...short-run repayment difficulties that arise when debtors are unable to obtain new loans with which to servicing existing debt obligations, even though their capacity and willingness to repay in the long-run is not in question, are often referred to as liquidity crises...".²

Under the "solvency (ability-to-pay) approach",³ however, the debtor country does not repay the debt because it is unable to pay. In other words, the indebted country repays its debt as long as it is able-to-pay. Here, the only requirement is that the debtor has the future resources to service its debt without the need to borrow forever in order to make interest payments. This time, the lending is bound by a solvency constraint.

In addition, all static measures of external debt such as debt/exports ratio,

^{&#}x27;This view is best represented by Cline (1984, 1985). For a discussion of the view, see also Aliber (1980), Cooper and Sachs (1985).

 $^{^2\!}See$ also Krugman (1985a) and $\,$ Sachs (1984) for the term liquidity crisis and/or liquidity approach.

³For relevant references, see section 3.3.

debt/GDP ratio and debt service ratio may be considered as traditional ability-topay measures. Broad evaluation of an indebted LDC generally relies on such indices. The underlying rationale is that, to be solvent, a country must eventually repay all its foreign debt to its creditors. If one believes that the problem reflect insolvency, neither rescheduling nor new loans improve the situation. Further loans to them only add to the burden of their existing debt.

A nation, like a household or a government, faces a budget constraint, the balance of payments. However, the lack of a simple definition of the ability-to-pay makes it rather confusing and difficult to determine whether a nation is solvent. Thus, one can come across different types of solvency conditions in the literature.⁴ As a rule, however, [considering Buiter (1990a), Burda and Wyplosz (1993), Currie and Levine (1991), Ghatak and Levine (1994), Wickens and Uctum (1993) among others], a nation that can meet its intertemporal budget constraint is said to be solvent; that is, its net debt does not exceed the present value of current and future primary (non-interest) surpluses:⁵

$$ND(t) \le PV[(t);(TB);(r^*+\lambda-n)]$$
 (3.1)

where

ND(t) denotes nation's net external debt at time t; $PV[(t);(TB);(r^*+\lambda-n)]$ represents the present discounted value, at time t, of the entire planned or expected future stream of trade balance surpluses plus net foreign current transfers including foreign

⁴For instance, an extreme upper bound on the ability-to-pay is the country's output (i.e. the present value of future output (or income) represents the broadest measure of debtor country's resources). For details of different types of solvency conditions in the literature, see Section 3.3.

⁵It is worth noting that the variables in equation (3.1) may, as an alternative, also be expressed as proportions of GDP. They can either be defined in nominal terms or in real terms. Here, we assume that the variables in (3.1) are expressed in real terms.

aid (TB), where the discount rate is the "real exchange rate depreciation corrected and growth adjusted real foreign interest rate $(r^*+\lambda-n)$ ". Note also that λ and r^* are defined as follows: $\lambda=e+\pi^*-\pi$ and $r^*=i^*-\pi^*$. Let λ be the rate of depreciation of the real exchange rate, e the rate of depreciation of the nominal exchange rate, π^* the world rate of GDP inflation, π the domestic rate of GDP inflation, r^* the foreign real interest rate, i^* the foreign nominal interest rate. Equation (3.1) implies that the present discounted value of future trade balance surpluses plus net inflows of foreign aid and remittances (i.e. net foreign current transfers) is just equal (or greater) to the nation's current net external debt.⁶ The solvency condition of equation (3.1) can alternatively be expressed as follows:

$$ND_{t} \leq \sum_{i=0}^{\infty} \frac{(TB)_{t+i}}{[1+(t^{*}+\lambda-n)]^{i+1}}$$
(3.2)

provided that "no-Ponzi-game" condition $\lim_{i\to\infty} \frac{ND_{t+i}}{[1+(r^*+\lambda-n)]^i} \leq 0 \text{ holds.}$

Equations (3.1) and (3.2) express the national solvency condition facing a debtor nation when $(r^*+\lambda-n)>0$. According to (3.2), the present discounted value of the nation's net external debt in the very distant (i.e. infinitely far) future is zero (or negative). In (3.1) and (3.2), it is assumed that ultimately $(r^*+\lambda-n)>0$; that is, "dynamic inefficiency" [i.e. the case where $(r^*+\lambda-n)<0$] is ruled out, and thus the nation cannot play a successful "Ponzi game": the nation cannot forever pay the interest on its outstanding external debt simply by borrowing more. That is why, a debtor country with ND_t>0 at time t will have to run primary surpluses sometime

The sum of the trade balance surplus and the net current transfers is referred to as the nation's "primary surplus".

in the future in order to service (pay the interest on) its external debt. Solvency does not require that the debt be repaid, only that it is impossible indefinitely to finance the interest bill through new borrowing; that is, sometime in the future primary surpluses must be achieved and any further borrowing will not be high enough to pay the entire existing debt interests.⁷

Finally, the debtor country may be liquid and able-to-pay its debt, but unwilling to do so. In this case, new lending may therefore be constrained by "repudiation risk". That is to say, it is likely that long before the debtor country is unable to service its debt, it will choose not to do so. Thus, the willingness-to-pay is the bottleneck restriction if it end well before the debtor's ability-to-pay comes to an end.⁸ According to this view, the lack of an effective legal "enforcement" mechanism enlarges the set of feasible actions for a debtor after a loan is made and diminishes the range of feasible actions for creditors. Under this scenario, the borrower will compare the perceived costs and benefits associated with repayments. If this cost exceeds the benefit, the borrower will threaten to renege on its obligations and face the retaliation from creditors.⁹

To a certain extent, each of these theoretical views has logical validity. While they share some qualitative implications, as a rule they point to very different policy strategies for debtors, creditors, and the relevant international institutions.

⁷For more details, see Section 3.3.

⁸This view is best represented by Eaton and Gersovitz (1981a). See also Cohen and Sachs (1986), Eaton and Gersovitz (1981b), Eaton *et al.* (1986).

⁹As already mentioned in Chapter One, in most cases, however, the cost of default is high enough to prevent the debtor country from defaulting. The cost of default includes the following: a) seizure of assets; b) exclusion from future borrowing; c) reduction of the gains from international trade, d) decline in the trustworthy reputation, e) retaliation by creditor governments. For a comprehensive evaluation of indirect and direct costs of default, see Kaletsky (1985). See also Krugman and Obstfeid (1991). Accordingly, the incentive of default by a LDC depends on a number of factors: a) the ratios of external indebtness, such as debt/GDP, debt/exports, debt service/exports; b) the cost of default [see Kaletsky (1985)]; the monetary and fiscal policies of the creditor countries; d) the nature and impact of the demand and supply shocks; e) the nature of domestic budget and external solvency constraints in the borrowing country [Buiter and Patel (1992), Ghatak and Levine (1994)]. Bulow and Rogoff (1986) postulate that the total cost of default is a major factor in deciding the final outcome of a bargaining model between debtors and creditors.

Supporters of the "liquidity view" believe that the debt problem is a temporary one arising from unfavourable global economic environment and should be dealt with rescheduling and new lending. According to "ability-to-pay" supporters, however, the problem is much more serious than a short-run payment problem and has to be dealt with some debt relief rather than rescheduling.

3.3. Ability-to-pay Approach: A Review of the Literature

Since there has been an enormous outpouring of studies in a wide variety of publications especially during the 1980s and the early 1990s, no review of the literature can reasonably be expected to be exhaustive. Thus, what we have tried to do is to include all the influential studies as far as the field of "ability-to-pay" of the indebted LDCs is concerned. It is important to note that, due to expected relationship and difficulty in making distinction among the liquidity, ability-to-pay and willingness-to-pay aspects of the external debt, some coincidence of these issues have been unavoidable. It is also worth stressing that most early ability-to-pay studies (i.e. traditional debt servicing capacity models) failed to make a clear distinction between liquidity and solvency (i.e. short-run and long-run) aspects of debt capacity.¹⁰ However, it should be made clear that throughout the text we use the term "ability-to-pay" in the long-run sense (i.e. solvency) unless otherwise stated.¹¹

As mentioned earlier, the question of LDC external debt has dominated discussions of international monetary economics during the 1980s and especially after the announcement of Mexico in 1982 that it would not be able to meet its outstanding debt obligations. As Bird (1992) put it: "...An avalanche of papers and

¹⁰For exceptions, see, e.g., Aliber (1980) and Cline (1983, 1984).

¹¹For a general discussion of liquidity versus solvency and solvency versus willingness-to-pay views, see Section 3.4.

books was written on the subject with the authorship reading like a Who's Who of Economics...It seemed impossible to open a newspaper without confronting at least one article which addressed the problem ... ". However, until recently, surprisingly, one could find small number of reviews of literature on the external debt problems of LDCs. The earliest comprehensive survey of the literature comes from McDonald (1982). Mcdonald surveys the literature as it relates the issue of "debt capacity". Glick (1987) provides an influential review study of different approaches developed to explain the occurrence of recent debt problems of LDCs. Some analytical issues of external borrowing by LDCs and/or the determinants of country risk (or the pure theory of sovereign lending) have also been reviewed by Eaton et al. (1986), Frenkel et al. (eds.) (1989), Kletzer (1988), and Saunders (1986). Besides, Glick and Kharas (1986) survey the literature on multi-period models of external borrowing regarding the issue of how much a country should borrow and the circumstances under which government intervention has a role in the international capital markets. Saini and Bates (1984), Lanoie (1986) and Lee (1988), on the other hand, provide a review of empirical studies on the debt servicing capacity of LDC borrowers. Besides, a recent attempt is made by Bhatt (1991) to review a selected literature on determinants of international bank lending to LDCs. Influential analytical reviews on the models of international capital movements and evaluation of the role of capital inflows are provided by Eaton (1989), Cardoso and Dornbusch (1989). The theory of external debt has been booming over the last decade under the obvious pressure of events. As regards analytical reviews which survey the different stages of the theory of external debt to date, there have been new important contributions in recent years: esp. see Armanderiz de Aghion (1993), Cohen, D. (1992, 1994), Dornbusch (1993, esp. Part IV), Eaton (1993), Kletzer (1994).

The applied literature has mainly followed two main paths. First, according

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to the "country-risk" (or debt servicing capacity) approach which includes those factors that determine or affect a country's ability and willingness to pay on schedule interest and amortization on its external debt, a country's prospects of repaying the funds borrowed are evaluated by a variety of economic indicators, usually in the form of aggregate ratios such as debt/GDP, debt/exports and debt-service/exports. These ratios are either evaluated as indicators of debt servicing capacity of the debtor in question or introduced into formal models which estimate an "objective probability of default" for each country-case and classify countries into two main categories (i.e. rescheduling and non-rescheduling) in order to reach an early-warning model of debt servicing difficulties. The estimating method which most frequently employed is the limited dependent variable analysis. There have been large number of empirical studies in the literature that have analyzed the debt servicing capacity (DSC) (i.e. the ability of the LDC debtor to meet its debt service obligations on time). Generally speaking, these studies were led to determine whether the debtor country will be facing external debt problems or not.¹² Besides, in evaluating LDC debt repayment prospects, some researchers [see, e.g., Edwards (1986), Feder and Ross (1982)] has focused on the lenders' own perception of the probability of default (i.e. the "subjective probability of default") as the determinant of the interest spread charged on LDC loans by international commercial banks. The second path in the applied literature, however, focuses on the sustainability of external debt policies in the long-run sense. Here, in principle, all that is required is that the consumption plans of the country do not violate its intertemporal budget constraint (in the sense of intertemporal optimizing). In other words, a debtor country's plans are said to be sustainable if the present value of its consumption

¹²An 'external debt problem' is defined as a situation in which a debtor has a high probability of reneging on its external debt service obligations. See, e.g., Lee (1991).

plans is less than or equal to the present value of incomes generated.¹³

In this review, we are, in principle, only concerned with the notion of "solvency" of a country in the sense that the solvency (or ability-to-pay) budget constraint requires that the present value of the stream of future primary surpluses is not less than the net current indebtness.¹⁴ However, in practice, since most of the applied work do not distinguish between liquidity (short-run) and solvency (long-run) aspects of debt capacity, any survey on the subject has no choice but to include both aspects of debt capacity when necessary. This is the approach we follow here in this review. It is not intended that the survey will be exhaustive. Given the remarkable increase in the literature especially in the 1980s, no survey can reasonably hope to be exhaustive. Rather, it will attempt to outline the major studies in the applied literature as it relates to the issue of "ability-to-pay" (also liquidity and willingness-to-pay aspects, and some vital theoretical issues when necessary).

3.3.1. Background and Early Works

The early work, traditionally, tackles the question in the framework of the growth-cum-debt literature. The focus has been, mainly, on the use of external finance for investment purposes. The Harrod-Domar and the two-gap models have been the main theoretical grounds for the early work. The first attempts to put the investment role of external finance in a growth framework employed the Harrod-Domar model. The main focus of this literature has been about examining how debt situations evolve over time, and not on how much a country should

 $^{^{13}\!\}text{One}$ can possibly add the requirement that the debt servicing not result in consumption below the subsistence level.

 $^{^{\}rm \mu} Since the distinction between the solvency of a government and a nation is important, both approaches are included in the review.$

borrow. Generally speaking, this type of models discuss the dynamics of debt in relation to some benchmark proxy of the ability-to-pay. Sustainable debt paths are defined as those paths along which the level of external debt, scaled by either exports or output, converges to a steady state. Using this framework, it is possible to derive the time path of debt and other relevant debt capacity indicators. Domar (1944), as one of the earliest attempts, investigates the sustainability of interest charges on domestic debt. In doing this, he identifies the debt burden as the tax rate necessary to finance interest payments, when a government borrows a fixed part of output each period. Eventually, he concludes that the key relationship in evaluating the debt burden is the one between the output growth rate and the interest rate on debt.

Domar (1950) is an early extension of the growth models to analyze external debt. He provides a simple way in which debt and debt service can permanently grow: the growth rate of new lending must exceed the interest rate. Avramovic (1958), Avramovic *et al.* (1964), Chenery and Strout (1966), Gulhati (1967), McKinnon (1964), Neher (1970), Nowzad and Williams (1981), Solomon (1977), among others, provide further analysis.

Avramovic *et al.* (1964) was the first to investigate systematically the factors affecting a country's balance of payments and thus, its ability to service external debt (i.e. its DSC). They apply an analysis somewhat Domar's (1950) to a debtor country in which savings, tax and import parameters are fixed. The key conclusion they point out is that a borrower eventually cannot repay its debt unless its output growth rate permanently exceeds the interest rate.¹⁵ Their study proposed a combination of short and long-run indicators for evaluating a country's external

¹⁵It is worth noting that this condition, n>r, emerges as a key criterion for solvency of a debtor country in the Harrod-Domar models. See, e.g., Solomon (1977).

debt servicing capacity. Short-run indicators relate to liquidity aspects of a country's DSC with general balance of payments vulnerability. Indicators derived from the short-run approach include: a) growth rate of export volume, b) debt service to exports ratio, and c) foreign exchange reserves to imports ratio. The long-run indicators which emerged from the analysis that seek to determine the conditions under which economic growth financed partly by foreign capital can succeed and hence provide for continuous servicing of external debt. The variables affecting the long-run aspect of DSC include: a) growth rate of GDP, b) investment to GDP ratio, c) exports to GDP ratio, and d) the rate of price increases. Avramovic *et al.* accept the approach that output growth depends upon saving parameters and capital-output ratios as in the case of Harrod-Domar models and assume that the debtor country borrows abroad to cover the investment-savings gap (one of the gaps that "two-gap" models point out).

Studies within the above line are sometimes referred to as models of "debt accumulation" in the literature [see, e.g., Glick (1987, pp.10-12)]. This type of simple models (also known as indicator approach to DSC) discuss the dynamics of debt in relation to some standard proxies of the DSC such as output or exports. As early works, Neher (1970) and Solomon (1977) use debt-output ratio. Similarly, Avramovic (1958), Avramovic *et al.* (1964), Dornbusch and Fischer (1985) and Simonsen (1985), among others, employ the level of exports as an alternative debt-scaling proxy. According to Solomon (1977), a condition for the debt-output ratio to remain bounded is that n>r, or that the target growth rate exceed the interest rate on debt. A comparison of borrower's growth rate with the interest rate is occasionally suggested as a measure of its solvency. Simonsen (1985) develops a similar solvency measure; that is, solvency requires a current account surplus equal to some (positive) fraction of exports (i.e. X-M = aX). Simonsen defines a

"weak solvency" test as one which requires all external debt be paid off in finite time so that in the steady state the debtor country is not a net debtor (if n_x >r where n_x represents export growth rate, then any positive value of a ensures satisfaction of the weak solvency test. The conventional measures of LDCs usually rely on such ratios as debt-GDP or debt-exports. The underlying rationale is that, to be solvent, a debtor country must eventually pay back all its external debt.

Because of large scale commercial bank lending to LDCs in the wake of the first oil price shock, a large empirical literature on assessing the DSC of LDCs has emerged. This rapid rise in commercial bank lending to LDCs led the banks to develop procedures for monitoring and assessing risks associated with lending to LDCs. Indeed, these commercial banks, such as the First National Bank of Boston and the Bank of Montreal, were the first to utilize some economic indicators, checklist methods and composite indices to evaluate country risk.¹⁶ These techniques of economic indicators adopted varied widely from a very short list of quantifiable variables to a wide range of economic, political and social components. It is worth noting that these techniques were often used as an early warning system in association with qualitative country assessment [Merrill (1982)]. However, it should also be pointed out that the lack of conceptual structure for selecting individual indicators and for attributing them appropriate weights limits their applicability to an extent.

Most of the early works [in addition to Avramovic *et al.* (1964) and other works quoted earlier, see, also, Alter (1969), Bitterman (1973), Ohlin (1966)] involve with a subjective analysis of economic variables and indicators that are believed to affect a country's DSC. For example, Avramovic *et al.* (1964) argue

 $^{^{16}\!{\}rm For}$ a list of empirical studies which utilize economic indicators to assess country risk, see Saini and Bates (1984, p.343).

ways of recognizing conditions under which the debtor countries will face difficulties in meeting their external debt obligations. However, the results provided by these growth theory approach,¹⁷ clearly, lacks easy applicability to empirical analyses of debt crisis situations. In this respect, McDonald (1982, p.607) points to their lack of attention to theoretical bases, their extreme rigidity (e.g. the constant marginal propensity to save and the constant capital to output ratio), and their common lack of institutional content [for further criticism, see also Eaton *et al.* (1986, pp.499-500)]. That is why, while providing some insight into the investment motives for using external debt, they tend to exclude a wide range of relevant factors.

Let us now focus on the works of intertemporal optimizing approach. Bardhan (1967) and Hamada (1969) are the typical early examples of such models. An intertemporal utility function is maximized in the context of a one-sector neoclassical growth model. Bardhan shows that the problem of default is intensified with a rise in the interest rate. These models are generally concerned with the noninvestment uses of external finance. A rationale behind this noninvestment employments of external debt is the smoothing of the consumption path over time. There has been increased interest in intertemporal optimizing models which focus on this consumption-smoothing character. Apart from the early ones such as Hanson (1974), studies such as Sachs (1981, 1982, 1984), Glick (1987) and Cohen, D. (1988a), among others, are worth mentioning. D. Cohen, for example, employs this optimizing framework to develop a solvency index [see, also, Cohen, D. (1985, 1991)].

¹⁷For some other contributions to the literature in the context of a more flexible neoclassical production structure, see, e.g., Katz (1982), Onitsuka (1974), Takagi (1981).

3.3.2. Econometric Studies

Investigators have turned to econometric analysis of LDC debt data in order to provide more objective analysis of DSC of debtor countries, starting with the study of Frank and Cline (1971). These studies are mainly concerned with testing which set of explanatory variables are statistically significant in explaining the ability of the borrowers to repay (or the DSC) by employing relatively sophisticated econometric techniques. Due to the binary nature of the dependent variable (i.e. a country is experiencing a rescheduling or not) that makes traditional regression techniques inappropriate, researchers have to use less known techniques in their analysis such as discriminant and logit/probit analyses. In fact, many of these studies obtain their explanatory variables from the study of Avramovic *et al.* (1964). Eaton *et al.* (1986) stress that a common feature of earlier studies is the use of a selective list of explanatory variables not derived from a clearly stated model of sovereign borrowing and lending [for a recent exception, see, Lee (1991)]. As Schmidt (1984) puts it: "...The independent variables have been chosen by inspecting the cited literature, and under the restrictions of data availability...".

There exists large number of econometric studies in the applied literature. They mainly focus on searching for economic variables that are possible indicators of DSC of debtor countries. Since the dependent variable is the probability of debt rescheduling, this approach is simply known as the "limited dependent variable analysis".¹⁸ Researchers following this approach acknowledge the occurrence of debt rescheduling as an indication of external debt problems faced by the debtor countries. Because the probability of debt rescheduling is not a directly observable

¹⁸For further information on limited dependent variable analysis, see Maddala (1983). For a comprehensive review of other approaches to the econometric analysis of DSC such as (a) analysis of Eurocurrency spreads, (b) nonparametric estimation of economic indicators, and (c) analysis of international return differentials, see, especially, Lee (1988).

feature of the sample, it should be estimated. The dependent variable is binary-valued since the sample contains only direct information on whether the debtor have rescheduled or not. For instance, if a debtor country had its external debt rescheduled or faced difficulties meeting its debt service obligations in a given year, a value of 1 would be assigned to the observation and the value of 0 would otherwise. The econometric techniques employed in the limited dependent variable analysis are typically either discriminant or logit/probit/tobit analysis with the exception of Dhonte (1975) who applied principal component analysis.

In their pioneering study, Frank and Cline (1971) applied discriminant analysis to search the ability of eight indicators to identify external debt servicing difficulties. Their chosen explanatory variables, based on the study of Avramovic *et al.* (1964), are as follows: a) debt service ratio, b) index of export fluctuations, c) compressibility of imports, d) imports/GNP ratio, e) imports/reserves ratio, f) amortization/debt ratio, g) per capita GNP, and h) growth of exports. They compile data for 26 countries over the period 1960-1968 on these eight economic variables. They conclude that only three out of eight indicators, i.e. debt service ratio, imports/reserves ratio, and amortization/debt ratio, are statistically significant. Others, such as Sargen (1977), Saini and Bates (1978), Yener and Mambrito (1984), Taffler and Abassi (1984), also use the discriminant analysis for analyzing debt servicing problems of LDCs.

Feder and Just (1977), instead of using discriminant analysis, use logit analysis to analyze the ability-to-pay of the debtor countries. Following Avramovic *et al.* (1964), nine economic indicators of DSC are employed in their analysis, and seven of them are same as defined by Frank and Cline (1971). Two additional explanatory variables are capital inflows and growth of per capita domestic product. They find that six variables are statistically significant. These are: debt service ratio, imports/reserves ratio, per capita income, outstanding debt/current amortization ratio, capital inflows/debt service ratio and real export growth rate. Three of these are the same as those found statistically significant by Frank and Cline. The logit analysis applied by Feder and Just determines three additional indicators, i.e. per capita income, capital inflows/debt service ratio, and real export growth rate. Since Feder and Just (1977), logit/probit/tobit models have been used extensively to analyze the DSC of debtor LDCs. Some of the major contributions are Cline (1984), Edwards (1984), Feder et al. (1981), Hajivassiliou (1987, 1989), Kharas (1984), Kharas and Levinsohn (1988), Lee (1991), Mayo and Barrat (1978), McFadden et al. (1985), Melvin and Schlagenhauf (1985), Savvides (1991), Schmidt (1984). Kharas (1984) uses probit approach and attempts to synthesize the empirical and growth theory approaches by extending a growth-cum-debt macroeconomic model into a formal theory of DSC (or creditworthiness). Hajivassiliou (1987, 1989), Lee (1991), and McFadden et al. (1985) use models different from the pure statistical models designed to determine the debt servicing problems of LDCs. Using the framework of credit rationing and a theory of LDC borrowing with potential repudiation developed by Eaton and Gersovitz (1981a), they determine certain country features relating to demand and/or supply of sovereign loans in a clearly stated model of sovereign debt.

Lee (1991), for instance, applies the multi-period willingness-to-pay model developed by Eaton and Gersovitz (1981a). Instead of using a selected list of variables taken from earlier studies, Lee obtains his set of explanatory variables from a willingness-to-pay model that provides a systematic method of determining relevant variables. Unlike the earlier works, with the exception of Taffler and Abassi (1984), Lee distinguishes between sovereign debt and non-publicly guaranteed private external debt. From a willingness-to-pay model, the probability of default is hypothesized to be a function of the following variables: a) interest rate on international lending, b) growth rate of per capita GDP, c) total external debt/GNP ratio, d) growth rate of industrialized countries' GNP, e) variability of changes in per capita GDP, and f) government debt held domestically/GDP ratio. Employing logit analysis, Lee concludes that three out of six variables, i.e. a), b), and c), are statistically significant to explain both commercial and official rescheduling cases. The remaining three variables, i.e. d), e), and f), affect rescheduling decisions of borrowers in a different way. Regarding commercial rescheduling cases, in addition to the factors determining official rescheduling cases, access to international credit markets becomes an important factor (i.e. creditors are less likely to impose sanctions, and/or debtor countries do not perceive the likelihood of being excluded from international credit markets as seriously, when debt is guaranteed by the creditors' government).

As Kharas (1984) point out, a main disadvantage of the pure empirical approach is the lack of theoretical structure, with few exceptions mentioned above, which undermines confidence in the interpretation of the results and in their use for forecasting and simulation purposes.¹⁹ There are also question marks relating to whether the variables should be lagged and whether some variables should be included in levels or growth rate form.

3.3.3. Solvency Constraint and Debt Servicing Capacity (DSC)

Despite certain difficulties in distinguishing between liquidity and solvency aspects of DSC, these two views point to different policy strategies for debtors, creditors and relevant international institutions while sharing some qualitative

¹⁹For evaluation of this point, see Bhatt (1991, pp.115-9), Eaton and Gersovitz (1981b, pp.29-30), Kharas (1984, pp.415-7) and McDonald (1982, p.623). For problems in econometric approaches to country risk evaluation, see also Saini and Bates (1984, pp.348-53).

implications. In the second half of the 1980s, it has become more clear that what most of the LDCs had was something closer to insolvency.²⁰ The Brady plan may simply be regarded as confirmation of this view by the creditors and the international institutions such as World Bank and IMF. General failure of most of the earlier empirical studies to distinguish between solvency and liquidity problems, a distinction that is relevant for relating the occurrence of rescheduling to the question of DSC, can be said to have led to a separate solvency literature, either nations's or government's solvency.²¹ Some researchers [e.g. Eaton and Gersovitz (1981a) and Eaton *et al.* (1986)], however, focus only on the willingness-to-pay aspect of the international debt and ignore the role played by the debtor countries' inability to pay. It is now worth noting that we are interested in the external debt literature as it relates to debtor's ability-to-pay, or solvency.

Simply, a nation that can meet its intertemporal budget constraint is said to be solvent: its net debt does not exceed the present value of the stream of future income [see, e.g., equations (3.1) and (3.2)]. As noted by Cohen, D. (1985, p.142), the main source of the solvency analysis is the standard finance literature [i.e. the value of an asset (here the country's external debt) is equal to the present value of all the dividends attached to it (here, all future debt servicing)]. He refers to the condition of a present value of future debt going to zero in the long-run as the "transversality condition".

The impact and the importance of solvency constraint on the economies of the LDCs has gained considerable attention in recent times.²² While some papers

²⁰Cohen, B. (1989a) calls it "de facto insolvency".

²¹Simply put, only long-run aspects of debt capacity is taken into account. In this solvency literature, the net current external debt (ND) and the net discounted present value of future income stream (PV) of a debtor country are compared. As a rule, the country is said to be solvent as long as ND \leq PV.

²²For solvency view and/or comparison of solvency with other views, see, among others, Aliber (1980), Bailey and Cohen (1987), Buiter (1990a, 1990b), Burda and Wyplosz (1993), Clarida (1986), (continued...)

[e.g. Sachs (1984)] use two-period models, others [e.g. Buiter and Patel (1992), Clarida (1986), Cohen, D. (1991), Currie and Levine (1991), Ghatak and Levine (1994)] utilize infinite horizon models. In two-period models, both the principal and interest on external debt incurred in the first period must be repaid by the end of the second period, and thus solvency requires that second period income exceed or equal external indebtness and debt service obligation. In a finite horizon economy, the solvency constraint is the requirement that the debt in the last period be nonpositive [Buiter and Patel (1992)]. In an infinite horizon framework, however, principles need not to be repaid; rather, the present value of debt service payments must exceed the value of the principal. In this case, the long-run net external asset position of the debtor country is endogenously determined by optimization of some objective function. Consequently, when r>n, the solvency budget constraint [or "intertemporal solvency" as Eaton (1989, p.1338) calls it] requires that the discounted present value of the stream of future income is not less than the current external debt level. This is a "no-Ponzi-game" (or transversality) condition; that is, "dynamic inefficiency" is ruled out [for more information, see, e.g., Blanchard and Fischer (1989), Buiter and Patel (1992), Currie and Levine (1991), Levine (1991)]. The constraint that current external debt cannot exceed the present value of future income is typically imposed to prevent a country from running such a "Ponzi scheme". However, if r<n the discounted value of future income is said to be infinite and the nation can play a successful "Ponzi game" [see, e.g., Buiter (1990a), Cohen, D. (1991), Currie and Levine (1991), Eaton (1989)]. As Eaton (1989, p.1338) puts it: "...[Such a] country has infinite net worth and can consequently

²²(...continued) Cohen, D. (1985, 1987, 1988a, 1991), Cohen, B. (1989a), Cooper and Sachs (1985), Currie and Levine (1991), Eaton (1989, 1992), Eaton *et al.* (1986), Furtado (1989), Gersovitz (1985), Ghatak and Levine (1994), Glick (1987), Hellwig (1986), Islam (1988), Kletzer (1988), Nunnenkamp (1986), Control (1984), Glick (1987), Hellwig (1986), Statum (1988), Kletzer (1988), Nunnenkamp (1986), Control (1984), Chem (1980), Control (1986), Statum (1987), Hellwig (1986), Statum (1988), Kletzer (1988), Nunnenkamp (1986), Control (1984), Chem (1986), Control (1986), Statum (1987), Hellwig (1986), Statum (1988), Kletzer (1988), Nunnenkamp (1986), Control (1984), Statum (1986), Statum (1 Sachs (1984), Schwartz (1989), Simonsen (1985), Smith and Cuddington (1985).

borrow as much as it wants and remain solvent. Since such a country does not pose very interesting economic problems and presumably does not warrant the attention of ... economics...".²³ Besides, as Eaton (1993, p.141) notes: "...for [such] a country to be permanently solvent in this sense implies that its resources are infinitely valuable. In this case, any level of debt is consistent with solvency. It is unlikely that any country meets this criterion. A growth rate above the [real] interest rate is almost surely a temporary phenomenon...". Let us now call equations (3.1) and (3.2):

$$ND(t) \le PV[(t);(TB);(r^*+\lambda n)]$$
(3.1)

<u>and</u>

$$ND_{t} \leq \sum_{i=0}^{\infty} \frac{(TB)_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}}$$
(3.2)

provided that "no-Ponzi-game" condition $\lim_{i\to\infty} \frac{ND_{t+i}}{[1+(r^*+\lambda-n)]^i} \leq 0 \text{ holds.}$

Repeating the argument we made earlier, equations (3.1) and (3.2) express the national solvency condition facing a debtor nation when $(r^*+\lambda-n)>0$. According to (3.2), the present discounted value of the nation's net external debt in the very distant (i.e. infinitely far) future is zero (or negative). In (3.1) and (3.2), it is assumed that ultimately $(r^*+\lambda-n)>0$; that is, "dynamic inefficiency" [i.e. the case where $(r^*+\lambda-n)<0$] is ruled out, and thus the nation cannot play a successful "Ponzi

 $^{^{23}}$ Note the contrast with the analysis of external debt in the growth theory models reviewed earlier in this Section, where the condition n>r emerge as a criterion for solvency.

game". That is why, a debtor country with ND,>0 at time t will have to run primary surpluses sometime in the future in order to service (pay the interest on) its external debt. Solvency does not require that the debt be repaid, only that it is impossible indefinitely to finance the interest bill through new borrowing; that is, sometime in the future primary surpluses must be achieved and any further borrowing will not be high enough to pay the entire existing debt interests [see, e.g., Buiter (1990a), Currie and Levine (1991)]. Equations (3.1) and (3.2) express the intertemporal budget (or solvency) constraint facing the nation for $(r^{+}+\lambda-n)>0$. All it says is that the current net external debt must be equal to the present value of future primary surpluses discounted at a rate $(r^*+\lambda-n)$. A debtor country with ND>0 must sometime in the future run primary surpluses.²⁴ If $(r^*+\lambda-n)<0$, then, (assume for a moment that net external debt and primary surpluses are expressed as proportions of GDP) a debtor country only needs to stabilize its primary surpluses/GDP ratio to achieve a stable ND/GDP ratio. The solvency condition requires that net external debt (or ND/GDP if expressed as proportions of GDP) eventually grow at a rate slower than $(r^*+\lambda-n)$. Apparently, if ND in real terms or ND/GDP are stable, then solvency is ensured.²⁵

It is worth noting that there is a recent and fast growing empirical literature on the notion of the national and/or governmental intertemporal budget constraints. The bulk of this new literature use the "cointegration analysis" (see Chapter Five)

²⁴As mentioned earlier, the sum of the trade balance surplus and the net foreign current transfers is referred to as the nation's "primary surplus". The nation's primary surplus is occasionally referred to as the nation's net resource transfer. The primary surplus measures the nation's net resource transfer to the rest of the world when domestic income is accepted as the criterion or origin relative to which transfers are measured. The current account surplus measures the nation's net resource transfer to abroad if national income is taken as the origin. The former concept of transfer stresses the "location" of resources and the income streams they generate within the nation's boundaries. The latter concept, however, focuses on the "ownership" of resources and the related income streams by national residents, irrespective of the location of the resources [see, e.g., Buiter (1990a, p.428)].

²⁵For weak and strong solvency conditions, see, e.g., Buiter and Patel (1992), Levine and Pearlman (1992).

to test whether government spending and revenue (when government's budget constraint is in consideration), and/or country's exports and imports (when nation's budget constraint is in consideration) are cointegrated. The main theme of this newly developing literature is that "cointegration" (i.e. the existence of a "genuine" and stable long-run relationship between the variables) is a necessary condition for the economy to be obeying its intertemporal budget constraint. In a sense, this literature attempts to answer the question whether the current account (for the nation) and/or the fiscal (for the government) deficits are sustainable in the long-run or not. That is, whether the nation's and/or the government's behaviours are consistent with their intertemporal budget constraints or not [see, e.g., Buiter and Patel (1992), Corsetti and Roubini (1991), Hakkio and Rush (1986, 1991), Hamilton and Flavin (1986), Haug (1991), Husted (1992), Kremers (1989), Smith and Zin (1991), Tanner and Liu (1994), Trehan and Walsh (1988, 1991), Wickens and Uctum (1993), Wilcox (1989)].

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As shown by Samuelson (1958) and Cass (1972) [see also Blanchard and Fischer (1989, Chapter 2), among others], if real interest rates are systematically below the growth rate of the economy, this is the sign of an inefficient credit market equilibrium. Under these circumstances, a nation may find itself borrowing indefinitely from the rest of the world. Any casual observations of the three decades from the 1950s to the early 1980s proves that such a hierarchy between real growth and interest rates (i.e. n>r) has in fact been the case [for this point, see Cohen, D. (1991, p.20)]. The surprise in the early 1980s was that a very sudden switch in the hierarchy between the two rates caught all debtor countries in the trap of having to finance high interest rate payments out of slow growth. The main problem with this switch was not so much that it occurred, rather that it happened as a worldwide phenomenon. Cohen, D. (1991) argues, however, that: "...there must have been,, some assumption about a possible switch in the hierarchy between the two rates, not necessarily for the world as a whole but at least for each individual country...". Currie and Levine (1991) and Levine (1991) point out that the economy in which r>n in a steady-state is suggested by both economic theory and empirical evidence [see also Blanchard and Fischer (1989, Chapter 2)].

According to Buiter (1990a), equation such as (3.1) can be used to evaluate the consistency of the external debt strategy. If, under current projections, equation (3.1) is violated (i.e. the left-hand side exceeds the right-hand side) this does not imply that repudiation is inevitable, only that the strategy under consideration will not be successful. At what expense can the equality be achieved is actually what the current external debt problem is all about. The debtors would like to see some combination of lower interest rates (lower r^{*}), more aid, better terms of trade (negative λ), higher growth rate (larger n) or a write-down or write-off of (part of) the external debt (a smaller value of ND). The lenders, on the other hand, would like to see larger primary surpluses by the borrowers (larger TB).

In their seminal paper, Eaton *et al.* (1986, pp.499-502) argue that long before a country's solvency would become relevant, its willingness-to-pay constraints its access to international credit market (i.e. credit rationing occurs). By re-examining the solvency issue, they point out that although primary reliance on solvency models is dangerous, some important information can be gained from this approach.²⁶

Cohen, D. (1985), in his influential work, develops a solvency index which

²⁶Following Eaton and Gersovitz (1981a, 1981b), supporters of willingness-to-pay approach point out that the borrower compares the perceived costs and benefits associated with debt repayment. If the perceived costs exceed the benefits, the borrower threatens to renege on its debt service obligations, and willingly faces retailation from creditors. Solvency is not a relevant issue. It is the 'willingness' of the debtor country to repay the loan which determines whether or not the debtor country will repudiate on its debt service obligations. For instance, Lee (1988, 1991) applies the multi-period willingness-to-pay model developed by Eaton and Gersovitz (1981a) to the current debt problems. In this scenario, at each payment period, the debtor country compares the expected value of the discounted utility of consumption with default against the expected value of the discounted utility of consumption with repayment. For a comprehensive review of willingness-to-pay approach, see Glick (1987, Chapter 5 and 6) and Lee (1988, Chapter 5). See also Alexander (1987).

measure the fixed fraction (call this b) of a debtor country's earnings (here exports earnings) that should be allocated to the repayment of the external debt to satisfy the solvency condition. He argues that a debtor country should be declared solvent if its observed trade surplus was superior or equal to that fixed fraction. He also notes that if n>r, then the debtor country's wealth is, in discounted present value terms, infinite and there is no solvency problem: any fraction, however small, of its income can repay any level of initial debt in finite time. If n<r, however, the country's wealth is finite and the current external debt level must be compared to the present value of future revenues if a situation of insolvency is to be avoided. Thus, D. Cohen's solvency index defines the minimum level of external debt repayment when r>n. The key factor of the index is that it weights the external debt/exports ratio by an average measure of the difference between expected real growth and real interest rates in the future. In that sense, D. Cohen's solvency index is superior to those static measures of solvency such as external debt/GDP ratio which clearly fail to explain the important role of the real growth and interest rates (i.e. the hierarchy between these two in time). The solvency index proposed by D. Cohen, however, takes this dynamic aspect into account. It implies that a country with a small amount of external debt and slow growth prospects may be less solvent than a country with a larger debt and fast growth prospects. At an empirical level, Cohen, D. (1985) shows that the debtor nations, with few exceptions, in 1983, needed to repay 15% of their exports to stay solvent. The levels of solvency indices were calculated as 7.7%, 16.4%, 12.11% and 15% for Turkey, Argentina, Mexico and Brazil respectively. When these percentages are compared to actual transfers performed by the debtors in the 1980s, it is observed that, among other countries, Turkey, Argentina, Mexico and Brazil successfully passed the test of solvency. In addition, Cohen, D. (1987) warns that any amount beyond that could seriously damage the economy and the structural adjustment programmes [see also Edwards (1989), World Bank (1987)]. Cohen, D. (1987) adds another element: the service of the domestic debt (i.e. the crucial issue of domestic budgetary problem that confronts a government that has to repay its external debt). That is, if a debtor country transfers much more than the fixed amount that the solvency index requires, then domestic debt will rise at the expense of external debt (i.e. external debt will simply be replaced by domestic debt or, put it other way, external solvency will be achieved at the expense of internal solvency).²⁷ At an empirical level, Cohen, D. (1987) shows that Brazil's crisis stems from the government insolvency, not from the insolvency of the nation. D. Cohen argues that if only 15% of Brazil's exports revenues had been transferred to creditors, its domestic debt would have risen much more moderately: by 22% instead of the actual 80% which was experienced from 1982 to 1985. What Brazil needed in the period 1982-1985, according to D. Cohen, was to reduce the servicing of its external debt and to raise domestic taxes.

Krugman (1985b) expresses his concern about the absence of sovereign risk from D. Cohen's analysis. D. Cohen's solvency index is also open, among other things, to the following question marks: a) Does the country have to "pre-commit" itself indefinitely to transfer a fixed fraction of its exports to secure its solvency? b) Why take exports as a denominator instead of GDP? In his following study, Cohen, D. (1988a) tackles these questions and shows: a) that it is enough for a country to be observed "at some time t only" to pass the test to be declared solvent, b) that neither exports nor GDP are a good indicator of a country's resources since creditors face the following moral hazard problem: if the creditors prefer basing their lending on the GDP measure, they will encourage the debtor country to change

 $^{^{27}}$ For the same point, see Buiter (1990a, pp.432-3). Also Anand et al. (1988), and Anand and van Wijnbergen (1989) suggest that both Turkey and Brazil have in recent years followed such a strategy.

its relative price structure in such a way as to increase artificially the value of its GDP (by overvaluing its currency). Conversely, if creditors base their estimations on the export measure, they will induce the debtor country to change its policy in the opposite direction; that is, the country will devalue its currency ineffectively. Since both measures create a distortion, a more appropriate measure would be the weighted average of the two.28 Following Eaton and Gersovitz (1981a) and Cohen and Sachs (1986), he assumes that the debtor country has the ability to repudiate its external debt. By doing that, unlike many other studies [for an exception, see Ghatak and Levine (1994)] D. Cohen synthesizes the ability-to-pay and willingness-to-pay approaches. Cohen expresses his views systematically in his influential "theoretical autopsy" [see Cohen, D. (1991)]. As regards repudiation issue, D. Cohen's stand is different from traditional willingness-to-pay view. He argues that it is, in practice, almost impossible to calculate the cost of default due to its complexity and "information asymmetry" as to whether a given default is due to debtor's "objective" inability to pay or not [for the same point, see also Hellwig (1986, pp.523-5) as a commentator on the Eaton et al. (1986) paper]. Instead, if a debtor country has not defaulted at the current (at time t) value of its external debt/IMW, that value is, by implication, ceteris paribus, not yet too high. Otherwise, the debtor country would have defaulted already. In other words, if a country at time t is observed to prefer repaying a fixed fraction of its resources (bIMW) to creditors rather than defaulting, by implication, ceteris paribus, the country will also be willing to repay in the future as well. One can relate bIMW to the primary surplus (TB) in equation (3.2):

²⁸Cohen (1988a) calls it "invariant measure of wealth (IMW)'. He calculates an IMW for the Brazilian case by using this technique and finds that it is 90% of exports plus 10% of GDP.

$$ND_{t} \leq \sum_{i=0}^{\infty} \frac{(TB)_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}} = \sum_{i=0}^{\infty} \frac{bIMW_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}}$$
(3.3)

provided that "no-Ponzi-game" condition $\lim_{i \to \infty} \frac{ND_{t+i}}{[1+(r^*+\lambda-n)]^i} \leq 0 \text{ holds.}$

As the commentator of the Eaton et al. (1986) paper, Hellwig (1986, pp.521-7) shows the three major weaknesses of the pure willingness-to-pay approach and criticizes their point about debtor's solvency. Although he agrees with the authors that the international debt problems must be analyzed in terms of strategic behaviour rather than mechanical concepts of insolvency or illiquidity, he expresses the following shortcomings of the authors. First, the allocation of risks in international debt contracts are inefficient, and the imposition is one-sided (i.e. on the borrower's side). Efficiency (in an uncertain world) require that lenders and borrowers share all risks arising a) from fluctuations in the US \$ parity, and b) from fluctuations in international interest rates since both are universally observable and are hardly affected by the actions of any particular debtor country or creditor in the market. Thus, it should be possible to share the risks arising from these factors efficiently between borrowers and lenders in the international credit market. From this perspective, Hellwig stresses that the international debt crisis of recent years seem to be the result of a) an inefficient prior allocation of exchange and interest rate risks in international debt, and b) an exceptionally unfavourable realization of these risks. At this point, Hellwig points out, one is tempted to regard the ongoing rescheduling as a substitute for the risk sharing arrangements that are absent from the original international debt contracts. Second, Hellwig notes that default can occur due to two reasons: debtor's unwillingness to pay or its inability

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to pay. He believes that the authors underrate the role played by debtor countries' inability to pay. Eaton et al. argue that government's ability to pay depends upon a) its ability to raise funds through taxation, and b) its ability to transfer them abroad. On both factors, Hellwig is confident that a government's objective ability to pay is remarkably less than Eaton et al. suggest. By the very nature of the information asymmetry, all sides (but not the debtor himself) will find it impossible to determine if a given default is due to inability or unwillingness to pay. Because the moral hazard interpretation of the debt crises is not distinguishable from an inability-to-pay approach based on the movements in interest and exchange rates. Third, the threat of sanctions on default may not be credible since the creditor's behaviour is subject to a fundamental time inconsistency. Ex ante, the creditor wishes to threaten the most austere sanctions in order to provide the debtor country with an incentive to run his affairs as carefully as it can and to default on its repayments only if it is truly unable to pay. However, ex post, once the debtor defaults, the creditor usually will not want to honour his threat due to noticeable private risks for some of the lender banks such as potential capital loses and write offs, and also systemic risk for the international financial and monetary system.

Clarida (1986) develops an infinite horizon model in which debtor countries repay as long as they are solvent. Since loans are available up to a ceiling to make sure that the debtor is solvent in all states of nature. Thus, default never occurs.

Due to considerable importance and popularity of the subject in international economic relations, even some textbooks examine the international sovereign debt in detail. For instance, Krugman and Obstfeld (1991, Chapter 21) especially focus on the default issue while Burda and Wyplosz (1993, Chapter 20) discuss and evaluate the concepts such as solvency condition, ability-to-pay, willingness-to-pay, systemic risk and insolvency versus illiquidity. Burda and Wyplosz (1993, p.428)

also point out that a nation that can meet its intertemporal budget constraint is solvent. In addition, they note (pp.428-32) five effects which can complicate the assessment of solvency of a debtor nation: a) unexpected changes in terms of trade; that is, a decline in the terms of trade in a world of uncertainty may drag a previously solvent nation into insolvency, b) unexpected changes in interest rates; that is, an increase in the borrowing rate reduces the present value of future primary surpluses and, here again, may be enough for turning ex ante solvent country into an insolvent one, c) the limits on a country's ability to generate primary surpluses, d) the importance and need to distinguish between the ability to pay and willingness to pay; that is, due to time inconsistency on the debtor country's behaviour, it is almost impossible to know whether the country is truly unable to pay or unwilling to pay although it is able to pay, e) systemic risk; that is, the risk of systemic collapse heavily affects the assessment of solvency of a debtor nation.

Seminal work of Mohr (1991) relates economic theory to sovereign international debt. Mohr stresses that international debt is a sovereign debt. Due to the lack of enforcement mechanism, international debt is said to be above the law.²⁹ He points out that solvency is not a sufficient condition for debt service repayment. Rather, the willingness to pay is the bottleneck constraint if it end well before a debtor's ability to pay comes to an end. Mohr tackles the problem of international debt problem within the framework of dynamic game theory. According to Mohr's analysis (pp.28-35) the only way that solvency becomes the bottleneck restriction is that in the period of repudiation the sovereign debtor country loses its entire income through sanctions (i.e. δ =1). In this case, the debtor's willingness to pay corresponds to its ability to pay. The parameter δ , within the bounds 1> δ >0, define

²⁹An interesting solution is suggested by Raffer (1990). The main idea is to apply the U.S. Chapter 9 insolvency law to international debt problems.

the range in which debtor sovereignty can exist in the long run. If $1>\delta>0$, this can be interpreted as defining the degree of sovereignty the debtor country enjoys. When $\delta>1$, solvency is the bottleneck condition and willingness to pay is irrelevant. However, when $\delta>1$, then, solvency is irrelevant and the willingness to pay is the bottleneck condition [see the following sovereignty restriction of Mohr's (p.31)]:

$$z < \delta . y^* \tag{3.4}$$

where

z represents the net transfer from the sovereign debtor to the creditors that is required to avoid a debt contract violation (in other words, z is the net cost to the debtor country of keeping a good relationship with the creditors); y^{*} represents the steady state value of the infinite sequence of income and δ is the same as explained earlier. So, what the sovereignty restriction (3.4) implies is that the net cost to the debtor country of maintaining the debt relationship must not exceed the costs arising from sanctions if repudiation is to be prevented in the long run.

Buiter (1990a, 1990b) and Currie and Levine (1991) explain the theoretical aspects of solvency in detail. In Buiter (1990a), he expresses his thoughts on the role of solvency in stabilization and structural adjustment in LDCs. He also derives solvency conditions for a nation and government separately. Currie and Levine (1991), similarly, examine the modelling of the intertemporal budget (or solvency) constraints (for both the government and the nation) in the analysis of economic policy options. The government budget and the nation's balance of payment identities are transformed into intertemporal constraints by solvency conditions. As they point out those solvency conditions require of a debtor nation or government to generate primary surpluses sometime in the future. In their analysis, Currie and

Levine (1991) assume that the fiscal authority is an intertemporal optimizing agent. Within such a framework, they examine reputational issues in the way that they relate to the budget solvency constraint facing the fiscal authority. It is important to note that both Buiter (1990a) and Currie and Levine (1991) are concerned with the open economy in which the real interest rates exceeds the growth rate in the long run (i.e. the nation cannot play a successful "Ponzi game").

Ghatak and Levine (1994), in line with the theoretical grounds developed in Currie and Levine (1991), apply the solvency analysis to India. A small scale macro-model of the Indian economy is employed to examine the cost of adjustment needed by national solvency. This cost is then compared with the corresponding cost if India were to repudiate its external payment obligations and experience financial autarky as a consequence. They conclude that a small drop in the growth rate, arising from a loss of lending and foreign investment to the Indian economy, is sufficient to deter reneging; but only if the Indian government is sufficiently far-sighted and opts for a discount rate of 5% (or less) a year. In a game theoretic framework, Ghatak and Levine successfully synthesize the ability-to-pay and the willingness-to-pay aspects of international debt.

3.3.4. Choices of Measure of the Debtor Country's Resources

The lack of a simple and widely accepted definition of the debtor country's ability to pay makes it rather difficult to determine whether it is solvent or not. First, the present value of future GDP (or output) represents the extremist upper bound on the ability to pay. That seems to be unrealistic since some minimum level of spending for consumption is inevitable. Since

Y = C+I+G+(X-M) and Y-(C+I+G) = (X-M)

where Y,C,I,G,X and M represent income, private consumption expenditure, investment expenditure, government expenditure, exports and imports respectively, then the following intertemporal national solvency conditions can be written:

$$ND_{t} \leq \sum_{i=0}^{\infty} \frac{(X-M)_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}} = \sum_{i=0}^{\infty} \frac{[Y - (C+I+G)]_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}}$$
(3.5)

These national solvency conditions assume that the government is a social planner with an unlimited potential claim on its private citizen's wealth. In this framework, the issue of the domestic budgetary problem that confronts a debtor country government is <u>not</u> taken into account.

Eaton (1989, pp.1348-9) notes that the income of the borrower places an upper bound on the resources available for debt service obligations. However, as Eaton expresses, resources available for repayment may fall remarkably short of the value of domestic resources for mainly three reasons:³⁰ a) nontraded assets and goods; that is, assets that are immobile and output of nontraded goods do not provide a basis for external debt service payments, b) the government fiscal constraints; that is, since the debt is largely a government debt, its maximal tax revenue constraints resources available for repayment, and c) moral hazard; that is, the difficulty of lender to control the allocation of resources within the borrowing country due to the fact that once a loan agreement is reached, the interests of the borrower and lender do not necessarily coincide.

³⁰In his comprehensive literature survey, Glick (1987, Chapter 4) also points out similar resource limitations for a debtor country. See also Burda and Wyplosz (1993, pp.428-30), Eaton *et al.* (1986, pp.500-1).

The most popular distinction in the solvency literature seems to be the one between the solvency of the government and the nation.³¹ Unlike the national solvency conditions like (3.5), the following solvency condition takes the domestic budgetary (fiscal) problem of the economy into account. In this case, the national solvency conditions of (3.5) turn into the following intertemporal solvency condition of the government:

$$ND_{t} \leq \sum_{i=0}^{\infty} \frac{(BS)_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}} = \sum_{i=0}^{\infty} \frac{(GS-TR-SR)_{t+i}}{[1+(r^{*}+\lambda-n)]^{i+1}}$$
(3.6)

where $BS_t=(GS-TR-SR)_t$ and ND is the government debt. BS,GS,TR and SR represent the budget surplus, government spending, tax revenue and seigniorage revenue (i.e. inflation tax) respectively.³²

D. Cohen's (1991) fixed fraction of country's resources (i.e. bIMW) as a solvency measure is, in a sense, different from others. IMW is the linear combination (or weighted average) of country's GDP and exports which is not affected by the overvaluation and undervaluation of the domestic currency. As long as the debtor country transfers bIMW, it is solvent. In this context, bIMW corresponds to (X-M) or [Y-(C+I+G)] in (3.5).

Within the context of government solvency, Buiter and Patel (1992) develop a framework and apply unit root tests to the discounted public debt of India. They stress that the evidence points to nonstationarity of the discounted debt series for India. This implies that continuation of recent patterns of behaviour of Indian

³¹See especially Buiter (1990a), Currie and Levine (1991), Cohen, D. (1987, 1991) among others.
³²For deriving the governmental intertemporal budget constraint (or solvency) conditions such s (3.6) from the government budget identities, see, e.g., Buiter (1990b), Buiter and Patel (1992).

so (3.6) from the government budget identities, see, e.g., Buiter (1990b), Buiter and Patel (1992). For deriving the intertemporal budget (solvency) constraint of a nation, such as equation (3.5), is derived from the balance of payments identity, see, e.g., Ghatak and Levine (1994), Wickens and Uctum (1993).

government debt will eventually threaten the solvency of the government [for studies using the similar framework, see, e.g., Corsetti and Roubini (1991), Werner (1992)].

Solvency considerations of the government in a game theoretic framework are also applied to areas such as international policy coordination and economics of European Monetary Union (EMU) [see e.g. Brociner and Levine (1992), Levine and Pearlman (1992)].

3.4. Discussion

The official strategy between the years 1982 and 1989 evaluated the external problem of LDCs as a temporary one. A new strategy came into effect in 1989 by the Brady Plan. The Brady Plan, unlike the Baker Plan, recognized the need for debt relief and debt reduction. This implies a shift in the direction of the official strategy, acknowledging the fact that we have something closer to insolvency³³ rather than pure illiquidity.

What is the relevance of default decision then? There is little doubt that international debt is a sovereign debt. This simply means that whatever the costs of default may be, there will always be some level of debt at which a sovereign debtor will default rather than servicing it fully. In practice, for instance, there have been two different examples in the history: the 1930s and the 1980s. In the 1930s, in a very similar situation, almost every Latin American country defaulted on its debt obligation. In the 1980s, however, the debtor country governments have been very reluctant to give default decisions. Then, why have the majority of the indebted countries continued to pay their debts against all the odds in the 1980s unlike the 1930s? Sachs (1986) and Diaz-Alejandro (1984) emphasize the existence

 $^{^{33}\}mbox{Cohen},$ B. (1989a) calls it "de facto insolvency" and in what follows we use the same term to refer to this situation.

of an influential political and economic power (i.e. the United States) in the 1980s which have been absent in the 1930s.³⁴ As Sachs (1986, p.411) put it: "...In the 1980s, the US has managed the debt crisis with a view toward maintaining continued commercial bank debt servicing. Under the US aegis, the other creditor governments and, through them, multilateral institutions have supported that basic strategy...Retaliation by the banks would involve no more than a cutoff of new loans, a withdrawal of trade credits, and possible seizure of some assets of the debtor government held in the creditor countries. But breaking official ties with creditor governments would involve such crucial financial and nonfinancial areas as aid, trade policy, technology licensing, and arms deals...". Furthermore, Diaz-Alejandro (1984) notes that defaults would threaten the debtor country.

As Sachs (1989a, p.241) put it: "...the whole question of whether the debt poses a liquidity, solvency or willingness-to-pay problem has turned to be rather sterile...". Simonsen (1985) notes that there is no clear borderline between liquidity and solvency. Krugman (1985a) goes further by claiming that even the solvency-insolvency distinction is impossible to operationalize when deciding how to respond to specific debt problems. In his view, it is quite difficult to explain a crisis unless there is a real possibility that the borrower is truly insolvent. If an indebted country is "only liquid, not insolvent", then it is not clear why commercial banks would not voluntarily provide necessary bridge loans needed to keep the debtor alive over until repayment resumes.

Hellwig's argument (1986) against Eaton et al. (1986) sounds reasonable to

³⁴As regards this influential "power", we believe that country specific factors also played an important role in determining the extent of the vulnerability of the indebted countries in the 1980s. We, however, decline to acknowledge that this factor alone played a significant role in causing the uninterrupted debt service of Turkey in the same era. See Eichengreen and Portes (1989) for a comparison of the 1930s with the 1980s. See also Kindleberger (1986) for an evaluation of the 1930s.

reach a balance between solvency and willingness-to-pay approaches. Accepting the role played by the debtor's unwillingness-to-pay, Hellwig (1986) notes that the supporters of the willingness-to-pay view tend to underrate the important role played by the debtor's true inability-to-pay. In the event of default, creditors, by observing from outside, will find it very difficult to decide whether it is due to unwillingness or true inability of the debtor. In this context, one cannot dismiss the possibility of default owing to debtor's true inability-to-pay.

Due to overall consideration, we agree with the opinion that the LDC debt problem needs to be analyzed in terms of strategic behaviour rather than mechanical concepts of insolvency, illiquidity or unwillingness although each of them has different policy implications for debtor countries, international banks, creditor governments and international organisations such as World Bank and IMF. We have the following reasons in mind why it is logical to analyze the LDC external debt problem in terms of strategic behaviour rather than mechanical concepts of insolvency, illiquidity and unwillingness:

a) Practical difficulties to distinguish between the ability-to-pay and the willingness-to-pay on the one hand, and between the solvency (long-run) and the liquidity (short-run) aspects of the sovereign debt on the other. First, due to moral hazard problems and asymmetric information in international debt, in practice, it is almost not possible for creditors to make sure that the debtor country is truly unable to pay or unwilling to pay. Thus, creditors prospective behaviours are driven by their own perception (i.e. subjective opinion) about debtor's situation. Second, in a similar way, the lack of clear solvency criteria makes it rather difficult, if not impossible, to distinguish between solvency and illiquidity although, in theory, they differ fundamentally. The debtor country may be unable to service its existing external debt simply because the liquid resources are not available. In this case, the

present discounted value logic favour lending to the country to help come over its difficulties this year so that it will have the productive capacity to repay its interest and principle in the future.

b) These different explanations of LDC debt problems are not necessarily alternatives or substitutes. That is, a country might be illiquid but solvent; illiquid and insolvent; liquid but insolvent; liquid, solvent but unwilling-to-pay; willing-to-pay but illiquid and insolvent and etc. Given the confusing international debt game between creditors and debtor countries, one can appreciate how difficult (if not impossible) for creditors and third parties (such as IMF and World Bank) to put clear borderlines and to define the situation objectively.

c) From the global perspective, we believe that the problem of LDCs in the 1980s and the early 1990s cannot be explained by a pure liquidity problem. Various aspects of the problem mentioned above suggest that we have something more serious and closer to insolvency (already called "de facto insolvency") rather than pure illiquidity. Continuation of the low growth rates, high external debt burden, and high discount rates in the secondary debt market are the main factors implying that the global situation is closer to insolvency rather than pure illiquidity. This suggestion, however, does not imply that we dismiss the global default risk of the indebted countries; on the contrary, it is a fact that the international debt is sovereign debt. The costs of default are not infinite; that is, there will surely be some level of foreign debt at which a sovereign debtor will default rather than repay. It would be very realistic if we assess this statement in the light of the global economic environment of the 1980s and the early 1990s. The presence of an "hegemonic" power (the US) in the 1980s and the early 1990s makes the default decision too costly for the LDCs due to the reasons mentioned above. There is little doubt that this is the main reason why most of the indebted countries have been reluctant to default and continued repaying the debt during the 1980s and the early 1990s.

Secondly, country specific factors are also determining on which countries escaped from the crisis and which could not. For example, it is likely that some Latin American countries and many low income African debtors are having a situation closer to insolvency rather than pure illiquidity. However, Korea, for instance, have followed a very different path and, is possibly not subject to "de facto insolvency". That is to say, each country has its own characteristic and structure as far as the external debt problem is concerned. Having recognized the global diagnosis as "de facto insolvency", does not necessarily imply that a specific country also suffer from the same problem. As a whole, a strategy dealing with the debt problem of LDCs should take into account not only global factors but also country specific factors. In this sense, the strategy which has been implemented by the Brady Plan sounds reasonable provided that it would be much faster to get going and its extent presumably needs to be reconsidered.

Accordingly, Turkey, like any other indebted country, has its own characteristics and structure regarding the external debt problem. Thus, a closer look and investigation is needed to sort out these country specific factors. With its uninterrupted debt service and its good relations with the creditors for more than a decade, Turkey is regarded as a success case. Its debt is sold in the secondary market with a little discount only suggesting the fact that the country is perceived as solvent and creditworthy by the international credit market. Thus, it is our aim in this study to see whether the country is truly solvent as suggested by very low discount values in the secondary market or the market indicators are simply misleading. To do that, in this thesis, we develop a solvency model pioneered by Cohen, D. (1985). This model is then applied to Turkey.

CHAPTER FOUR

THE TURKISH ECONOMY IN RETROSPECT

4.1. Introduction

This chapter presents an overview of the Turkish economy during the Republic years. The focus, however, is on the post-War (1950-90) period. The methodology of the chapter is mostly descriptive. Its focus is based on an interpretive evaluation of the economic policies implemented. The main aim is to set the stage for the next chapters where we examine the external solvency and the trade sector issues of the Turkish economy. Naturally, the questions to be asked are primarily centred around that main theme. What is the stage of industrial development that Turkey has reached under the planned import-substitution industrialisation (ISI) phase? What are the main results of the economic policy switch (to an outward-oriented export-led strategy (ELG)) introduced in 1980? What lessons are to be taken for the years ahead?

The chapter consists of the following sections. The next section summarizes the general characteristics of the Turkish economy and provides an economic background including some comparisons with other middle-income countries. Section 4.3 focuses on the early foundations of the Turkish economic development (1923-29), the state-led industrialisation (i.e. etatism) in the 1930s, the economic aspects of the development strategies that were adapted during the War and

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post-War years (1939-50) and an experience of liberalism under the Democrats (1950-61). Section 4.4 examines the inward-oriented ISI phase of development, and covers the performance of the economy during the 1962-79 period (i.e. national planning years under the influence of etatism). Section 4.5 introduces the 1980 Reform package and evaluates the performance of the 1980s (i.e. market orientation and export-led growth (ELG)). The final section is devoted to a brief discussion.

4.2. Economic Background

Although it may be inappropriate to call any country "typical" of a large group, Turkey, in many respects, is a typical middle-income LDCs. Table 4.1 provides a comparison of middle-income countries (MICs), lower-middle income countries (LMICs), upper-middle-income countries (UMICs) and severely indebted middle-income countries (SIMICs) with Turkey while Table 4.2 presents a comparison of Turkey with the norms calculated in Chenery and Syrquin (1975) for a "typical" LDC with approximately the same per capita GNP and population as Turkey. Regarding Table 4.1, Turkey lies near the average of MICs in terms of the main indicators presented. However, Turkey is more "dualistic" than most middle income countries. Note that the country's GNP per capita is closer to those LMICs although its GDP growth rate during the eighties is impressively higher than the MICs. The World Bank classifies Turkey as a LMIC [see World Bank (1991, 1992) and various issues of World Development Report].

As far as Table 4.2 is concerned, the comparisons are reported for two years (i.e. 1977 and 1984) to point out the similarities and differences of Turkish economic structure during the years of inward and outward orientation. In 1977, Turkey is different from the typical LDC in a number of respects:

a) Both exports and imports are quite small as a percentage of GDP.

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Exports, especially, are extremely low and grew much less rapidly than in comparable LDCs.

b) Gross domestic savings is relatively low compared to the typical LDC.
 Gross domestic investment is above the norm; foreign borrowing and workers' remittances financed the gap between investment and savings.

c) A large proportion of the economy remains in the agricultural sector; both output and employment in the primary sector are much larger than in the typical LDC.

The comparison of norm to performance in 1984 explains both the increased outward orientation of the recent period and the remaining structural imbalances within the economy (for structural outlook of the Turkish economy during the second half of the 1980s, see Table 4.3):

a) The industrialisation of the economy has risen rapidly, with both output and employment shares in primary production regressing to "normal" levels while output and employment shares in industry rose closer to norm.

b) From an economy with below-norm shares of GNP for exports and imports, the economy has evolved to one with above-norm shares of imports and exports. The gap between import and export shares scarcely declined, however. The gap between total export and import shares in Turkey for 1977 is 8 percent of GNP; the same gap in 1984 is 7 percent.

c) This structural problem is also evident in the investment-savings imbalance. Investment exceeds savings by 9 percent of GNP in 1977; this is also true in 1984. The main difference between the two periods, as the comparison to the international norm shows, is that both investment and savings have fallen suddenly. National savings is still below "normal" by 11 percentage points; national

investment dropped from above-norm to below-norm.1

Table 4.4 illustrates the composition of national income and growth by sector for selected years between 1950 and 1990. Similarly, Table 4.5 shows the composition of GDP by sectors for the same selected years between 1950 and 1990. An important change is the steady decline in agriculture's share from about 45 percent in 1950 to less than 20 percent in 1990. Meanwhile, industry's share came from about 12 percent in 1950 to about 27 percent in 1990. Services sector also increased its share of GDP from about 37 percent in 1950 to about 48 percent in 1990. These developments underline the extent of the transition process that Turkey has realized during the post-War years. Despite its diminishing share of GDP, agriculture still remains a very important sector in Turkey. It accounts for about half of all employment, and its raw products are the important components of most of the country's exports.

Agricultural problems of Turkey are much like those of many LDCs. Agriculture grew quite fast in the 1950s as the amount of land under cultivation increased by 50 percent. Since the early 1960s, however, the cultivated area has grown by only 15 percent, and there has been a slight decline in cultivated area in the last decade. That is why, increased value added should come either from higher yields or from planting larger amounts of higher-valued crops. In the Turkish case, however, increases in yields have been elusive due to infrastructure problems, poor use of credit, and the high costs of additional irrigation, fertilizers, and pesticides.

During this period, government policies of subsidized credit, price and quantity protection, and considerable amount public investment have been used to

¹Note that although this investment trend is "abnormal" from the Chenery-Syrquin calculations, it is typical of debt-burdened economy behaviour in the 1980s. Gross capital formation as a percent of GDP was 27 percent in 1977 and 18 percent in 1984 for those countries that the IMF describes as having recent debt servicing problems [see IMF (1986)]. For the investment-savings imbalance of Turkey during the second half of the 1980s, see also Table 4.3.

assist the manufacturing sector. Therefore, it is not surprising to see that the sector's growth has far exceeded that of GDP during the period (see Table 4.4). About half of manufactured output (in terms of gross output value) is consumer goods. It is worth noting that the share of consumer goods in value added and employment is considerably larger. Despite the fact that manufactured investment goods represent only 10-15 percent of the sectoral value, they have been growing much more quickly than any other sector, mainly due to public investment expenditures (often at low or negative real rates of return).

The manufacturing sector mainly consist of three subsectors: public, large-scale private, and small-scale private. The public sector [i.e. State Economic Enterprises (SEEs)] dominates heavy industry and receives the largest share of investment. Large-scale private industry has been supported by the government through allocation of credit and high level of protection from foreign competition until especially the 1980s. Although the country has been more trade oriented (i.e. less anti-export bias) during the 1980s, some industries, such as automotive industry, are still protected from foreign competition to a considerable extent by imposing high tariff rates. The private small-scale manufacturing appears to be the closest to being an internally competitive sector. Naturally, wages and capital-to-labour ratios are lower, and entry to the market is relatively easier. High growth rates have been avoided, however, by the sector's difficulty in draining funds from credit markets. Recently, the main objectives of the government have been to support the manufacturing sector by a) encouraging exports, b) promoting private investment, c) lowering capital-to-output and capital-to-labour ratios, and improving the efficiency of the SEEs.

The economy's average real annual GNP growth rate for the period 1950-90 was 5.8 percent, although there was significant variation within subperiods (see
Table 4.6). The periods of most rapid growth were 1950-58, 1970-76 and 1981-90 while the period of slowest growth was that from 1977 to 1980. Provided that the 1980s were the "lost years" in terms of investment and output growth for many heavily indebted LDCs, Turkey's average real annual GNP growth rate of 5.2 percent during the 1980s (i.e. worldwide recession years) deserves much appreciation. It is also worth noting that the rapid growth in the mid-1970s was misleading, since it was paid for by rapidly rising trade deficits and additional foreign debt. The slow growth of the late 1970s was the result of experiencing a foreign debt crisis (or the country's inability to finance trade deficits at previous relative magnitudes), structural adjustments associated with changing global factor prices, and macroeconomic stabilisation policies.

Turkey comprises about 780,000 km² of which 97-98 percent lie in the Asia Minor land mass (i.e. Anatolia) and the rest lie on the European side of the Dardanelles and the Bosphoros (see Map 4.1). For a country of its size, Turkey is only moderately endowed with mineral resources. Some of the minerals found in Turkey include coal, lignite, petroleum, iron ore, chrome, boron and etc. Although petroleum is Turkey's most (economically) valuable mineral, domestic production accounts for only about 12 percent of total petroleum consumption. The mining sector accounts for less than 2 percent of GDP and less than 1 percent of total employment. It is important to note that these proportions have not changed considerably since 1960.

Turkey is starting to take greater advantage of its favourable location. During the 1980s, particularly since the beginning of the war between Iran and Iraq, Turkey's exports to the Middle East (although the OECD countries have been the traditional trade partners of Turkey) have increased substantially to the level of about 30-40 percent of export earnings. Service exports to the Middle East have also risen.² Turkey is also a major competitor for medium-sized construction projects in the Middle East and the Persian Gulf countries. As regards the demographic developments, the population has grown rapidly during the post-War period and is now about 60 million (see Table 4.7). The main reason appear to be efficient public health measures which have led to reduced infant and adult mortality. Annual average total population increase came from 3.2 percent during the 1950-60 period to about 2.3 percent during the 1985-90 period (see Table 4.7). Apparently, there has been a sharp fall in total population growth since the 1970s. This development may well be due to improved female literacy, which correlates negatively with birth rates. However, it is important to note that even if the number of children per mother decline sharply, the population is expected to continue to increase rapidly since half of the population is under 20 years old.

Rapid and unbalanced urbanisation is another important demographic factor. During the 1950-1990 period, annual average urban population increase has always been higher than the total population increase, mainly due to migration from rural area to cities (see Table 4.7). Although the major cities (especially Istanbul, Ankara and Izmir) have grown rapidly, the urban population is still less concentrated than in most LDCs. Since the mid-1960s, medium-sized cities have grown even faster than large cities, easing the pressure on the large cities.

Labour force has grown more slowly than the total population. One reason for this may be that female participation is much higher in agriculture than in other sectors of the economy. It is also worth pointing out that Turkey has been a net exporter of labour, mainly to Germany and other European countries, since the early

²Note that after the invasion of Kuwait in 1991, an international trade embargo has imposed (and still continues) on Iraq. The cost of this embargo to the Turkish economy is estimated around 20 billion US\$ by the government sources, given that Iraq's exports about a million barrels of oil daily through a pipeline in Turkey had to be stopped.

1960s. This has resulted in some important effects on the whole economy. Workers' remittances forms a significant fraction of Turkey's foreign exchange earnings, labour migration has eased the domestic unemployment problem, and the domestic labour force has been more qualified due to returning workers.

Turkey is typical of middle-income LDCs in other respects as well. Its political background, for example, have witnessed considerable instability during the last 30 years: a number of changes in the ruling coalitions, three constitutions, and three military interventions (the last one in 1980). Ideologically, government policy has been consistently nationalistic, with economic policy ranging from mildly leftist to moderately rightist. While generally supporting other LDCs on international economic issues, Turkey has remained an active member of the North Atlantic Treaty Organization (NATO) and the Organization for Economic Corporation and Development (OECD). Turkey joined the EC as an associate member in 1963 on the signing of the Ankara Agreement. In 1987, Turkey applied for full membership of the EC, a decision on which was postponed until at least 1992 following a discouraging preliminary assessment by the Commission of the EC. Turkey is already committed to completing a customs union by 1996.

For half a century, from the 1930s to the beginning of the 1980s, except for short period of time liberalization experience between 1950 to 1953, Turkey followed a strategy of growth through inward-oriented ISI strategy coupled with intensive government intervention.³ The government has had a leading role in the economy by creating public enterprises while putting barriers to trade and financial flows. Although it is useful in discussing long-run economic developments by

³Note that in a recent World Bank study on liberalising foreign trade, Baysan and Blitzer (1991) focus on developments in the Turkish foreign trade sector between 1950 and 1984. They identify four attempts of trade liberalisation, namely the years 1950, 1958, 1970 and 1980. The authors conclude that the liberalisation was not sustained in the first three cases. Only the 1980 liberalisation attempt is viewed as the start of a more fundamental and sustained liberalisation. For more information, see Chapter Six.

aggregating information in a few periods, Turkey's changing development strategies suggest a much more detailed periodisation. Table 4.8 illustrates the periods that are examined in the next sections.

From the early 1930s to the early 1980s, Turkey's economic policies are characterised as interventionist and protectionist. Accordingly, policies were mainly designed to protect domestic industry from foreign competition and increase the government controls over the allocation of resources and production of goods. These included the following policies and principles [Saracoglu (1987)]:

a) encouragement of the domestic industrial sector with minimal foreign competition (infant industry argument) through the introduction of quotas, high tariffs and licensing requirements;

b) a high level of monetary expansion to finance large fiscal deficits;

c) support to the industrialisation process and avoidance of bottlenecks by the creation of SEEs in sectors such as steel production and mining;

d) control over the quantity and price of credit to influence the sectoral composition of investment within the private sector;

e) the maintenance of fixed exchange rates and exchange controls which results in overvalued domestic currency.

Political instability has carried over into economic policy. While all the Turkish governments have been interventionist and nationalistic,⁴ there have been changes in emphasis over the years. For example, rightist governments have been more willing to rely on the private sector and to reduce trade restrictions, while the left has placed more emphasis on social welfare programs and economic autarky. In this respect, governments have used their economic power (in terms of both price

 $^{^{4}}$ By which we mean that the state has tried to direct the pattern of investment while limiting foreign ownership and management.

intervention and operation of SEEs) to implement a consistent set of economic policies. Although the reforms of 1980 were significant, Turkey remains an economy in which the public sector accounts for about 60 percent of national investment, owns and operates about 40 percent of all manufacturing enterprises, and controls the minerals sector. This pattern is no exception among LDCs.

Table -	4.1	Basic	Indicators	of	Development	for	Turkey:	А	Comparis	son
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	GNP Per Capita (US \$) 1990	GDP Growth Rate (%) 1980-1990	Average Inf.Rate (%) 1980-1990	Life Exp.Birth (Years) 1990	Adult Illiteracy (%) 1990	Average Pop.Growth (%) 1980-1990	Urban Pop. (%)of total popul. 1990
Turkey	1,630	5.2	47.4	67	19	2.4	61
MIC	2,220	2.5	85.6	66	22	2.0	60
LMIC ^b	1,530	2.6	64.8	65	25	2.2	52
UMIC°	3,410	2.4	102.1	68	16	1.7	71
SIC ⁴	2,140	1.7	173.5	67	21	2.1	69

* Middle-income countries.

Middle-income countries.
Lower-middle-income countries.
⁶ Upper-middle-income countries.
⁴ Severely indebted countries.
Source: World Bank, World Development Report (1992); State Planning Organisation (SPO) Statistics (various years).

Table 4	4.2	Turkey	: Compa	arison	of	Performance	with	Development	Norms
(perce	nt d	of GNP	unless	otherv	vise	e stated)			

	Chenery Norm of a 'Typical' LDC	Turkey 1977	Deviation from Norm	Turkey 1984	Deviation from Norm
Primary Output	24	28	± A	19	**
Industrial Output	33	27	-6	33	õ
National Savings (gross	s) 22	17	-5	11	-11
National Invest. (gross)	23	26	+3	20	-3
Exports	11	5	-6	12	+1
Imports	13	12	-1	22	+9
Primary Employment	38	62	+24	52	+14
Industrial Employment	28	14	-14	21	-7

Comment to Table 4.2: Chenery norm of a "typical" LDC is derived for a large country with GNP per capita of \$570 in 1964 \$US, population of 42 million and average capital inflow of 2 percent of GNP. The methodology used is discussed in Chenery and Syrquin (1975). The norm calculation is most exact for 1977; in 1984 the population is higher (48 million) and the dollar value of GNP per capita at current exchange rate is lower (\$350). The actual average capital inflow in 1977 and 1984 was 8 and 7 percent, respectively, of GDP at market prices; 2 percent is used to indicate an international norm with a sustainable amount of capital inflow. Employment figures are expressed as percentages of labour force.

Table 4.3 Structural Outlook of the Turkish Economy, 1986-90 (billion Turkish Lira (TL) at 1988 prices)

	1986	1987	1988	1989	1990°
Gross National Product	90,298	97,058	100,582	102,229	111,392
External Deficit	2,060	867	-2,268	-1,615	1,559
Total Resources	92,358	97,924	98,315	100,614	112,951
Total Investment, (TI)	24,424	25,738	24,231	23,894	27,743
Fixed Capital Investment	23,278	24,468	24,182	23,992	26,045
Public	13,855	13,292	11,494	10,786	11,705
Private	9,423	11,176	12,688	13,207	14,340
Total Consumpt. (TC)	67,934	72,186	74,083	76,720	85,208
Public Disposable Income	19,052	17,296	17,679	15,936	15,214
Public Consumption	8,234	8,544	8,799	9,041	10,115
Public Savings, (PS)	10,818	8,752	8,880	6,895	5,099
Public Investment, (PI)	13,910	13,695	10,974	10,512	12,784
(PS)-(PI)	-3,092	-4,943	-2,094	-3,617	-7,685
Public Savings Ratio,%	57	51	50	43	34
Public Inv. Ratio,%	73	79	62	66	84
(PS)-(PI) as %	-16	-28	-12	-23	-50
Private Disposable Income	71,246	79,762	82,903	86,293	96,179
Private Consumption	59,700	63,642	65,284	67,679	75,093
Private Savings, (PRS)	11,546	16,120	17,619	18,614	21,085
Private Investment,(PRI)	10,514	12,043	13,258	13,382	14,959
(PRS)-(PRI)	1,032	4,077	4,361	5,232	6,126
Private Savings Ratio,%	16	20	21	22	22
Private Inv. Ratio,%	15	15	16	16	16
(PRS)-(PRI) as %	1	5	5	6	6
Total Savings,(TS)	22,364	24,872	26,499	25,509	26,184
(TS)-(TI)	-2,060	-866	2,267	1,615	-1.559
Total Savings/GNP	25	26	26	25	24
Fixed Cap.Inv./GNP	26	25	24	23	23
Total Inv./GNP	27	27	24	23	25

Projection.
 Source: Central Bank of Turkey, Annual Report, 1990.

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Activity	1950	1958	1964	1970	1976	1982	1985	(1)0661
Agriculture	15.6	25.7	28.7	32.0	42.7	48.2	51.3	59.8
Industry	4.2	8.8	13.1	22.7	39.2	46.0	57.4	80.8
Construction	2.1	4.1	5.4	8.2	11.2	13.0	13.7	16.5
Services	12.9	22.1	31.6	49.4	81.1	97.6	112.7	147.1
GDP at factor cost	34.8	60.7	78.9	112.3	174.1	204.8	235.1	304.2
Net factor income from								
abroad	-0.1	-0.5	-0.2	1.5	2.5	1.1	0.6	2.0
GNP at factor cost	34.7	60.2	78.7	113.8	176.6	205.9	235.7	306.2
(1) Projection. Source: State Institute	of Statistics,	Statistical	Yearbook	f Turkey, v	arious issues	s; State P]	lanning Orga	nisation, Main

, source: state institute of statistics, statistical reactook of ut Economic Indicators (1991), and Baysan and Blitzer (1991, p.276).

Table 4.5 Composition of GDP by Sectors for Selected Years, 1950-1990, as percentage (%)

Agriculture 44.8 42.3 36.4 28.5		1982	COAT	(T)066T
	24.5	23.5	21.8	19.6
Industrv 12.1 14.5 16.b 20.2	22.5	.22.5	24.4	26.6
Construction 6.0 6.8 6.9 7.3	6.4	6.3	5.8	5.4
Services 37.1 36.4 40.1 44.0	46.6	47.7	48.0	48.4
Total 100.0 100.0 100.0 100.0	100.0	100.0	100.0	100.0

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Table 4.6 Annual Growth Rate of Real GNP (as 2), 1950-1990

1969	5.4	
1968	6.7	
1967	4.2	
1966	12.0	
1965	3.1	
1964	4.1	
1963	9.7	
1962	6.2	
1961	2.0	
1960	3.4	
1959	4.1	
1958	4.5	
1957	7.8	
1956	3.2	
1955	7.9	
1954	-3.0	
1953	11.2	
1952	11.9	
1951	12.8	
1950	9.4	

Table 4.7 Sone Denographic Indicators, 1950-1990

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68 51	6 6 5 5	63	61 111	58 140	55 158	52 185	43 206	44 235	Life Expoctancy at Birth (years) Treat Mortslitt (nor 1 000)
1990-95(2)	1985-90	1980-85	1975-80	1970-75	1965-70	1960-65	1955-60	1950-55	
29,003,235	137	23,286,	96,393	17,98	10,905,624	15,111	6,2	3,035,961	Urban Population (person) (1)
27,469,800	321	27,378,	50,564	26,75	24,699,552	89,709	21,5	13,911,227	Rural Population (person)
56,473,035	458	50,664,	36,957	44,7	35,605,176	54,820	27,73	20,947,188	Total Population (person)
1990		1985	980	1:	1970	960	1	1950	

Infant Mortality (per 1,000) 235 206 185 158 140 111 83 Source: State Planning Organisation (SPO), Economic and Social Indicators (1950-1992), May, 1993. (2) Projection.

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Table 4.8 Turkey's Development Strategy, by Period, the Republic years

Period	Institutional Setting	Development Strategy
1923-29	Private enterprise, free trade with low tariffs (Lausanne Treaty)	Westernisation, recovery, in- frastructure, industrialisa- tion, tax reform)
1929-39	Etatism, mixed economy with large public enterprise sec- tor, balance of payments controls, primitive five-year planning	Inward-looking import substi- tution, infrastructure, industrialisation
1939-46	Etatism, mixed economy, war economy for neutrality	Military considerations
1946-50	Relaxed etatism, mixed econ- omy, controls	Recovery, increased emphasis on agriculture
1950-53	Democracy, trade liberalisa- tion, mixed economy	Agricultural expansion and mechanisation
1953-59	Democracy, mixed economy, balance of payments controls	Agricultural expansion, import substitution
1959-62	Democracy replaced by mili- tary regime, etatism, mixed economy	Stabilisation
1962-78	Democracy, mixed economy, comprehensive planning, labour market liberalisation	Import substitution
1978-80	Same as in 1962-78	Stabilisation
1980-85	Military regime followed by limited democracy, mixed economy, trade and finan- cial liberalisation, labour market repression	Stabilisation, export-oriented growth
1985-	Democracy, mixed economy, trade and financial liberali- sation, accelerating inflation	Export-oriented growth

Source: Hansen (1991), p.264.

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Map 4.1 Map of Turkey



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4.3. Early Foundations and The Post-War Era

The Ottoman Legacy and the Early Years, 1923-29

Following the collapse of Ottoman Empire, the Turkish Republic was established in 1923. Period between 1923-50 practised the efforts of the political movement (Republican People's Party) which directed the war of independence and ruled the country afterwards. During this period, main emphasis was given to the establishment of an economic base on the grounds of self-sufficiency.

The young Turkish Republic inherited a seriously handicapped economy from the ruins of the Ottoman Empire in 1923.⁵ The Turkish economy during the 1920s was under the legacy of war years and political conflicts. It was an economy without a modern manufacturing basis inherited from the Ottoman Empire. Manufacturing sector in the Ottoman era was overwhelmingly composed by small workshops which processed primary products for domestic market. Two industrial censuses of 1913 and 1915 are the only reliable statistics of the manufacturing sector in Anatolia (land which covers today's Turkey) under the Ottoman rule. Both censuses covered the western part of Anatolia, particularly Istanbul and Izmir, where the manufacturing activities mainly concentrated. 55 percent of the industrial plants covered in the 1915 census located in and around Istanbul, 22 percent in Izmir and 23 percent in other regions.⁶ Food and textile had the largest share among the products of 264 plants covered by the censuses of 1913 and 1915. Textile and food processing formed about 84 percent of the total production in 1913 and 82 per cent in 1915 [Wagstaff (1989)]. Only few of the plant covered were factories

For information on the Ottoman economy in the 19th century and the early 20th century, see, among others, Gursoy (1989), Kepenek (1990), Pamuk (1984).

For details of these two industrial censuses in 1913 and 1915, see, e.g., Boratav (1988), Hansen (1991, esp. Part II), Kepenek (1990), Owen (1981) and Wagstaff (1989).

in the real sense. Another census was carried out by the Ankara government in 1921 during the War of Independence. This time the census covered all plants in Anatolia except the industrial centres such as Istanbul and Izmir. Plants covered by 1921 industrial census showed very similar product range as the Ottoman government's censuses in 1913 and 1915 [Owen (1981)]. In this respect, there is no surprise why Boratav (1988) refers to the 1920s as an extension of the late Ottoman economy. Hershlag (1988), however, tends to see it as a "transitional period of trial and error" due to post-War reconstruction of the economy.

Although terms such as "liberal" and "market economy" are used to describe the 1923-29 era (as far as the economic policy is concerned), these phrases are generally used to refer to the contrast between the 1920s and the etatist 1930s. The leaders of the new Turkish Republic decided to let industrialisation be based on private entrepreneurship and to support the emerging industry. They also aimed at accelerating the private capital accumulation in the industrial sector with government intervention whenever necessary. Therefore, economic policy of the 1920s cannot appropriately be termed "liberal".

During the 1920s, government of the new Republic has had two important task: securing the national unity and developing a viable economy. A set of reforms was introduced to create a nation from the subjects of the former Ottoman Empire. As regards the economic policies, an economic congress, in which economic policies and prospects of the Republic were debated, was held in Izmir in 1923. Businessmen, farmers, manufacturers and workers were represented at the Congress [Kepenek (1990)]. There were two major issues: the role of the state in the economy and the role of foreign capital. The outcome of the Izmir Congress was in favour of free enterprise, and the economic policies of the 1920s were remarkably influenced by the idea of free enterprise [Hershlag (1988)]. The major role undertaken by the state has been to create the appropriate environment required by a liberal economy [Hale (1981),Hershlag (1988)].

During the new Republic years, political issues relating to formation of the Republic, undoubtedly, played an important role on shaping the economic policies adopted as a whole. Some of the economic provisions of the 1923 Lausanne peace treaty acted as constraints on the new republican government during the 1920s [Hansen (1991)]. This is because, in addition to the peace settlement, the 1923 treaty also covered some important economic matters. For instance, the treaty froze tariffs at the level of the adjusted specific scale of 1916, which nearly corresponded to the level of nominal protection existing on the eve of World War I. In addition, differential rates of taxes on imported and locally produced goods were prohibited. Under the treaty, Turkey was obliged to eliminate prevailing quantitative restrictions on foreign trade and prevented from introducing new ones [Hansen (1991)]. Another important economic outcome of the 1923 peace treaty was that Turkey had to repay two thirds (2/3) of the Ottoman external debts (around 78 million sterling) starting in 1929 [Boratav (1988), Hale (1981)]. While the government's industrialisation policies during the 1920s were ambiguous, they became more explicit and much more protective after 1929 when the provisions of the Lausanne treaty expired and the Great Depression began.

The 1927 industrial census can give a good idea about the economic situation in Turkey in the early years. At the time, the manufacturing industry mainly consisted of small enterprises. It is worth noting that product range of the enterprises were not different from those revealed by the earlier industrial censuses in 1913 and 1915, and mainly concentrated in food processing, metal works, and textile (see Table 4.9).

Agriculture has continued to be the dominant sector in the economy during

the period. Between 1924 and 1929, average annual growth in agricultural production was about 16 percent while industrial growth was 8.5 percent [Boratav (1988)]. An important point here is that the government's efforts in agricultural development were far behind the incentives of the industrial sector.

The model of industrial development being followed by the governments of the 1920s emphasized public financing with the active participation of private local investors and capital contributions from foreign investors. As regards the agricultural development, the aim was both to improve the standard of living of the rural population and to increase the contribution of the agricultural sector to the industrialisation process through supply of raw materials. The governments, undoubtedly, knew the low levels of both land and labour productivity in agriculture and the potential for betterment. Fortunately, in the 1920s, world market conditions were relatively favourable for exports of primary commodities. Thus, the government emphasized the increasing commercialisation and export orientation of agriculture.

Table 4.10 suggests that the 1923-29 period is characterised by the high growth rates of typical of postwar periods. Domestic demand has been the main source of the expansion in national production in these years. From 1923-25 to 1927-29, the estimated growth rate for the GDP was 7.5 percent.

As pointed out by Hansen (1991, p.316), in a compromise between ideology and realpolitik, leaders of the new republican government thus, during the years of reconstruction (1923-29), adopted a relatively free trade and finance policy. Government, to the extent possible given the external constraints, subsidized an inward-looking infant-industry strategy and an export-oriented agricultural-development strategy, shifting taxation from rural to urban population. The economy in the early years of the republic is assessed as an extension of the Ottoman economic structure and/or as a restructuring period [Hershlag (1988), Boratav (1988)]. It was, however, far from self sufficiency, and had to import some basic consumer goods while country's exports largely consisted of agricultural goods.

The Etatist Experiment, 1929-50

The year 1929 marked the turning point for economic development of Turkey in several ways. First of all, this was the beginning of the Great Depression.⁷ For Turkey, however, it was also the year of abolition of the Capitulations when, among other things, the country eventually obtained tax and tariff autonomy. For both reasons, this is the year from which new development efforts should be expected.

Because Turkey was an exporter of primary commodities, the 1929 Great Depression caused a sharp deterioration in Turkey's external terms of trade. The provision of the Lausanne treaty that froze Turkish tariffs at about the prewar levels of 11 percent was expired and a new tariff structure was implemented from 1929 onwards. Another importance of the year of 1929 is that the first instalment of the old Ottoman foreign debts was paid (the repayment continued until 1953).

The new developments emerged after 1929 made the government search for a new strategy for economic development. The policies and measures associated with this new strategy was referred to as "etatism", and was recognized as the official economic ideology of the republican government. According to "etatism", the government would continue to acknowledge the importance of private enterprise, but because of undesired international developments, the state would have to

 $^{^7\!\}mathrm{For}$ the global economic effects of the Great Depression on the Turkish economy during the 1930s, see, e.g., Gursoy (1989).

participate in economic affairs in order to raise the level of welfare. In practice, it meant a situation in which the state would take an active role in economic affairs. The most obvious feature of the etatist policies was the emergence of the state as a major producer and investor. During the 1930s, the government started a heavy investment drive in key manufacturing industries through the creation of the publicly-owned SEEs which became a key factor in the development process during the period 1930-50. The motivation behind this movement are mainly threefold.⁸ First, it originated as a response to the judgement that, during the 1920s, private capital sources had been inadequate and ineffective in promoting sufficient economic growth. Second, the Great Depression of 1929 affected the Turkish economy through, especially, decreasing world prices of primary products. Third, the provision of the Lausanne treaty that froze Turkish tariffs at the prewar levels was expired, and this change gave the government a chance to control the economy from, especially, foreign competition more effectively.⁹

In the etatist period, from 1931-33 to 1936-38, the contributions from both export expansion and import-substitution were small and most of the high GDP growth rate of 7.0 percent came from the expansion of domestic demand (see Table 4.10). Under Turkish etatism, the foreign trade regime of the 1920s was continued through the 1930s, with high tariff rates, balance of payment controls, and quantity restrictions. From 1930 to 1938, the country persistently ran small surpluses in its current account (see Table 4.11).¹⁰ The low level of investment during the 1930s

⁸For a variety of explanations about the sources of inspiration of etatism, see, e.g., Boratav (1988), Hershlag (1988), Kepenek (1990), Keyder (1987).

⁹Let us keep in mind that the 1930s has been the era of interventionist policies all over the world. During these worldwide depression years, the production and the volume of international trade have fallen sharply, and very high level tariffs and quantitative restrictions have been observed.

¹⁰Note that the figures of national savings, investment, and external surpluses illustrated in Table 4.11 are not complete. That is, savings does not take into account foreign trade in services, and investment does not include inventory changes. The change from an calculated external deficit of about 4 percent of gross national income in 1923-29 to a surplus of about 0.5 percent in 1930-38 is, however, so pronounced in the relevant literature that it presumably reflects the reality.

was almost fully financed domestic resources. Due to conservative monetary and fiscal policies, substantial fiscal deficits during the early recovery years of the 1920s were reduced quickly. From 1933, deficits were negligible. It is also worth noting that inflationary financing has never been a policy of Turkish etatism during the interwar years [Hansen (1991), Hershlag (1988)].

In the real sense, the foundations of the Turkish industrialisation, which created a remarkable change in the economy, were laid during the early 1930s. Average annual industrial growth during the 1930s was about 10 percent. Moreover, industry's contribution to the national product increased from 14 percent in 1929 to 19 percent in 1939 [Hershlag (1988)]. Despite the remarkable increase of the number of the SEEs, private enterprises have had a reasonably high share in the manufacturing industry.¹¹

Five-year industrial plans were also drawn up and implemented to coordinate public activities in the industrial sector. The First Five-Year Industrial Plan, implemented between 1934 and 1938, was a detailed list of the investment projects the public sector aimed to pursue in industry, mining, and energy, not a comprehensive exercise in planning in the technical sense of the term [Hansen (1991)]. Despite a small number of deviations, the targets of the first plan were achieved within the plan period [Hansen (1991), Hale (1981), Rivkin (1965). Foreign credits were quite limited with Soviet and British contribution, and the rest was financed by domestic savings [Kepenek (1990)]. A second five-year industrial plan, the implementation of which started in 1938, was interrupted by the World War II.¹²

During World War II years, economic development efforts outlined above

¹¹Between 1933 and 1939, total gross investment has been around 9-10 percent of GNP, and the private sector's share has been about 50-65 percent of the total [Hale (1981)].

¹²For full account of achievements of etatism, see, e.g., Hansen (1991, pp.324-37).

interrupted mainly due to reservation of resources for military needs. Although Turkey maintained its neutrality during the war, economic costs were quite high. Full-scale mobilisation throughout the war together with shortages of raw materials caused a severe recession and a substantial reduction in output. Between 1940 and 1945, average annual decrease in GNP was 6.3 percent, and production levels fell by an average of 5.6 percent and 7.2 percent in industry and agriculture respectively. Nevertheless, foreign trade had a surplus of 250 million US dollars due to low level of imports [Boratav (1988)]. The state, during the war, increased its control over the economy through SEEs. With military considerations having the priority, civilian economic development efforts were reduced dramatically. Some new taxes were imposed on industry and agriculture as part of the emergency measures.

Experience of Liberalism and Failure, 1950-61

The late 1940s marked the beginning of a multiparty system in Turkey. The general elections of 1950 transferred political power away from the (etatist) Republican Party to the newly formed Democratic Party. Democrats gave more emphasis to issues such as infrastructural investment, supports for agriculture and private sector, and the liberalisation of foreign trade. Although these policies created an economic boom period in the first half of the 1950s, second half saw severe economic difficulties mainly originated from lack of any sort of planning,¹³ crop failure of 1954, and foreign trade deficit of the late 1950s.

Following the elections of 1950, the new government introduced some liberal domestic and foreign trade policies. As the economic situation deteriorated, however,

 $^{^{13}} Singer$ (1977) notes that, as far as the economic matters are concerned, the Democrat Party's plan was <u>not</u> to plan.

economic policies changed accordingly. Until the dramatic crop failure of 1954, the favourable terms of trade of primary products created an optimistic environment for the government to follow more liberal economic policies towards trade, and to implement a growth strategy financed by agricultural exports. Thus, the government encouraged agricultural production via high price supports on major agricultural products using, mainly, the substantial financial support of the Marshall Plan of the United States. Hershlag (1988) notes that this American aid financed about half the increase in imports in the late 1940s and the early 1950s, as well as about 40 percent of the increase in investment spending. Since land productivity has been virtually constant in the 1950s [Hershlag (1988)], once the force of the agricultural expansion was exploited, with the further constraints of a crop failure in 1954,¹⁴ the rate of increase of real GNP slowed down. In addition, starting in 1953, the trade and payments regime became increasingly restrictive in response to growing balance of payments difficulties. The government reacted to this development by increasing its foreign borrowing and restricting imports through licences with aim rationing the scarce foreign exchange. Despite some efforts, the trade deficit increased rapidly, and by 1958, total foreign debts amounted to more than 25 percent of the country's GNP. Thus, on the eve of the 1960 military coup, Turkey was on the edge of a debt crisis [Krueger (1974)].

In response to these difficulties experienced, especially, in 1958, the country pursued a stabilisation program coupled with a devaluation of the Turkish lira. As Baysan and Blitzer (1991, p.291) points out, these difficulties were mainly due an to exceedingly ambitious investment program that required funds much more than the domestic sources could afford. In addition to the devaluation and unification of

 $^{^{14} \}rm Krueger$ (1974) notes that, due to weather conditions, agricultural production decreased about 20 percent in 1954.

the Turkish lira, the stabilisation program consisted of not only changes in foreign trade regime and in domestic economy but also consolidation and rescheduling of the outstanding foreign debt. Substantial amount of additional credit came from international lenders, including the IMF and the United States. The program also included import liberalisation, removal of price controls and increases in SEE prices.¹⁵ Krueger (1974, p.87) argues that the fact that the general price level became stable may be regarded as a relative success of the program (see Table 4.12). As a result of the 1958 program, the growth rate of money supply came from 20 percent annually in 1950-59 to 9 percent during 1959-61. Table 4.12 shows the sum of real GDP in industry and construction. Hansen (1991, p.347) suggests that, given the usual problem of crop fluctuations in agriculture, this is likely to be the best measure of the short-term impact of the stabilisation measures on economic activity. According to Table 4.12, the sum of real GDP in industry and construction increased by 11 percent annually from 1950 to 1957, declined slightly in 1958, and did not increase more than 0.9 percent annually from 1957 to 1960. Not until 1961 did the index of GDP in industry plus construction start growing significantly. As can be seen, for almost four years, the Turkish economy thus experienced a recession as a consequence of the 1958 stabilisation program. The trade deficit has also increased during the program years. An overall evaluation of Table 4.12 suggests that the stabilisation program of 1958-60 cannot possibly be called successful.16

Specifically, Baysan and Blitzer (1991, p.291) argue that the foreign trade regime of the 1950s was highly restrictionist, and was characterised by constantly changing controls, regulations, and multiple exchange rates. Thus, the trade policy

¹⁵For a successful and more detailed discussion of the 1958 Stabilisation Program, see, e.g., Krueger (1974).

¹⁶For the same point, see Hansen (1991, p.348).

did not reflect any long-term aim or strategy. On the contrary, it became increasingly restrictionist as a result of ad hoc measures introduced in reply to the growing trade deficit. Baysan and Blitzer also suggest that the initial experiment with a liberal trade policy (1950-53) was not an attempt to pursue on a lasting course toward free trade. Rather, it resulted from a number of factors that mentioned earlier. Baysan and Blitzer's subjective index of trade liberalisation¹⁷ averaged about 7 for the 1950s. This, in effect, reflects the reality that, except the 1950-53 period, the trade regime was inward-oriented and restrictionist (see Figure 4.1). The index is kept, as they argue, below 10, since the 1958 program were essentially correctional and were not aimed at permanently creating a more liberal trade regime. It is also true that the devaluation package had some distortion-reducing elements, but the anti-export bias was maintained. Going one step forward, Baysan and Blitzer (p.289) also imply that the overall economic policy during the 1950s were essentially inward looking, but it was based neither on an explicit economic theory nor on formal planning. Economic policy was made mostly on an ad hoc basis, and there was a general lack of interest in coordinating economic policies. Eventually, the economy was pushed to the point of international bankruptcy by the late 1950s. Overall, most criticized aspect of the Democrat government in the 1950s had been unplanned and uncoordinated economic decisions which had originated from its perception of "liberal" economic policies. Towards the end of 1950s, economic crisis resulted in political crisis, and the Democratic era was ended by a military's takeover in 1960.

¹⁷The scale of index ranges from 1 to 20, with 1 corresponding to the most highly restrictionist and controlled trade regime, and 20 corresponding to the completely free trade policies. The 10-20 range is used for "outward-oriented" trade regimes, whereas the 1-9 range is used to identify restrictionist trade regimes. For more information, see Chapter Six.

Table 4.9 Major Sectors of the Manufacturing Industry, 1927

Sector	Percentage of Establishments	Percentage of Workers
Food processing	43.9	47.8
Metallurgical	22.8	14.7
Textiles	14.4 ,	20.8
Miscellaneous	18.9	16.7

Source: Wagstaff (1989, Table 1).

Table	4.10	GDP	Growth,	by	Source	of	Demand,	1923-38,	as	percentage	

	Average	Sc	ource of ex	pansion	
Period	annual growth rate	Domestic demand	Exports	Import substitution	Total
1923-25 to 1927-29 1927-29 to 1931-33 1931-33 to 1936-38	7.5 5.6 7.0	72.7 32.0 94.9	8.8 10.8 2.1	18.5 57.2 3.0	100 100 100

Comment to Table 4.10: Annual growth rates are measured on GDP at 1938 prices. Import-substitution figures are calculated on the basis of initial import propensities of each period. **Source**: Hansen (1991), chap.9.

Table 4.11 Savings, Investment and External Surplus, 1923-61, as percentage of National Income

Period	والمحاورة والمحافظ والمحافظ والمحافظ والمحافظ	National Gross Savings	National Gross Fixed Investment	External Surplus	
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1923-29,	average	5.7	9.8	-4.1	
1930-33,	average	10.1	9.4	0.7	
1934-38,	average	10.7	10.2	0.5	
1939-46,	average	10.7	9.7	1.0	
1947-48,	average	7.0	9.5	-1.5	
1948-53,	average	12.9	15.1	-2.2	
1954-61,	average	12.4	15.4	-3.0	

Comment to Table 4.11: External surplus is defined as the difference between national gross savings and gross fixed investment. The period 1923-48 are expressed at constant (1938) prices, while the period 1948-61 at constant (1968) prices. **Source:** Hansen (1991), chap.9.

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Item	1950	1957	1958	1959	1960	1961	
Money supply index(a) Central government	100.0	411.0	433.0	511.0	556.0	611.0	(Coupe
surplus(b)	-0.5	-0.4	-0.2	-0.2	1.0	0.5	
Consumer price index(c) Index of GDP in industry and	100.0	189.0	227.0	279.0	282.0	284.0	
construction(d)	100.0	211.9	209.1	213.3	217.7	235.2	
Balance of trade(e)	-47.8	-51.9	-67.9	-116.2	-147.5	-160.5	

Table 4.12 Macroeconomic Performance of the 1958 Stabilisation Program

(a) 1950=100, money and quasi money, IMF definition.
(b) percent of GNI, not including SEEs and annexed budgets.
(c) 1950=100.
(d) 1950=100, at constant 1968 prices.
(e) Millions of US dollars.
Source: Hansen (1991, Chap.10).

Figure 4.1 Trade Liberalisation Index for Turkey (1950-85)



Source: Baysan, T. and C. Blitzer (1991), "Turkey", in Liberalizing Foreign Trade: The New Zealand, Spain and Turkey: Vol.6, D. Papageorgiou, M. Michaely and A.M. Choksi (eds.), A Research Project of the World Bank, Basil Blackwell, Cambridge, MA, esp. p.289.

4.4. National Planning Years with Etatist Orientation, 1962-79

Political and economic stability were eventually restored following the coup, a new constitution was prepared and accepted in 1961, and a civilian government was formed in 1962. In the aftermath of the 1960 coup, Turkey entered an era of planned economic development. The constitution imposed comprehensive development planning and preserved the mixed economy with planners deliberately going for inward-looking ISI strategies but also liberalising the labour market [Hansen (1991, Chap.11)]. Five year plans were established by a new institution, the State Planning Organisation (SPO), which was in charge of proposing and implementing plans for, socio-economic development under a High Planning Council. Long-term, prospective programming medium-term five-year plans and a very detailed annual plans was required. The first three five year plans under the new constitution included the years 1963-67, 1968-72, and 1973-77; the fourth plan was delayed due to the foreign debt crisis (a severe liquidity crisis) of 1977-79. Baysan and Blitzer (p.302) stress that development plans of the 1960s and 1970s had the following main objectives in common: a) economic growth, b) structural change by setting higher growth targets for manufacturing industries, and c) development of import-competing industries and diversification of exports. According to the planners, the role of trade policy would be to provide protection to domestic industries (i.e. "infant industry" argument) and to allow the imports of capital goods and raw materials considered essential to achieving this three objectives. Given the fact that much of the support for the coup stemmed from dissatisfaction with the country's poor economic performance especially in the late 1950s, it is no surprise that the framers of the created a strong planning institution, the SPO, as a means of insuring rapid economic development.¹⁸ The idea of

¹⁸For some other reasons of reintroducing planning, see, e.g., Kepenek (1990), Keyder (1987).

planning of the 1960s and the 1970s was more comprehensive than the industrial development plans of the 1930s. The latter included industrial sector only whereas most of the aspects of socio-economic development were covered in the planning practice of the 1960s and the 1970s [Kepenek (1990)]. During the period, main features of industrialisation were priority, protection, and incentives for private industry. Protected domestic market and incentives for private industry were the most explicit forms of priority given to industrialisation. The share of industry in the total fixed capital investment was targeted at an increase amounts in the first three five-year plans (1963-77), and it exceeded targets except the third five-year plan (1973-77) (see Table 4.13). During the same period, value added in industry increased remarkably [see Hale (1981, Table 11.1)], and composition of output of manufacturing industry changed in favour of intermediate and capital goods [see Hale (1981, Table 11.2)]. The consensus was that the state must have a leading role in promoting development and that the country must industrialize as fast as possible. Although the planners had little theoretical objection to exports, they felt that policies based on free-trade inevitably would leave the country a producer of agricultural products, with few prospects for industrial growth [Baysan and Blitzer (1991)].

Planning methodology in Turkey were strongly influenced by Professor Jan Tinbergen who served as chairman of the United Nations Development Committee in the early 1960s and became chief consultant to the SPO. Accordance with UN recommendation, a growth target of 7 percent was adopted, expanded to 8 percent with the 1973-77 plan. Inflationary financing of public expenditure was banned by the new constitution and fiscal policy was regarded as the major economic policy instrument. Investment, to a large extent, oriented towards import-substitution, and exchange rate policy was not on the agenda after the strong de facto devaluation in 1958 (formalized in 1961). All sorts of foreign exchange controls including import and export licensing, quotas, tariffs, premiums, tax rebates and subsidies and foreign aid were implemented as the natural instruments of balance of payments policy. An OECD consortium, founded in 1961 to institutionalize foreign borrowing on concessionary terms, carried through debt rescheduling in 1965 and 1978-80. Considerable exchange rate adjustments (urged by the IMF), however, were undertaken in 1970 and in the second half of the 1970s as the public sector credit policy became increasingly inflationary and macroeconomic targets overambitious. Despite a short liberalisation era with a relatively generous supply of foreign exchange and relaxation of controls occurred after the devaluation of 1970, main principles of planning and economic policy remained unchanged until the debt crisis of 1978 [see Celasun (1983), Hansen (1991), Krueger (1974)].

It is argued by Hansen (p.353), among many others, that the inward-looking ISI strategy was quite successful in so far as growth rates remained high (see Table 4.6 and also Table 4.13) and distribution probably improved until the second half of the 1970s. The etatist-oriented policy collapsed after the first oil shock in 1973-74, the deterioration of the domestic political scene when domestic inflation and foreign borrowing increased beyond sustainable levels and foreign lending to Turkey finally dried up. In due course, an external debt crisis became inevitable in 1978. As stressed by Hansen (p.353), one important factor that tended to make the etatist policy unsustainable and contributed to its breakdown was the excessive increase in real wages, a result of the liberalisation of the labour market and the legalisation of labour unions which the 1961 constitution guaranteed.

As known, given factor input, factor productivity, is the main determinant of growth. For Turkish manufacturing industries in, total factor productivity is estimated by Krueger and Tuncer (1980, Tables 1-4) to have increased by 2.1 percent annually for the period 1963-76. In a study of comparative advantage, Leamer (1984, Table B-1) estimates national endowments of capital, labour, and land for Turkey (and many other countries) for 1958 and 1975. The result is a modest increase of total factor productivity by 1.1 percent annually, from 1958 to 1975 [see also Hansen (Table 11-2, p.356)].

As far as foreign trade is concerned, low growth rates of foreign trade (at constant prices) have been characteristic of development in Turkey since the founding of the republic and are an obvious result of the import-substitution policies systematically followed since the early 1930s. In this context, Chenery and Syrquin (1975, p.131) argue that in the policy of reducing trade relatively, Turkey resembles Latin American countries such as Argentina and Brazil. According to Hansen (p.358), this resemblance extends to the success in the 1980s of old import-substitution industries in the export markets. Foreign trade sector, in the Turkish industrialisation, was assigned a dual role. Foreign trade was essential in enabling the importation of capital goods for their use as inputs in domestic industries in order to allow for the development of an import-substitution industrial program (i.e. "infant industry" argument).

During the 1929-1980 era, Turkish development strategies have been dominated by import-substitution with two short periods of relaxed trade controls in 1950-53 and 1970-73.¹⁹ As far as the ISI policies and the national planning of the 1960s and the 1970s are concerned, it is important to point out the link between the OECD and Turkey. It is a fact that these policies, by and large, was endorsed

¹⁹Baysan and Blitzer (pp.289-95) argue that in 1958-60 the trade regime was inward oriented and restrictionist since the 1958 program were essentially correctional and were not aimed at permanently creating a more liberal trade regime. It is also true that the devaluation package had some distortion-reducing elements, but the anti-export bias was maintained.

by the OECD. Since 1961, the OECD consortium has been the number one financier of development in Turkey. Apparently, OECD views, which are reflected in the regularly published OECD <u>Economic Surveys</u> for Turkey, have been important to Turkish governments as they have formulated and implemented development policies.²⁰

Dervis *et al.* (1981, Chap.11, pp.93-94) and Chenery *et al.* (1986, pp.129-37) evaluates the impact of the import-substitution measures of the 1960s and the 1970s. They suggest that ISI policies have had remarkable contribution to the growth rate of GDP especially during the 1960s. In that sense, they support the view that early import-substitution (1960s for the Turkish case) may exploit natural advantages and be highly efficient, but sooner or later these advantages would be exhausted. It is suggested that Turkey should have reached this stage in the 1970s.

National planning years of the 1960s and the 1970s mark an intensive import-substitution drive in Turkey, which was mainly implemented through effective quantitative restrictions and a deliberate policy of overvalued foreign currency regime. As a matter of fact, looking in retrospect, three sub-periods can be roughly identified (see Table 4.14). In this respect, it is argued by Krueger (1974) that although import-substitution was primarily adopted by the first five-year plan (1963-67) as means of reaching the industrialisation goal, by the time of the (1968-72)second five-year plan the motivation for inward-looking import-substitution policies stemmed much more from balance-of-payments difficulties.

Persistent balance of payments deficits throughout the 1960s and most of

²⁰At the time of the first five-year plan, the OECD, among other domestic and external groups and organisations, viewed import substitution and the policy of infant industries as a necessary initial stage in economic development and industrialisation. For such views on the merits of import substitution policies, see 1963, 1966, 1967 and 1976 OECD <u>Economic Surveys</u> for Turkey.

the 1970s created a severe debt problem in the late 1970s. From 1962 to 1970, the current account deficit was largely covered by concessionary loans from the OECD consortium. The debt rescheduling in 1965 was also undertaken by the consortium. During 1971-73, Turkey had, mainly as a result of the rapidly increasing remittances from migrant workers, a small surplus on current account and had accumulated large foreign exchange reserves. However, in 1973-74 with the oil price shock and related adverse occasions and much more expansionary fiscal and monetary policies²¹ the need for foreign financing became critical. Foreign exchange reserves were drawn down during 1974-76, oil facility loans were obtained from the IMF and short-term loans from the Euromarkets, and exchange controls were tightened. A serious crop failure in 1977 with weak foreign markets for Turkish agricultural exports deteriorated the problems and in the autumn of 1977, the country was unable to repay its debt. After negotiations with the IMF and the OECD consortium, a stabilisation program was adopted in early 1978. The program, the IMF Accord of 1978, was intended to last two years; it included credits from the IMF and the OECD consortium, reduction of public expenditure in real terms, price increases on the products of the SEEs, import restrictions and export promotion, and devaluation of the Turkish lira (TL) [see OECD Economic Survey, Turkey (1978), World Bank (1982)]. The impact of the 1978 stabilisation program is clear from Table 4.15. The policies of the government obviously were not successful and when the 1979 oil shock promised to bring a further deterioration, the social democrat government after losing the senate elections, resigned.

As seen, the period 1974-79 was one of external shocks, expansionary

²¹Unlike many other countries, Turkey has continued its fast growth policy despite adverse global economic environment after the 1973-74 oil shock. This policy, however, proved to be too ambitious, and resulted in an external debt crisis in 1978.

macroeconomic policies, and political instability²². As noted by Baysan and Blitzer (1991, p.315), economic policymaking was not consistent, nor stable and rational. In a period when global growth was low, the Turkish economy was quite slow to adjust. Despite unfavourable external circumstances, successive Turkish governments attempted to maintain or even accelerate the economic growth rates achieved during the earlier period. Although the growth rates have been about 7 percent in the three years immediately following the 1974 oil price shock, the growth process soon proved to be temporary due to those strategies based on inflationary policies, heavy borrowing, and postponement of the structural adjustment measures called for by changing world factor price. Economic performance of the country rapidly deteriorated after 1976, resulting in an external debt crisis in 1978.

²²Note that between October 1973 and September 1980, seven governments (all coalitions) took office. The longest and shortest ones were 14 months and only ten days respectively.

(Dercenc)		and a second		-
Sectors	1st plan period (1963-67) T A	2nd plan period (1968-72) T A	3rd plan period (1973-77) T A	Gertfreysbard
Agriculture	17 7 13 9	15 2 11 1	11 7 11 8	
Mining	54 56	37 33	58 37	
Industry	16.9 20.4	22.4 26.8	31.1 28.2	
Fnerov	86 65	8 0 9 0	8 5 7 4	
Transport	13.7 15.6	16.1 16.0	14.5 20.6	
Tourism	1.4 1.3	2.3 2.1	1.6 1.0	
Housing	20.3 22.4	17.9 20.1	15.7 16.9	
Education	7.1 6.6	6.7 4.7	5.0 3.3	
Health	2.3 1.8	1.8 1.5	1.4 1.1	
Other	n.a. 6.6	5.9 5.4	4.7 6.0	
Total	100.0 100.0	100.0 100.0	100.0 100.0	

Table 4.13 Sectoral Distribution of Fixed Capital Investments, 1963-77 (percent)

T: Target A: Actual n.a.: Not available Source: Kepenek (1990, Table VI.8).

Table 4	1.14	Stages	of	Import-Substitution	Industrialisation	(ISI),	1963-80
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	Avera	age annual gro	owth rate (%) Manufacturing	·	
	GNP	Agriculture	Industry	Imp./GNP	Exp./Imp.
Harrison and an annual Station Station Station Station Station Station		an a	an in Carlinda an an an an an Anna an A	ĨĨĸĸŢĸŢ <u>ĸĊ</u> ĸĊĸĊĬĸĨĬĸĨĬĸĬĸĸĊĸĸŢĸŢĸŢ	an an the Construction of the C
1963-70 (a)	6.4	2.6	10.4	6.8	0.68
1971-77(b)	7.2	4.3	10.1	10.9	0.45
1978-80(c)	0.5	2.4	-2.7	9.4	0.43

(a) Positive ISI financed with domestic savings.
(b) Negative ISI financed with foreign deficit.
(c) Economic crisis years.
Sources: Pamuk (1984, Table 1, p.53); SPO Annual Programs.

Table 4.15 Real GDP, Domestic Absorption, Foreign Trade and GNP, 1977-84 (percent, over previous year)

Category	1977	1978	1979	1980	1981	1982	1983	1984
Population	2.0	2.0	2.0	2.2	2.3	2.3	2.4	2.6
GDP(a)	5.1	4.4	-0.7	-1.6	3.7	4.5	4.0	6.1
Agriculture	-1.1	2.5	2.8	1.8	0.0	6.4	-0.2	3.6
Manufacturing	7.2	3.7	-5.2	-6.3	9.2	5.5	10.3	5.5
Services	5.7	3.9	-0.3	0.8	4.2	4.1	4.5	5.7
GDP per capita	3.1	2.4	-2.7	-3.8	1.4	2.2	1.6	3.5
Domestic absorption(a)	6.0	-4.4	-2.2	-0.6	0.8	1.4	4.5	7.7
Private consumption	4.9	0.4	-1.9	-4.5	-0.9	3.5	6.2	10.4
General government cons.	4.4	9.8	1.6	8.8	-0.4	1.1	2.7	0.0
Fixed gross investment	6.9	-9.8	-3.6	-9.9	2.0	3.3	2.7	0.2
Domestic absorpt. per cap.	4.0	-6.4	-4.2	-2.8	-1.5	-0.9	2.0	4.9
Exports(b)	-17.7	14.1	-9.6	4.2	85.4	40.0	13.7	19.8
Imports(b)	4.2	-33.5	-6.8	2.5	14.8	7.5	17.1	27.7
GNP(a)	4.7	3.2	-1.5	-1.7	3.7	4.5	3.8	5.9
GNP per capita	2.7	1.2	-3.5	-3.9	1.3	2.2	1.3	3.3

(a) At constant 1980 prices.
(b) Goods and nonfactor services, at constant 1980 prices.
Source: World Bank, World Tables, 1989.

4.5. Market Orientation and Export-led Growth, the 1980s

A turning point in Turkish economic policy came in January, 1980. At the time, the government announced an economic reform program, after several unsuccessful attempts in 1978-1979 and several failed IMF programs. Inward-looking ISI strategy was replaced by an outward-oriented ELG strategy. The economic reform program, primarily, consisted of the following objectives and arrangements which have been realized to an extent:²³

a) abandonment of an inward-oriented ISI strategy, and replacement with outward-oriented one based on a more market-based economy (this is the macro and the main objective of the Turkish economic reform program);

b) reduction of direct government intervention in the productive sector;

c) lowering of barriers to foreign direct investment;

d) broad-based price liberalization, including a realistic and flexible determination of exchange and interest rates;

e) gradual import liberalization;

f) tight monetary controls and discipline to restrain domestic absorption and reduce the inflation rate;

g) financial sector reform; by the end of the 1980s, there were only few remaining restrictions on the financial markets;

h) public enterprise reform to reduce their heavy burden on the economy and improve their efficiency;

i) encouraging privatization and limiting the extent of public enterprises;

j) deregulation and rationalization of the public investment programme;

²⁹There are substantial number of books, conferences, and papers on this field either in English or Turkish. See, e.g., Asikoglu and Uctum (1992), Aricanli and Rodrik (1990a, 1990b), Balazs (1990), Baysan and Blitzer (1990), Boratav (1987, 1990), Kazgan (1988), Kopits (1987), Kirkpatrick and Onis (1991), Krueger (1992), Kuruc *et al.* (1987), Milanovic (1986), Nas and Odekon (1988, 1992), Saracoglu (1987), Senses (1988), Taylor (1991), Uygur (1993), Wolff (1987).

k) export drive strategy; that is, more effective export promotion measures to encourage rapid export growth;

l) steps to an improved external debt management and increase the creditworthiness.

An overall evaluation of the above objectives of the 1980 reform programme simply reflects a transition experience from an inward-looking economy to an outward and more market based one. Accordingly, the programme has imposed some radical changes to the Turkish economy. Like previous liberalisation episodes (i.e. 1950-53 and 1970-73), the liberalisation of 1980 was characterized by a devaluation of the domestic currency (in January 1980 the government devalued the lira from 47 to 70 per US dollar and the exchange rate has been adjusted on a daily basis since May 1981) and the institution of a macroeconomic stabilisation program. However, what distinguishes the 1980 reform program from earlier liberalisation attempts is that, as Baysan and Blitzer (1991, p.357) put it, "...for the first time the Turkish government demonstrated that it would use economic policies to create a more liberal market-oriented economy..."²⁴

It is also important that the 1980 program was, at the time, presented as if they were the government's own initiatives and nothing to do with the international institutions of Bretton Woods such as the IMF and the World Bank [Wolff (1987) and Kirkpatrick and Onis (1991)]. However, the developments after the debt crisis of 1982 suggested a great deal of similarities between the economic reform

²⁴Unlike the earlier stabilisation packages of the 1950s and the 1970s, the 1980 program marked the beginning of a committed major program of economic liberalisation and trade reform. It is also worth noting that like all Turkey's previous liberalisation episodes (i.e. 1950-53 and 1970-73), its roots lay in balance-of-payments difficulties. During the late 1970s, inflation was accelerating, unemployment was rising, shortages were common, and labour unrest had reached crisis proportions. Even worse, political violence was widespread throughout the country. All these problems were becoming increasingly severe due to the economy's inability to adjust to higher world oil prices, a lack of incentives for exports, irrationality in the import-licensing system, poor performance by the SEEs, and political instability.
programs of those indebted countries imposed by the IMF and the World Bank and Turkey's on the following issues:²⁵

a) IMF conditionality²⁶ on getting any kind of rescheduling agreement based on Paris Club negotiations;

b) the similar procedure has also been applied to the World Bank originated structural adjustment lendings (SALs);

c) the commercial banks have only made new arrangements with those countries which were confirmed to be credible by the IMF and/or the World Bank.

More than a decade after the introduction of the economic reform package in 1980, we are in a position to evaluate the results more objectively. Turkey's macroeconomic performance indicators suggest a series of puzzles during the 1980s. First of all, Turkey is one of the few countries that managed to maintain high GNP growth after rescheduling foreign debts in a rather unfavourable global economic environment of the 1980s. Its real GNP grew by 5.2 per cent on average between 1981 and 1990 (see Table 4.16). Table 4.17 illustrates the fundamental change of the composition of GDP in favour of industry during the 1980s. The industry's share has considerably risen during the first half of the 1980s while stagnated during the second half. As a result, the share of industry in GDP came from 25 percent level in 1980 to 31.3 in 1989 and 29.2 in 1990. In addition, the country's export earnings have increased considerably (see Table 4.16, Table 6.1 and Table 6.2). There is little doubt that one of the most successful outcomes of the 1980

 $^{^{25} \}rm This$ must be the reason why Aricanli and Rodrik (1990b) refers to Turkey as "...a Baker Plan example before the Baker Plan...".

²⁶For evaluations of the issue, see Avramovic (1986)and Williamson (1985). For the Turkish case, see Okyar (1983).

Turkish economic reform program was the remarkable growth in exports.²⁷ As a result of continual real depreciations, output recovery was driven mainly by exports until 1986-87. While many of the countries with debt problems chose to run large NICA surpluses, mainly by cutting expenditures and growth. Turkey opted for a high growth strategy with less NICA surpluses known as "growth-oriented debt strategy" [see, e.g., van Wijnbergen et al. (1992, p.160)]. This strategy sought to improve the debt-output ratio through output growth and permitted running lower external surpluses. Although this exchange rate policy raised the debt-output ratio through capital loses, it lowered the debt-exports ratio by increasing exports. Mainly due to this policy, Turkey's creditworthiness was restored, and the country was distinguished from most debtor countries whose debt-exports ratio rose in line with their debt-output ratios. During the 1980-88 period, the exchange rate strategy have been used actively for export promotion. Turkey's export performance has been impressive, especially in the first half of the 1980s. Some combination of the following factors can explain such a successful export performance: a) a substantial real depreciation of the Turkish lira, b) the introduction of new export promotion schemes and the improvement of existing ones, and c) a significant reduction in domestic demand and the shift of production from domestic to foreign markets. As Asikoglu and Uctum (1992, p.1511) point out, the policy of persistent real depreciation until late 1988 has been an essential component of the high growth strategy Turkey opted for solving its debt problem. The spectacular growth of exports and outward orientation of the Turkish economy, and expansion of production in tradables relative to nontradables are some of the achievements of the

²⁷Rodrik (1988), e.g., notes that "fictional" exports played some role during the first half of the 1980s due to explicit export subsidization which fall outside the "orthodox" policies. During the 1981-1985 period, the extent of overinvoicing averages 16 per cent, according to Rodrik's (1988) calculations. The key policies which played important role in contributing to export performance were the active exchange rate policy, generous subsidization, the explosive political situation in the Middle East (especially, Iran-Irak war), and the austerity at home.

1980 post-liberalisation period for which the exchange rate policy is to be credited for. Starting in late 1988, as macroeconomic developments showed a discomforting resemblance to the Latin American experience, Turkish government implicitly started to use exchange rate as part of an anti-inflationary strategy, without committing themselves to an explicit plan. Some exogenous factors together with the endogenous factors worsened economic conditions in the domestic market [Kazgan (1993)].

The fight against inflation was given top priority in the 1980 adjustment programme. With the help of restrictive monetary and fiscal policies, inflation fell in the following years, but these policies were relaxed after 1983 and especially 1987, due to electoral considerations. In the end, inflation accelerated and hovered around 60 to 70 per cent in the 1988-90 period. The view that the major cause of this outcome is the growing deficits of the public sector is generally accepted. It is also suggested that the Turkish authorities, during the 1980s, have used inflation tax (seigniorage) to finance the huge fiscal deficits [see, e.g., Anand and van Wijnbergen (1989)].

The years since 1986, however, have been marked by uncertainty in macroeconomic policies. During the last years of this period, real wages increased, the Turkish lira appreciated in real terms and exports stagnated. This dimension of the adjustment programme has also been stressed and evaluated in the literature recently.²⁸ At first, the increasing competitiveness of Turkish politics made fiscal discipline of the economy a major victim especially after 1987 [Aricanli and Rodrik (1990b)]. Fiscal deficits have been one of the major characteristics of the economy

²⁸For evaluations of the orthodox policies of stabilisation programmes in general, and/or the Turkish experience, see, e.g., Aricanli and Rodrik (1990a, 1990b), Boratav (1987, 1990), Celasun and Rodrik (1989a, 1989b), Celasun (1990), Greenaway and Morrissey (1992), Kazgan (1988), Kuruc *et al.* (1987), Rodrik (1990), Taylor (1983, 1987a, 1987b, 1990, 1991).

in the 1980s (see Table 4.16). The fiscal situation of the economy, during the second half of the 1980s, has remained unstable despite the initial squeeze on fiscal balances in the early 1980s [Celasun (1990)]. The inconsistency of the underlying fiscal policy with the exchange rate policy and other fields of liberalisation program became increasingly obvious after 1986-87 when Turkey started to transfer net income abroad.

One of the major objectives of the liberalisation program was to bring a lasting solution to the chronic balance of payments problem through switching the productive capacity of the economy into the tradables sector. While this requires, in the short-run, the output level of tradables to expand relative to that of nontradables, sustaining the export-led growth, in the longer-run, needs increased fixed capital formation in the traded goods sector.²⁹ Asikoglu and Uctum (1992) illustrate that, in the Turkish case, while the short-run supply response in the form of reorientation of production is achieved, the long-run supply response in the form of increased capital formation in the tradables sector has not been forthcoming (see also Figures 3,4,5 and Table 3 in Asikoglu and Uctum). In other words, despite the achievements in the sectoral composition of production, a capacity increase in tradables has been missing so far. The view that the favourable export performance of Turkey in the 1980s appears not to have generated an increase in private investment in tradables is also confirmed by Aricanli and Rodrik (1990b), Conway (1990, 1991) and Uygur (1993), among others. In short, the 1980 economic reform program is, so far, said to have fallen short to induce the level of investment in the

²⁹Asikoglu and Uctum (1992, p.1508) suggest that the behaviour of aggregate investment could be misleading more than it could reveal for two reasons. First, what is more important is its breakdown into investment in traded and nontraded goods sectors. Second, an obvious characteristic of the Turkish economy is the significant role of the public sector in economic activity, particularly in fixed capital formation. Since the 1980 reform programme aimed at achieving an outward-looking transformation based primarily upon market forces, private fixed capital formation in the traded (rather than nontraded) goods should be the investment category to be used in evaluating the post-1980 period.

tradables sector required for the future growth of the economy. The growth of the investment has been maintained mainly through public sector investment programs, largely in nontradables. It appears that symptoms of inconsistent policies, inflation and high real interest rates, and the lack of an efficient investment policy lie at the heart of the problem. It is also very likely that high debt service requirements (especially in the second half of the 1980s) reduced investment levels in Turkey. Due to the elimination of the excess capacity in tradables largely, the future of the export-led growth strategy depends upon stimulating investment in tradables. The 1980 adjustment program relied on the assumption that financial liberalisation would stimulate private savings and so that greater funds would be available for fixed productive investments. These, however, did not materialize. As mentioned above, the decline in private manufacturing investment should be taken as a very serious sign, since the sustainability of outward orientation and liberalisation strategies critically depends upon investment growth. In the Turkish case, Uygur (1993, p.232) suggests policy uncertainty as an important factor which prevented private investment from increasing. Additionally, Conway (1991) econometrically shows that relative price uncertainty in the economic environment is significantly correlated with reduced real investments. Uygur (1993) also shows that manufacturing productivity growth was not as high as expected. This relatively low growth of productivity in manufacturing also casts some doubts on the sustainability of the growth of Turkish exports.

As shown by Table 4.16, unemployment rates have fluctuated around 10-11 per cent. Unemployment rates have been reduced considerably during the second half of the 1980s. However, high real-wage increases in 1989 and 1990 have already put a damper on further reductions in unemployment. However, according to Kepenek (1990), those officially published unemployment figures in Turkey are

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simply misleading. Hence, any comment based on these figures would be quite dubious. Kepenek (1990), with his own calculations, shows that the unemployment rate rose from 16.4 per cent in 1980 to 22.9 per cent in 1988. Put it another way, the number of unemployed people rose from 2.8 million in 1980 to 4.8 million in 1988 [see Kepenek (1990, p.380)]. Apparently, with those high inflation and unemployment rate figures, the Turkish example does not appear to provide evidence in favour of the inflation-unemployment trade-off.

As regards foreign direct investments, although there has been a clear increase in the late 1980s (see Table 4.16), when compared with the liberalisation efforts that have gone into this project, the response has been rather discouraging. Since most of the foreign direct investments went to service sector (especially banking), the contribution of financial capital to the Turkish economy, however, has been insignificant [Aricanli and Rodrik (1990b)]. This is largely because foreign investors have been concentrating in those fields of foreign trade financing and investment banking. It is also suggested that foreign investors continue to doubt the durability of reforms and the stability of the financial system. High rates of inflation, interest, and currency depreciation and political instability have been additional factors of major concern for the foreign investors during the 1980s [Aricanli and Rodrik (1990b)].

The functional (see Table 4.18) and the size distribution of income have deteriorated between 1980 and 1988. A relative improvement came in 1989 and 1990, when real agricultural prices and real manufacturing wages rose significantly [Celasun (1989), Uygur (1993)]. In this respect, Boratav (1990), suggests that agricultural income decreased considerably and that the agricultural terms of trade deteriorated 53 per cent between 1976 and 1986. van Wijnbergen *et al.* (1992) concludes that even though income distribution within agriculture may have

recovered, agriculture's position compared with that urban areas probably did not.

It is also true that compared with the first half of the 1980s, the economy has been less stable in terms of macroeconomic performance of the economy during the second half especially after 1987. Real GNP slowed down in 1988 and 1989, as a result of a tightening of economic policy in 1988 aimed at containing rasing budget deficits and strongly increasing inflation. In 1990, however, economic growth recovered to 9 per cent largely due to relaxing the monetary and fiscal policies in 1989. Economic expansion came to a halt by the end of 1990 owing to the shock events of the Persian Gulf [OECD (1992)]. Foreign borrowing and foreign debt of Turkey increased remarkably in the second half of the decade (see Chapter Two). However, foreign exchange and gold reserves reached an all-time high in the late 1980s (see Table 4.16).

As regards trade liberalisation, Baysan and Blitzer (1991) assess the 1980s' reforms to have been sufficient to merit the status of an outward-oriented regime. They view the 1980 liberalisation as the start of a fundamental and sustained liberalisation. As Dornbusch (1992, p.77) points out: "...The results of Turkish opening (and of accompanying domestic political and economic stabilisation and reform) are altogether striking...".³⁰ The liberalisation of imports and the capital account was, however, approached gradually and at later phases of the 1980 adjustment programme.³¹ Nominal tariff rates were reduced remarkably; quantitative restrictions were abolished and bureaucratic controls over imports were also relaxed especially in and after 1983-84 [see e.g. Balkir (1993), Kazgan (1993)]. However, Uygur (1993) suggests that import liberalisation process in the late 1980s led to an

³⁰Dornbusch (1992) also provides a good account for the case for trade liberalisation for LDCs. ³¹Relying on the theoretical framework for policy options for reducing anti-export bias by Milner (1990b, esp. pp.92-4), one can reasonably suggest that the Turkish government, during the 1980s, has utilised the following policy options: a) raising "export subsidies", b) lowering the "effective protection of importables".

increase in the imports of consumer goods. Besides, capital account liberalisation appear to have contributed to the real appreciation of the Turkish lira.³² In 1990, further import liberalisation measures were introduced during a period of real exchange appreciation, with the result that there was a noticeable trade and current account deficit. Uygur (1993) finds it very unlikely that the Turkish economy can afford this "simultaneity" problem much longer. For this purpose, Asikoglu and Uctum (1992) suggests that restoring policy consistency should receive the top priority and the correcting action should come from the fiscal side of the problem. To them, the main task of the exchange rate policy should be to send credible and sustainable signals for continued outward orientation. This can be best achieved by a) avoiding real appreciations and overvaluations, and b) maintaining internal consistency of economic policies, including the investment policy.

The two most significant features of the 1980s' adjustment process were the substantial capital inflows during the very early stages of adjustment and the successful export drive. Although an overall evaluation of the 1980 reform program on the economy is not an easy task, the impact of the economic reform program on the economy can be assessed as a success, despite the fact that the Turkish economy still has a number of structural problems, including inflationary pressures

³²Akyuz (1993) warns that special care needs to be given to the design of external financial policies, since mistakes in this area tend to be very costly and difficult to reverse. Allowing residents uncontrolled access to international capital markets has proved damaging in many developing countries, and short-term speculative capital flows have proved troublesome even for developed economies. Thus, most developing countries need to exercise some control over external capital flows in order to minimize their disruptive effects and gain greater policy autonomy to accomplish growth and stability. Akyuz cites the experience of Turkey following the liberalisation of its capital account and lifting of restrictions on private borrowing in August 1989. Turkey received about 3 billion US\$ of short-term capital in 1990 compared to a net outflow of 2.3 billions in the year before, and its currency appreciated remarkably. Capital flows were reversed in early 1991 with the outbreak of the Gulf War and political uncertainty at home. Consequently, net short-term outflows reached 3 billion US\$ in 1991, the currency depreciated sharply against the US\$ and foreign exchange reserves dropped. This evidence shows how short-term capital can be reversed easily. What is remarkable, as quoted by Akyuz, about this experience is that real domestic interest rates were hardly different between the two periods: the main difference was in the state of expectations and the direction of capital and exchange rate movements.

and high proportion of fiscal deficits, as can be seen from Table 4.16. Most observers credit the reforms with a significant structural transformation of the economy, and suggest that, even if there is a future macroeconomic crisis, the move toward a more outer-oriented economic activity will persist [see, e.g., Krueger (1992, pp.136-46)]. There is little doubt that the Turkish economy has achieved an impressive transformation from an inward-looking economy to an outward-oriented one. Exports rose from about 3 billion US\$ in 1980 to about 12 billion US\$ in 1988. It is worth noting that the export boom was mainly in manufactured products. In fact, Turkey is one of the few countries that managed to maintain high GNP growth rates in real terms, after rescheduling their debts in the 1980s. Riedel (1991), among others, citing the Turkish reform program implemented in the 1980s, argues that the outward-orientation of trade can boost export growth rates of LDCs. It is also true that the early and favourable timing of Turkey's debt crisis (in 1978), a favourable political environment (political autonomy) during 1980-1983 period, and a very generous international loan package which has been launched in the early 1980s³³ by the creditors are the factors that cannot be ignored in evaluating the success of the Turkish experience.

To sum up, the Turkish reforms of the 1980s have already produced a remarkable payoff, although a number of structural economic difficulties remain. A more accurate evaluation would, no doubt, require specification of what would have happened in the absence of the 1980 reform program. Krueger (1992, p.144) argues that if successive Turkish governments had attempted to continue the policies of the late 1970s, there is little doubt that real output would have continued to fall, and inflation would have accelerated further. We agree with Krueger that, contrasted

³³It is worth noting that during the period 1978-1979, that is, before the economic reforms of 1980, the economic performance of Turkey was not much different from the typical pattern of a SIC after 1982.

with a scenario such as that, the Turkish reforms are to be judged already to have been reasonably successful despite some question marks remain.

Table 4.16 Some Macroecononic Indicators for Turkey in the 1980s

	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	
Real GNP Growth (%)	8.0	-1.1	4.1	4.5	3.3	5.9	5.1	8.1	7.5	3.6	1.9	9.2	
Inflation Rate [1] (%)	10.1	107.2	36.8	27.0	30.5	50.3	43.2	29.6	32.0	68.3	69.6	53.1	
Total GFI (2)/GNP (%)	21.6	19.7	19.0	18.0	18.8	17.9	20.0	23.1	24.0	24.0	22.4	21.3	
Total public GFI/GNP (%)	10.3	10.4	11.0	6.6	10.5	9.7	11.6	13.3	12.8	11.4	10.2	9.7	
Total priv. GFI/GNP (%)	11.3	9.3	7.9	8.0	8.3	8.2	8.4	9.8	11.2	12.6	12.3	11.6	
Unemployment Rate (%)		11.6	11.6	11.7	12.1	11.8	11.7	10.5	9.5	8.0	8.3	7.4	
Total Revenues/GNP (%)	21.7	22.6	24.3	20.1	23.1	22.5	24.8	29.5	28.8	28.6	28.3	28.2	
Total Expenditure/GNP (%)	27.8	33.1	29.2	24.4	29.1	29.0	29.3	34.3	36.6	34.8	35.5	37.9	
PSBR (3)/GNP (%)	6.1	10.5	4.9	4.3	6.0	6.5	4.5	4.7	7.8	6.2	7.1	9.4	
Export/Import Ratio (%)	29.6	36.8	52.7	65.0	62.0	66.3	68.5	66.6	71.4	81.1	73.6	58.1	
Export (4)/GNP (%)	3.7	5.0	7.9	10.6	11.1	14.2	14.8	12.7	14.9	16.5	14.4	11.9	
Import [5]/GNP (%)	12.7	13.6	15.0	16.3	17.9	21.4	21.7	19.1	20.9	20.2	19.6	20.5	
Total Foreign Trade/GNP(%)	16.4	18.6	22.9	26.9	29.0	35.6	36.5	31.8	35.8	36.7	34.0	32.4	
Industrial Exp./Total Exp.	35.9	36.0	47.9	59.7	63.9	72.1	75.3	7-1.4	79.1	76.7	78.2	79.0	
CAD (6) (Billion \$)	-1.6	-3.4	-1.9	-1.0	-1.9	-1.4	-1.0	-1.5	-0.8	1.6	1.0	-2.6	
CAD/GNP (%)	-4.4	-5.8	-3.3	-1.8	-3.7	-2.9	-1.9	-2.5	-1.2	2.3	1.2	-2.4	
FE&GR (7) (billion \$)	1.2	1.2	1.7	2.0	2.1	3.5	3.3	4.3	5.2	6.4	9.3	11.8	
Total External Debt/GNP (%	0.8 (23.5	24.7	32.5	35.7	41.0	47.5	54.7	59.0	57.8	51.0	43.3	
Annual Inflow of FDI (8)	15.1	97.0	337.5	167.0	102.7	271.4	234.5	364.0	536.5	824.5	1470.5	1784.3	
 (1) Average annual change (2) GFI: Gross fixed investigation 	in whole tment.	sale pri	ce inde										
(2) PSBA: PUDIIC SECLOL DO	ANTMOI	"a Trnba J	· i u at										

[4] Exports of goods (fbb).
[5] Imports of goods (cfl).
[6] CAD: Current account deficit.
[7] Foreign and gold reserves (net).
[8] FDI: Foreign direct investments (million \$).
Source: state Flanning Organisation (SPO); Undersecretariat of Treasury and Foreign Trade (UTFT).

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	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Agriculture Agriculture Services GDP (at factor cost)	29.1 20.0 51.0 100.0	22.6 25.0 52.4 100.0	22.0 26.1 51.9 100.0	20.8 27.1 52.1 100.0	19.6 28.6 51.8 100.0	19.6 29.4 51.0 100.0	18.8 31.6 49.6 100.0	18.5 31.9 49.7 100.0	18.6 31.8 50.2 100.0	17.5 32.4 50.1 100.0	16.6 31.3 52.1 100.0	18.1 29.2 52.6 100.0

Source: SPO; UTFT.

Table 4.18 Turkey's Functional Income Distribution in the 1980s

	1980-83	1984-87	1988	1989	1990	7667
Agricultural Sector	22.3	19.8	18.5	17.6	18.9	16.9
Wages and Salaries	24.8	18.3	17.4	20.5	21.7	23.6
Profit. Interest and Rent	52.9	61.9	64.1	61.9	59.4	59.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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4.6. Discussion

In this chapter, we presented a comprehensive overview of the Turkish economy (esp.) in the post-War years. We now would like to add a brief discussion, although the Chapter, as a whole speaks for itself. The post-War era marks a struggle of the Turkish economy for rapid economic development. The country has been, and still is, a "typical" middle-income LDC. Turkey has been characterized by a rather closed economy with inward-oriented policies until the 1980s. In the late 1970s, the country found itself in a severe external debt problem stemming from foreign exchange liquidity crisis with widespread shortages, negative growth and three digit inflation rates. A turning point in the Turkish economic policy came in January 1980. Inward-looking economic strategy was replaced by an outwardoriented growth strategy based on export promotion. A decade later, in 1990, Turkey has a comfortable balance-of-payments situation, and holds remarkable foreign exchange reserves. Within last ten years, the economy has achieved a remarkable transformation from an inward to an outward orientation with record increases in exports. Yet, inflation remains high and substantial public sector budget deficits pose a real threat for the economy as a whole. In the late 1980s, especially, fiscal balances have come under increasing pressure due to heavy external transfers.

There is little doubt that the Turkish economy, compared to the first half of the 1980s, has been less successful in terms of macroeconomic performance in the late 1980s. Real GNP slowed down in 1988 and 1989, as a result of a tightening of economic policy in 1988 aimed at containing considerable budget deficits and increasing inflation. From late 1988 onwards, the Turkish Lira (TL) appreciated in real terms and the exchange rate has been used exclusively as a tool to fight inflation. That is, the government opted for the use of exchange rates as a tool for the stabilisation policy instead of trade policy. This illustrates the two conflictive roles of the exchange rate, as a tool for stabilisation policies, on the one hand, and of trade policies on the other. As regards trade liberalisation, the 1980s' reforms have been sufficient to merit the status of a sustained liberalisation. The import liberalisation process, in the late 1980s, however, led to an increase in the imports of consumer goods [see, e.g., Uygur (1993)]. Capital account liberalisation, on the other hand, appear to have contributed to the real appreciation of the TL. In 1990, further import liberalisation measures were introduced during a period of real exchange rate appreciation with the result of increasing trade deficits. In this respect, allowing residents uncontrolled access to international capital markets might be damaging, and short-term speculative capital flows might be costly. Accordingly, it appears that Turkey needs to exercise some control over external capital flows in order to minimize their disruptive effects and gain greater autonomy to accomplish growth and stability [for this point, see, e.g., Akyuz (1993)]. Akyuz warns that special care needs to be given to the design of external financial policies since mistakes in this area tend to be costly and difficult to reverse. We believe that restoring policy consistency should receive the top priority and the correcting action should come from the fiscal side. The main task of the exchange rate policy needs to send credible and sustainable signals for continued outward-orientation. There is little doubt that future prospects and sustainability of the Turkish success depend critically on achieving optimal solutions to those problems stated.

CHAPTER FIVE

EMPIRICAL MODEL BUILDING OF THE LONG-RUN WITH NONSTATIONARY MACROECONOMIC TIME SERIES DATA

5.1. Introduction and Background

Nonstationary (trended) time series data can be regarded as potentially a major problem for empirical econometrics. It is well known that trends, either stochastic or deterministic, may cause spurious regressions, uninterpretable Student-t values and other statistics, goodness of fit measures which are "too high" and, as a rule, make regression results rather difficult to evaluate. Unfortunately, most macroeconomic time series are subject to some type of trend. Some researchers have suggested a remedy, namely to difference a series successively until stationary is achieved. Nevertheless, it has been proved that "differencing" results in a loss of some valuable long-run information in the data. A breakthrough in time series econometrics came with the concept of "cointegration" in the early 1980s. Since then, there has been an explosion of research on "cointegration" and related topics. The concept suggests that even if, say, the variables X and Y are nonstationary, they may still be floating in time together, implying that a linear combination of X and Y might be stationary. This simply means that although the variables in question are nonstationary, there might still be a long-run relationship between them.

In that sense, the main idea is that deviations from this long-run path, which is given by the residuals of the "cointegrating regression", are stationary. The appeal of the cointegration analysis is that it simply provides an effective formal framework for testing, estimating and modelling long-run economic relationships from time series data.

This chapter may also be regarded as a selective review of "cointegration", a technique becoming widely used in empirical macroeconomic modelling of the long-run. In particular, the concepts of stationarity, and of integrated variables and related test procedures are examined. Methods of testing whether variables are cointegrated and of estimating cointegrated variables are considered. It provides not only a general discussion of the methodology and a guide to current practice but also some practical applications for unit roots regarding Turkish macroeconomic data are provided.

Cointegration analysis within time series econometrics was introduced to the literature in the early 1980s, and has recently become an established method of empirical modelling. Indeed, the implications of cointegration analysis for the theory and practice of econometrics are remarkable and have led to a revolution in the way applied econometric work is carried out. One of the aims of this Chapter is to examine the development, nature and importance of cointegration and related topics. In the literature, some recent technical discussions have become technically too complex to be followed by the non-specialist. Since we intend to be non-technical and to keep the details to a minimum, we are mainly concerned with the single equation case with annual macroeconomic time series data. However, system-based methods, such as the Johansen method, are also explained.

The following articles survey the issue of "cointegration": Campbell and Perron (1991), Dickey *et al.* (1991), Dolado and Jenkinson (1987), Dolado *et al.*

(1990), Holden and Thompson (1992), McDermott (1990), Muscatelli and Hurn (1992), Perman (1991). Also, the following journals have presented special issues on cointegration: *Empirical Economics* (1993), *Journal of Economic Dynamics and Control* (1988), *Journal of Policy Modelling* (1992), *Oxford Bulletin of Economics and Statistics* (1986, 1992). Recently, some econometrics books have dealt with the concept in detail: see, e.g., Banerjee *et al.* (1993), Charemza and Deadman (1992, Chapter 5), Cuthbertson *et al.* (1992, Chapter 5), Hall and Henry (1988), and selected papers on cointegration are published in the volumes edited by Engle and Granger (1991), and by Hargreaves (1994). In recent years, the concept of cointegration have been included even by introductory textbooks of econometrics and time series analysis: see, e.g., Davidson and Mackinnon (1993), Greene (1993), Maddala (1992), Thomas (1993), and Hamilton (1994).

In this introduction section, we discuss how cointegration analysis relates to the existing time series econometrics literature together with nonstationarity and spurious regression results. Subsequently, in Section 5.2, we examine the nature of cointegration. Here, the concept of cointegration is explained, defined and motivated. Our presentation is mainly based on the Engle-Granger two-step modelling method (EGM). Integrated processes and the statistical tests for order of integration are discussed in Section 5.3. The relevant tests are applied to a number of Turkish macroeconomic time series data to check whether they are of stationary or nonstationary nature in Section 5.4. Section 5.5 presents statistical tests of cointegration. In Section 5.6, we explain how to estimate and model cointegrated time series through some alternative methods such as the Engle-Granger two-step modelling method (EGM), the Engle-Yoo three-step modelling method (EYM), the Saikkonen method and the Johansen method. Section 5.7 clarifies the significance of new long-run modelling methods for economists. The final section draws some concluding remarks.

Most time series econometrics techniques have relied on the assumption of stationarity until recently. In their works, some applied analysts still assume that the underlying data process are stationary. Time series that satisfy the stationarity assumption have a tendency to revert back to a constant mean. Nonstationary (trended) time series data can be regarded as potentially a serious problem for applied econometrics. It is well known that trends, either stochastic or deterministic, may cause spurious regressions. However, the grim fact is that in especially macroeconomics most time series are subject to some type of trend. Although the nonstationary nature of many time series has been well known for a long time, it was not until the 1970s that much attention was given to the time series properties of the economic data. Prior to the development of cointegration analysis and the recent work on estimating and modelling nonstationary data, the underlying assumption of time series econometrics has been the stationarity of time series data.

Econometricians have taken a variety of approaches to dealing with this conflict. At the simplest level, many early researchers simply ignored the stationarity requirement. This practice led to a substantial literature dealing with the "spurious regression" problem. Some investigators have suggested a remedy; namely, to difference a series successively until stationarity is achieved. However, it was proved that "differencing" resulted in losing some valuable long-run properties in the time series data.

A real breakthrough in time series econometrics came with the concept of "cointegration" in the early 1980s. The concept was first introduced by Granger (1981). Afterwards, Engle and Granger (1987), in their seminal paper, provided a firm theoretical base for representation, testing, estimating and modelling of cointegrated nonstationary time series variables. Since then, there has been an

explosion of research on cointegration and related subjects. The concept simply suggests that even if, say, the variables C_t and Y_t are nonstationary (i.e. as time passes, each of these variables increases in magnitude so that they have an increasing mean), they may be floating in time together (i.e. not drifting apart). That is to say, the differences C_t and Y_t do not have a clear tendency to rise or to decline implying that these differences (or, more generally, a linear combination of C_t and Y_t) might be stationary. This simply means that although the variables under consideration are nonstationary, there might still be a "genuine" long-run relationship between them. In that sense, the main idea is that deviations from this long-run path, which is given by the residuals of the long-run cointegrating regression are stationary. Thus, cointegration analysis allows nonstationary data to be used so that spurious results are avoided. The analysis provides an effective formal framework for testing, estimating and modelling long-run economic relationships from time series data.

The basis of cointegration analysis draws on three themes in the recent literature: stationarity, spurious regression and error-correction mechanism (ECM). First of all, the key concept underlying the concept of cointegration is the idea of stationarity. Consider a stochastic process X_{t} .¹ Formally, X_t is said to be "stationary" if the followings are hold altogether:²

¹In the literature, the context of time series is often used alongside the context of stochastic process. For simplicity, we assume here that a time series and a stochastic process are the same. See, e.g., Charemza and Deadman (1992).

²In applied econometrics, it is more usual to deal with weak sense stationarity focusing attention on the means, variances and covariances of the process. Throughout this paper, we are concerned with the idea of weak stationarity. For the concepts of weak versus strong (strict) stationarity and the concept of stochastic process, see Charemza and Deadman (1992), Harvey (1990), Mills (1990), Spanos (1986).

$E(X_t) = constant = \mu$	(5.1)
$Var(X_t) = constant = \sigma^2$	(5.2)
$\operatorname{Cov}(X_i, X_{i+i}) = \sigma_i$	(5.3)

Thus, the means [see equation (5.1)] and the variances [see equation (5.2)] of the stochastic process X_t are constant over time, while the value of covariance between periods [see equation (5.3)] depends only on the gap between periods, and not on the actual time at which this covariance is considered. Equation (5.3) states that the covariance between any two values of X from the series (i.e. autocovariance) depends only on the "distance apart in time" between those two values. If one or more of the conditions above are not hold, then X, is said to be nonstationary. The mean, variance and autocovariances are thus independent of time (i.e. remain constant over time). However, many time series in macroeconomics are clearly nonstationary in the sense that the mean and variance of the series depend on time, and they tend to depart ever further from any given value as time goes on. The degree of integration of a series is closely related with stationarity. A nonstationary series is said to be integrated of order d [denoted X₁-I(d)] if it has to be differenced d times to become stationary.³ It is stressed by many econometricians that the properties of a stationary series and a nonstationary series are quite different [Hall and Henry (1988, pp.48-9)].

It is still possible to run regressions, even if time series do not satisfy the stationarity assumption. However, these regressions could simply be spurious (meaningless). This leads us to the concept of "spurious regression (correlation)".

³There are mainly two approaches in the literature which seek to reach stationarity: taking the differences of the series to attain stationarity [difference stationary process (DSP)] and estimating regressions on time to get rid of a trend [trend stationary process (TSP)]. Here we follow Nelson and Plosser (1982) in the sense that most macroeconomic time series are DSP; that is, stationarity is achieved by successive differencing. For more details, see, e.g., Maddala (1992), Mills (1990) and Perman (1991).

It is well known that the existence of a high degree of correlation between, say, two variables does not automatically imply the existence of a casual relationship between them. The possibility of correlation representing a purely mathematical rather than a causal relationship is referred to as spurious correlation. The regression which includes spuriously correlated variables is referred to as spurious regression. In this case, one possibility is that there exists another variable affecting both variables in the same direction. The first formal analysis of this problem is Yule (1926) who constructed a number of experiments to show that standard theory worked well in the case of stationary variables but could give highly misleading results in the case of nonstationary variables [Hendry (1986)]. Spurious regression results usually arise when the regression variables are nonstationary. Since many macroeconomic time series are typically nonstationary, this is a case of particular interest to economists. A number of obviously spurious relationships have been shown in the literature [see, e.g., Charemza and Deadman (1992), Hendry (1980). In Hendry's (1980) example, one can see how easy it is to create a spurious regression artificially. Regressing the logarithm of the consumer price level in the UK, P, on C, the cumulative rainfall in the UK, he obtains the following results:

 $P_t = 10.9 - 3.2C + 0.39C^2$ (0.55) (0.23) (0.02) (5.4)

R²=0.982 DW=0.1

where the values in parentheses are the standard errors.

If an investigator forgets(!) to report the Durbin-Watson (DW) statistic, the regression looks quite interesting. Can more rainfall really lead to higher prices? Since the answer is a clear "no", then this regression is said to be "spurious" and economically meaningless, and thus it would be wrong to draw any conclusion

from the regression.

Unfortunately, economists and econometricians disregarded these early lessons and applied standard statistical procedures for stationarity processes to nonstationary economic time series. The early criticisms made by Yule were repeated by Granger and Newbold (1974). They pointed out that for nonstationary series R^2 tends to one while DW statistic tends to zero. According to Granger and Newbold's findings, this spurious relationship as indicated by a low DW statistic leads to: inefficient estimates, sub-optimal forecasts and standard tests such as t and F tests being invalid even if high R^2 values are observed. An elegant theoretical basis for Granger and Newbold's findings were provided by Phillips (1986). Phillips (1986), at the theoretical level, shows that the statistical properties of regression analysis using nonstationary time series are dubious.

The discussion above implies that regression analysis make sense only for series which are not subject to a trend. Since almost all economic time series contain trends, it follows that these series have to be detrended before any sensible regression analysis is performed. We already know that this is done by successive differencing. Based on the ideas of Box and Jenkins (1970), Granger and Newbold (1974) suggested the idea of differencing the economic series data to remove nonstationarity. This approach, however, disregards potentially important long-run relationship among the levels of the series postulated by economic theory.

Much earlier, this problem was anticipated by Sargan (1964) who used a class of mechanism that later became known as "error-correction mechanism" (ECM). Phillips (1954) developed a class of ECM and Sargan (1964) was the first to apply this to economic data. The name ECM was first introduced by Davidson *et al.* (1978) which is one of the best known applied example of ECM. The Davidson *et al.* model, or DHSY consumption model as it is often referred to, is

of the form:

 $\Delta_4 \log C_t = b_0 + b_1 \Delta_4 \log Y_t - b_2 \Delta_1 \Delta_4 \log Y_t - b_3 (\log C - \log Y)_{t4} + e_t$ (5.5)

where C_t and Y_t represent real expenditure on non-durable and services, and real personal disposable income respectively; Δ is the first-difference operator.

The dynamic adjustment term $-b_3(\log C - \log Y)_{t-4}$ is the important component here. DHSY suggested that if we use the variables in differences, as suggested by the Box-Jenkins approach, it is impossible to reach the long-run relationships which are of interest to economists. However, a fundamental theory is missing from the DHSY model.

This gap is filled by the concept of cointegration which provides theoretical support for DHSY's claim that nonstationary variables may still be included in a regression without spurious results occurring. The appeal of cointegration analysis is that it allows nonstationary data to be used so that spurious regression results are avoided. The analysis simply provides an effective formal framework for testing, estimating and modelling long-run economic relationships from time series data.

5.2. The Nature of Cointegration

Let us consider the variables C_t and Y_t in Figure 5.1 Both variables are clearly nonstationary as they are both subject to a positive trend. However, they seem to be floating in time together. They are most probably integrated of the same order and the fact that the differences between C_t and Y_t do not have a clear tendency to rise or to decline suggesting that these differences are likely to be stationary.

The concept of cointegration suggests that even if, say, the variables C_t and

 Y_t in Figure 5.1, are nonstationary, they do not drift apart in time. If there is such a long-run relationship between C_t and Y_t , the main idea is that deviations from this long-run path are stationary. If this is the case, the variables C_t and Y_t are said to be cointegrated (see Figure 5.1).

The concept was introduced by Granger (1981) and the formal definition was developed by Engle and Granger (1987). Following is the definition of cointegration of two variables developed by Engle and Granger (1987):

Definition 5.1: Two time series C_t and Y_t are said to be cointegrated if there exists a β such that $(C_t - \beta Y_t)$ is integrated of order zero. This is denoted by saying $C_t, Y_t \sim CI(1,1)$. More generally, if $C_t \sim I(d)$ and $Y_t \sim I(d)$, then $C_t, Y_t \sim CI(d,b)$ if $(C_t - \beta Y_t) \sim I(d-b)$ with b>0. The coefficient vector of a linear combination which draws on cointegration between the series is known as the "cointegrating vector".⁴

Let us assume that economic theory suggests a long-run relationship described by the following equation:

 $C_t^* = \beta Y_t \tag{5.6}$

where C_t^* is the long-run equilibrium path [i.e. expected (target) long-run path according to economic theory] of real aggregate consumption; C_t is the real actual aggregate consumption; and Y_t is the real GDP.

If target consumption, C_t^* , follows, at each instant, an equilibrium path, then by definition from equation (5.6):

⁴It is important to note that the idea behind cointegration can most easily be explained by considering the case d=b=1. This is what we assume in the definition above. A straightforward generalization of the above definition for the case of n variables is possible. For multivariate cases, the condition that all the series are of the same order may be relaxed in some special instances. See Charemza and Deadman (1992, pp.147-8). For simplicity, here, we are only concerned with the two-variable case. It is shown by Johansen (1988) that in multivariate (more than two variables) cases, there might be more than one cointegrating vector.

 $C_t^* - \beta Y_t = 0$

(5.7)

In short, one would not expect C and Y to act in accordance to this equilibrium at every point in time, and thus even if equation (5.6) correctly specify an equilibrium relationship, equation (5.7) will not hold at all instants. Let stochastic variable u_t represent deviations of C_t from its long-run path C_t^* ; that is:

Error-correction Mechanism (ECM) = $C_t - C_t^* = C_t - \beta Y_t = u_t$ (5.8) $C_t = \beta Y_t + u_t$ (5.8) where $u_t - I(0)$.

Within the cointegration framework, u_t in equation (5.8) is regarded as deviations from the long-run (equilibrium) path [see, e.g., Granger (1993)]. In Figure 5.1, for example, u_t is given by the differences between C_t and Y_t (i.e. $u_t = C_t - \beta Y_t$).

This is simply what one is supposed to understand from the ECM within cointegration framework. The ECM constitutes a case of systematic disequilibrium adjustment process through which C_t and Y_t are prevented from "drifting too far apart". As Charemza and Deadman (1992, p.154) put it: "...The fact that variables are cointegrated implies that there is some adjustment process which prevents the errors in the long run relationship becoming larger and larger...". It is shown by Engle and Granger (1987) that any cointegrated series have an error-correction representation. The reverse is also true, in that cointegration is a necessary condition for ECM to hold. This is known as the "Granger Representation Theorem" (GRT) [see, e.g., Charemza and Deadman (1992, p.154 and p.197), Engle and Granger (1987; 1991, pp.7-8), Hylleberg and Mizon (1989)].

As a result, in practice, for C_t and Y_t to be cointegrated, it is required that:

a) the two series should be integrated of the same order,⁵

b) there has to be a linear combination of the two series which is integrated of order zero, denoted $u_t = (C_t - \beta Y_t) - I(0)$.

However, as mentioned earlier, if the number of variables involved in the long-run relationship is more than two, the problem becomes more complicated. Charemza and Deadman (1992, p.148) note that in a multivariate context if variables in a long-run economic relationship are of a different order of integration and the order of integration of the dependent variable is lower than the highest order of integration of the explanatory variables, then there should be at least two explanatory variables integrated of this highest order if the necessary condition for stationarity of the error term is to be met.

Accordingly, the existence of cointegration has some "causal" implications as well. Statistically significant error-correction term introduces an additional channel through which Granger causality could be detected. Accordingly, if two variables are cointegrated, causality must run in, at least, one direction between them [for further information, see Granger (1988)].

 $^{^5\}mathrm{It}$ is shown by Nelson and Plosser (1982) and Perron (1988) that most macroeconomics are nonstationary and integrated of order one.





5.3. Statistical Tests for Order of Integration: Tests for Unit Root

The argument so far suggests that the first thing to do in any applied time series study should be to examine each of the variables individually to check their order of integration. The integration analysis is based on the following key definition provided by Engle and Granger (1987):

Definition 5.2: A nonstationary series which can be transformed to a stationary series by differencing d times is said to be integrated of order d. A time series X_t integrated of order d is denoted $X_t \sim I(d)$. For example, if $X_t \sim I(2)$, the first differences of the first differences of X_t achieve stationarity: $\Delta\Delta X_t = \Delta(X_t - X_{t-1}) = (X_t - X_{t-1}) - (X_{t-1} - X_{t-2})$. This operation is termed second (order) differencing, and the resulting series called second differences.

The relevant tests for integration level fall into three categories: visual inspection of the series and of the sample autocorrelations (correlogram) of the series, Integration Durbin-Watson (IDW) statistic test and regression-based t tests such as the Dickey-Fuller (DF) [see Dickey and Fuller (1979)], the Dickey-Pentula (DP) [see Dickey and Pentula (1987)] and Phillips-Perron tests. Regression-based t-tests and especially the DF test has received the most attention in the applied econometrics literature. First two categories can only serve as a quick and rough guide. Our focus in this paper will be on the DF test.⁶

The DF test involves estimating regression equations and carrying out standard t-tables. However, with nonstationary variables, the distributions of these statistics are nonstandard, and thus special tables derived by simulation are essential.⁷

⁶More information about the other integration level tests can be found in the following literature: Charemza and Deadman (1992), Engle and Granger (1987), Engle and Yoo (1987), Holden and Thompson (1992), Sargan and Bhargava (1983).

⁷This is termed "modified t-statistic" by Holden and Thompson (1992, p.13).

Now assume that we wish to test the hypothesis that an annual series X_t is integrated of order one. Consider the model:

 $X_t = \theta X_{t-1} + e_t$

(5.9)

where e_t represents a sequence of uncorrelated stationary error terms with zero mean and constant variance.

The series X_t is stationary if $|\Theta|<1$ [see Charemza and Deadman (1992, pp.124-31), Granger and Newbold (1986, pp.8-10), Harvey (1990, pp.12-4), Maddala (1992, pp.581-2)]. If $|\Theta|=1$, the series is not stationary [i.e. the variance, σ^2 , of X_t is then t. σ^2 and therefore increasing with time--for the proof, see Perman (1991)]. It is rather likely that for most economic time series, the autoregressive coefficient Θ would be one or less [Perman (1991)]. It is conventional to suppose that the explosive processes given by $\Theta>1$ are not economically sensible. As will be seen in the DF integration level testing, we are essentially testing the null $\Theta=1$ against the one-tailed alternative $\Theta<1$. Autoregressive model (5.9) with $\Theta=1$ is known as "difference stationary process" (DSP), and most economic time series seem to be of DSP [Nelson and Plosser (1982)]. Such a process with $\Theta=1$ is said to be integrated of order one.⁸

It is tempting to estimate equation (5.9) by the ordinary least squares (OLS), and to test the hypothesis that $\theta=1$ by the standard t test. However, this not the test employed. The OLS estimate of θ may be substantially biased in autoregressive equation (5.9) and only little is known about the distribution of the t statistic where the variable X₁ in equation (5.9) is nonstationary [Charemza and Deadman (1992,

⁸Maddala (1992, Chapter 14) provides a critical assessment of statistical tests of integration level. The fact is that, the topic whether θ =1 or θ <1 (i.e. nonstationarity versus stationarity) has attracted the most attention of time series econometricians. Confirming this point, Diebold and Nerlove (1988) survey the literature and list more than two hundred (!) papers published in the 1980s. Among others, Nelson and Plosser (1982), Perron (1988) suggested that most economic time series are nonstationary. However, it has been argued recently by some [e.g. Kwiatkowski et al. (1992)] that accepting the null as I(0) instead of I(1) can change the results obtained by earlier studies. Note also that structural breaks in the form of outliers may create spurious unit roots [see, e.g., Perron (1990)].

p.131)].

 $X_t = (1+\lambda)X_{t-1} + e_t$

An appropriate method of testing the order of integration of X_t in equation (5.9) was suggested by Dickey and Fuller (1979) which is known as the Dickey-Fuller (DF) test. In short, it is a test of the hypothesis that in equation (5.9) θ =1 against the one-tailed alternative θ <1. Instead of equation (5.9), the following model is estimated:

 $\Delta X_t = \lambda X_{t-1} + e_t$ Equation (5.9) can now be expressed as: (5.10)

which is the same as equation (5.9) with $\theta = (1+\lambda)$. Here in equation (5.10), the OLS is valid. If λ in equation (5.10) is negative, then θ in equation (5.9) becomes smaller than one. Hence, the DF test consists of testing the negativity of λ in the OLS regression of (5.10). Rejection of the null hypothesis $\lambda=0$ in favour of the alternative $\lambda<0$ implies that $\theta<1$ and that X_t is integrated of order zero [i.e. $X_t \sim I(0)$].

For equation (5.10), the t and F distributions are not appropriate for testing the null λ =0. Corrected critical value tables of the t statistic in the DF regression of (5.10) are reported by Fuller (1976), Guilkey and Schmidt (1989), MacKinnon (1991), Charemza and Deadman (1992). Since the distribution of the t statistic in this case is not known precisely, it should be obtained by simulation, and thus the critical values are subject to some error.⁹ The null hypothesis of λ =0 [i.e. X_t-I(1)] is rejected if the t statistic value has a larger negative value than the corresponding critical value. Rejection of the null hypothesis implies that X_t-I(0) (i.e. X_t is

⁹For more information about the simulation technique, see, e.g., Blangiewicz and Charemza (1990), Charemza and Deadman (1992, Appendix).

stationary).¹⁰ In practice, it is not clear whether one should use the DF regression (5.10) with or without intercept term.

What happens if the null hypothesis cannot be rejected? In such a case, there are two alternatives: either X_t is integrated of order higher than zero or is not integrated at all. Naturally, the next step would be to test whether the order of integration is one. Then, the DF equation (5.10) becomes:

$$\Delta\Delta X_{t} = \lambda\Delta X_{t-1} + e_{t} \tag{5.11}$$

and in the same way, our interest is in testing the negativity of λ . We can continue this process until we establish an order of integration for X_t , or until we understand that X_t cannot be made stationary by differencing.

In case of possible autocorrelation in the error process e_t in the DF equation (5.10), however, the DF test results are invalid. There are two main approaches to meet this problem within the single equation framework. The first is to modify the test procedure and the second is to modify the test statistic. The former one is known as the Augmented Dickey-Fuller (ADF) test which involves including lagged values of the dependent variable in to the DF equation (5.10). The ADF test is widely regarded as being one of the most efficient tests for integration level:

$$\Delta X_{t} = \lambda X_{t-1} + \sum_{i=1}^{k} \Psi_{i} \Delta X_{t-i} + e_{t}$$
(5.12)

A practical rule for establishing the number of lags for $\Delta X_{t\text{-}i}$ (the value of

¹⁰Following Nelson and Plosser (1982), we assume that the series that we are concerned with are DSP rather than TSP. Similarly, Nelson and Kang (1984) conclude that using a regression on time has serious consequences when, in fact, the time series is of the DSP type, and thus, differencing is the appropriate procedure for trend elimination. It is worth noting that Dickey and Fuller (1981) provide an appropriate joint test whether a series is DSP or TSP type.

k) is that it should be relatively small in order to save degrees of freedom, but large enough to secure the lack of autocorrelation of the error term. One can use Lagrange Multiplier (LM) test for serial correlation, DW test or any of the model selection procedures such as Akaike Criterion to choose the optimal value for k.

An alternative correction is provided by Phillips and Perron [see Phillips (1987), Perron (1987), Phillips and Perron (1988)] for the test known as the Phillips-Perron (PP) test for integration level. The disturbance with the ADF test is that addition of lagged values of ΔX_t loses degrees of freedom and hence reduces the power of the tests. Phillips and Perron (1988) argue that the power of the ADF test is likely to be low for time series where moving-average terms are present or where the error process is heterogeneously distributed. The examination of the PP test are beyond the scope of our selective review. The procedure of the PP test are defined, explained and applied in Phillips and Perron (1988). Perman (1991) suggests the following procedure as to the ADF or the PP tests to choose: a) test the diagnostic statistics for normality, serial correlation, heteroscedasticity and etc. from the ADF regression, b) if they are satisfactory, then the ADF test is sufficient, otherwise, c) adopt the PP test.

It has recently been argued that "structural changes (breaks)" in a time series can affect the integration level of the series. In short, a structural break in the mean level is a sort of exogenous intervention to the series. It is argued by Perron (1990) that ignoring these effects can lead to an inadequate model specifications, poor forecasts, spurious integration test results and improper policy implications. Perron (1990) and Perron and Vogelsang (1992a), in this direction, propose an integration level test for structural break known as the Perron test and provides the appropriate critical values.¹¹ In a recent work, Perron and Vogelsang (1992b), apply the tests in the spirit of Perron (1990) and Perron and Vogelsang (1992a) to analyze the issue of purchasing power parity between the United States and the United Kingdom, and also between the United States and Finland. The Perron test can be regarded as an improvement in the direction of searching and creating more informative economic time series. What the test does is to remove the effect of the structural break from the series and then apply the standard DF integration test procedure. It is important to realize that with the Perron integration test we are not testing the presence of a structural break. Instead, we test whether or not the order of integration is changed by the structural break.

The existence of seasonal aspects of the data makes both the integration and cointegration tests much more complicated. This is beyond our scope, but more information can be found in Charemza and Deadman (1992).

5.4. Evidence for Nonstationarity from the Turkish Macroeconomic Data

Using MICROFIT 3.0 version [see Pesaran and Pesaran (1991)], we apply the DF/ADF tests to some Turkish macroeconomic time series data to see whether they are nonstationary.¹² In other words, we wish to know whether the findings of Nelson and Plosser (1982) and Perron (1988) that most macroeconomic time series are nonstationary is confirmed by the Turkish macroeconomic data. Due to data unavailability and difficulties to reach the available data we were not able to apply the complete Nelson-Plosser data to Turkey. The data are in natural logarithms and annual, 1960-1991. We have ten macroeconomic series under investigation; namely, money in circulation (M1+M2=MONEY), GNP deflator (GNPDEF), consumer price

¹¹However, it worth noting that the Perron test is valid only if there exists one break. For cases when there are two structural breaks in a series, see Escribano (1990).

¹²For a similar study on the Turkish economy, see Selcuk (1993).

level (PRC), nominal exports of goods and services (XN), real exports of goods and services (XR), real GDP per capita (GDPPER), nominal GDP (GDPN), real GDP (GDPR), nominal aggregate consumption expenditure (CONN), real aggregate consumption expenditure (CONR). Data sources and definitions of the variables are reported in the Appendix A.

Our empirical results suggest (see Table 5.1) that all variables are nonstationary in levels. Money in circulation, GNP deflator and consumer price level are found to be integrated of order two. The rest (i.e. nominal exports, real exports, real GDP per capita, nominal GDP, real GDP, nominal aggregate consumption, real aggregate consumption) appear to be integrated of order one. These results seem to confirm the findings of Nelson and Plosser (1982) in that most macroeconomic series are of I(1) or in some cases I(2). These results for Turkish macroeconomic data have an important implication: any regression analysis using Turkish macroeconomic data in levels are very likely to be misleading due to nonstationarity of the series unless the cointegration analysis is employed.

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Table 5.1	The DF/ADF	Tests for	: Unit	Roots:	Some	Macroeconomi	c Turkish	Data
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	LEV	ELS	1ST DIF	FERENCES	2ND I	DIFFERENCES	3
VARIABLE	DF	ADF	DF	ADF	DF	ADF	And a factorial to the transformation
MONEY GNPDEF PRC XN XR GDPPER GDPN GDPR CONN	7.25 5.81 6.74 0.74 0.43 -1.02 -0.01 -1.08	1.99 1.90 2.08 0.15 0.54 -1.24 -1.24 -1.52	-1.65 -2.05 -1.71 -7.48 -6.13 -4.68 -6.79 -4.61	-1.67 -1.56 -1.36 -4.37 -4.45 -3.48 -3.27 -3.39 -3.18	-5.6(-6.2) -6.7! 	0 -5.08 3 -4.72 9 -4.88 	
CONR	-0.06	-1.32	-6.52	-3.18 -4.46			

Comment to Table 5.1: The corresponding critical values are obtained from Charemza and Deadman (1992). The test statistics reported are automatically calculated by the use of "ADF" command in MICROFIT 3.0 version. Pesaran and Pesaran (1991) note that "ADF" command includes the intercept term in the ADF equation. Accordingly, the corresponding critical values should take the intercept term into account. The corresponding critical values with intercept for 30 observations at 5% significance level are as follows: -2.26 (lower value) and -2.05 (upper value). The test result is said to be inconclusive between the two values. In most of the cases, an augmentation of one appeared to be sufficient to secure lack of autocorrelation of the error terms.

5.5. Testing for Cointegration

Let us reconsider equation (5.8):

 $C_t = \beta Y_t + u_t$

(5.8)

Referring back to the definition of cointegration between two variables introduced by Engle and Granger (1987), let us assume that the integration level test (step 1) reveals that C_t and Y_t are integrated of order one. This implies that the first condition for two variables to be cointegrated is met.¹³ The critical requirement for the existence of cointegration is that the residuals from estimated cointegrating regression (5.8) should be integrated of order zero. In this case, the integration level tests such as the DF/ADF can be utilised to check whether the estimated residuals, \hat{u}_p from equation (5.8) are stationary.

By analogy with various integration tests mentioned earlier, there are also some tests that might be used for quick approximate results: visual inspection of the plot of residuals against time; visual inspection of the residual correlogram (i.e. sample autocorrelation function of the residuals), and utilisation of the Cointegrating Regression Durbin-Watson (CRDW) test. The distribution of the CRDW test has not been fully investigated yet, and thus its critical values are not known accurately. However, it might still be used as rough and ready method of evaluating the existence of cointegration. The CRDW is computed in exactly the same way as the usual DW statistic and expressed as:

$$CRDW = \frac{\sum_{t=1}^{n} (\hat{u}_{t} \cdot \hat{u}_{t,1})^{2}}{\sum_{t=1}^{n} \hat{u}_{t}^{2}}$$
(5.13)

¹³Multivariate case is straightforward.
where \hat{u}_t denotes the estimated OLS residual from the cointegrating regression (5.8). The appropriate critical values for the CRDW test are reported by Engle and Granger (1987, Table 2) and Engle and Yoo (1987, Table 4). The main rule is that the smaller is the CRDW, the bigger is the chance that the null hypothesis of no cointegration is not rejected. Banerjee *et al.* (1986) propose simple and quick rule; that is, if CRDW>R², the null of no cointegration is more likely to be rejected. As regards the CRDW test for cointegration, under the null of no cointegration, CRDW should be close to zero and hence the null is rejected if the statistic exceeds the corresponding critical values.

Several formal cointegration tests have been suggested in the literature. These are mainly two-fold. First group of tests are known as the "residual-based tests" which are based on the residuals of single and static cointegrating regression. The most widely used residual-based cointegration tests are the residual-based DF/ADF tests [termed "Engle-Granger" tests by MacKinnon (1991)] suggested by Engle and Granger (1987).¹⁴

The DF/ADF tests for stationarity of the estimated residuals from equation (5.8) are as follows:

$$\Delta \hat{u}_{t} = \lambda \hat{u}_{t-1} + \varepsilon_{t} \qquad \text{(Dickey-Fuller), or} \qquad (5.14)$$

$$\Delta \hat{u}_{t} = \lambda \hat{u}_{t-1} + \sum_{i=1}^{k} \psi_{i} \Delta \hat{u}_{t-i} + \varepsilon_{t} \qquad \text{(Augmented Dickey-Fuller)} \tag{5.15}$$

¹⁴Haug (1993) compares seven different residual-based tests for cointegration with the use of Monte Carlo method. Among the tests considered, Engle-Granger's residual-based ADF test shows the least size distortion. For critical values of the residual-based DF/ADF cointegration tests, see, e.g., Engle and Granger (1987), Engle and Yoo (1987), MacKinnon (1991) and Charemza and Deadman (1992).

where \hat{u}_t is the estimated OLS residuals in equation (5.8), and is interpreted as the deviations of C_t from its long-run (equilibrium) path. The same logic and test procedure of the integration DF/ADF tests apply to the cointegration DF/ADF tests with one exception: the distribution of the t statistic depends upon the number of variables included in the static cointegrating regression, and so the critical values of the cointegration tests are <u>not</u> the same as used for testing the level of integration. Again, C_t and Y_t are said to be cointegrated if \hat{u}_t -I(0). Note that we have the null of no cointegration against the alternative of cointegration. Therefore, the null should be rejected for C_t and Y_t to become cointegrated.

It has been recently argued in the literature that the definition of the null hypothesis as no cointegration or cointegration change the test results obtained.¹⁵ Kwiatkowski *et al.* (1992) note that the nature of the standard hypothesis testing ensures that the null of no cointegration is not rejected unless there is a strong evidence against it, or equivalently standard cointegration tests may have low power against relevant alternatives.

We have another residual-based cointegration test in the literature known as the Phillips-Ouliaris (PO) test [Phillips and Ouliaris (1990)].¹⁶ Although it is argued in the literature that the PO test has superior power properties in small samples, the DF/ADF cointegration tests attract the most attention among practitioners. It is however beyond our scope to examine the PO test.

Second group of cointegration tests are known as "systems-based" tests which are applied within systems of equations. In this case, a unique cointegrating vector assumption of the single equation residual-based DF/ADF tests is not valid

¹⁵A procedure that is designed to test a null of cointegration would be more practical for applied econometricians. However, Phillips and Ouliaris (1990) argue that such tests have major disadvantages.

¹⁶For small sample critical values, see Haug (1992).

anymore. If there are N variables, there can be at most r=N-1 cointegrating vectors. Among these models, the Johansen maximum likelihood approach has dominated the relevant literature [see Johansen (1988, 1991), Johansen and Juselius (1990)]. Critical values for the Johansen test can be found in Johansen (1988) and Osterwald-Lenum (1992). The complexity of the Johansen test can easily be dealt with by the use of econometric computer programs such as MICROFIT and PC-GIVE. It is also worth noting that the residual-based tests of a single cointegrating regression and systems-based tests are grounded within different econometric methodologies and thus cannot be directly compared. However, Charemza and Deadman (1992) suggest that it might be more appropriate to use systems-based cointegration tests as an auxiliary tool, testing the validity of the residual-based test results.

5.6. Modelling Cointegrated Series: A Review

Here in this section we describe how cointegrated nonstationary series can be used to formulate and estimate a model with an ECM. The existence of cointegration between variables implies that there is some adjustment process which prevents the residuals in the long-run relationship (5.8) becoming larger and larger. A number of different methods for estimating the long-run equation (5.8), and the short-run error-correction model are suggested in the literature. Such models currently represent the most attracted approach to cases where it is wished to incorporate both the economic theory and relating to the long-run relationship between variables, and short-run adjustment (disequilibrium) behaviour. As regards estimating long-run relationships in economics, there exists various different approaches. Among these approaches, the Engle-Granger (EG) type of static long-run regression has become a widely applied method since it was introduced by Engle and Granger (1987). Some [see, e.g., Stock (1987)] suggest that the estimates of the EG type static long-run OLS regression parameters are both consistent and highly efficient. The EG static long-run regression has not gone unchallenged. For instance, Banerjee *et al.* (1986) stress that ignoring the lagged terms in small samples is likely to create a bias in the estimated parameters.¹⁷

In an attempt to estimate alternative cointegrating regressions, many have been interested in adding dynamic (either differences or lags) components [see, e.g., Charemza and Deadman (1992), Cuthbertson *et al.* (1992), Inder (1993), Phillips and Loretan (1991), Saikkonen (1991), Wickens and Breusch (1988)]. Others have been more concerned with the appropriate corrections and modifications to the static parameter estimates [see, e.g., Engle and Yoo (1991), Park and Phillips (1988), Phillips and Hansen (1990), West (1988)]. In addition to these single equation-based approaches to estimate the long-run equilibrium, Johansen (1988, 1991) and Johansen and Juselius (1990) provide a systems-based approach. The main advantage of the Johansen method is that it enables one to determine the number of existing cointegrating relationships among the variables in hand. As mentioned earlier, single equation-based approaches assume the uniqueness of the cointegrating vector.¹⁸

5.6.1. Engle-Granger Two-step Modelling Method (EGM)

Among a number of alternative methods, the Engle-Granger two-step

¹⁷The findings of Banerjee *et al.* (1986) have two important implications. First, \mathbb{R}^2 is only important as an indicator of the degree of bias of the estimates. They show that the bias is large when \mathbb{R}^2 is considerably less than one. They also suggest that the EGM should be completed in an extra confirming step by checking that the residuals of the estimated short-run equation (5.16) are I(0). Second, \mathbb{R}^2 might have a role as a guide for choosing the appropriate correction for the bias. The closer the \mathbb{R}^2 to one is the less bias and the more appropriate correction. Blough (1988) is also concerned about the low power of the cointegration tests in small samples. The results of Blangiewicz and Charemza (1990) are, however, more promising as regards the power of cointegration tests in small samples.

¹⁸Inder (1993) and Phillips and Loretan (1991) provide extensive reviews about the alternative approaches for estimating long-run equilibria in the relevant literature.

modelling method (EGM), originally suggested by Engle and Granger (1987), has received a great deal of attention in recent years. One of its benefits is that the long-run equilibrium relationship (the cointegrating regression) can be modelled by a straightforward regression involving the levels of the variables. In the <u>first step</u>, all dynamics are ignored and the long-run equation (5.8) is estimated by the OLS. Let us now rewrite equation (5.8):¹⁹

$$C_t = \beta Y_t + u_t \tag{5.8}$$

where both C_t and Y_t are integrated of order one. In order for C_t and Y_t to be cointegrated, the necessary condition is that the estimated residuals from equation (5.8) should be stationary. In this case, the estimated long-run equation (5.8) (i.e. the cointegrating regression) is said to be satisfactory. As mentioned earlier, since the variables are nonstationary (let us remember the spurious regression problem!), one should place little faith in the standard error estimates (and thus t statistics) in the cointegration regression (5.8). Therefore, little importance can be attributed to the standard statistical tests on R^2 or t statistics of the estimated coefficients unless a correction procedure is employed to eliminate this bias. Different type of corrections are reported by Engle and Yoo (1991), Park and Phillips (1988), Phillips and Hansen (1990) and West (1988).

The <u>second step</u> involves estimating a short-run model with an ECM by the OLS. From the GRT, we already know that, if a number of variables, such as C_t and Y_t , are cointegrated, then there will exist an ECM relating these variables. Conditional on finding cointegration between C_t and Y_t , the estimate of β from the first step long-run regression (5.8) may then be imposed on the following short-run

 $^{^{19}\!\}mathrm{For}$ simplicity, here, we are concerned with the two-variable case. Extension for multivariate case is straightforward.

model with the remaining parameters being consistently estimated by the OLS. In other words, we retrieve the estimate of β from equation (5.8), and insert it in place of β in the error-correction term (C_t- β Y_t) in the following short-run equation:

$$\Delta C_{t} = \alpha_{1} \Delta Y_{t} + \alpha_{2} (C - \beta Y)_{t-1} + \varepsilon_{t}$$
(5.16)

where ε_t is the error term. Alternatively, especially in practice, since C_t - $\beta Y_t=u_t$ from equation (5.8), we may substitute the estimated residuals from equation (5.8) in place of the error-correction term, as the two will be identical. Note that the estimated coefficient α_2 in the short-run equation (5.16) should be negative and statistically significant. According to the GRT, negative and statistically significant α_2 is necessary condition for the variables in hand to be cointegrated. In practice, this is regarded as an extra evidence and confirmation for the existence of cointegration found in the first step. It is also important to note that, in the second step of the EGM, there is no danger of estimating a spurious regression because of the stationarity of the variables. In the second step of the EGM, the ECM is built in a similar fashion to those of Sargan and DHSY with the exception that the errorcorrection term is given by the lagged values of the error terms from the first step cointegrating regression. Combination of the two steps then provides a model incorporating both the static long-run and the dynamic short-run components.

To summarize the EGM, in the first step, estimate equation (5.8) by the OLS and test for stationarity of the error terms. In the second step, if the null hypothesis of no cointegration is rejected, estimate equation (5.16) by replacing β by its previously computed OLS estimate $\hat{\beta}$ in the error-correction term (C_t- β Y_t) or simply substituting the estimated residuals \hat{u}_t in place of (C_t- β Y_t). In practice, most practitioners seem to prefer the latter one due to its simplicity. In the second step, all variables and the residuals are supposed to be I(0) provided that the model is

properly specified.

5.6.2. Engle-Yoo Three-step Modelling Method (EYM)

Engle and Yoo (1991) propose a "three-step" estimation technique to overcome two of the main disadvantages of the classical two-step EG procedure. The two major problems of the two-step EG procedure are: a) although the long-run static regression gives consistent estimates, they may not be fully efficient, b) due to non-normality of the distribution of the estimators of the cointegrating vector, no sensible judgement can be made about the significance of the parameters.

The third step corrects the parameter estimates of the first step so that standard tests, such as t-test, can be applied [for further details, see Engle and Yoo (1991), Cuthbertson *et al.* (1992)]. The three steps are then: first, estimate a standard cointegrating regression of the form (5.8), where u_t is the OLS residual to give first-step estimates of β , β^* . Then, estimate a second-step dynamic model (5.16) using the lagged residuals from the cointegrating regression as an error-correction term. The third-step, then, consists of the regression

$$\varepsilon_{t} = \eta(-\alpha_{2}Y_{t}) + v_{t} \tag{5.17}$$

The appropriate correction for the first-step estimates is, then, simply

$$\beta^{\rm cor} = \beta^* + \eta \tag{5.18}$$

and the correct standard errors for β^{cor} are given by the standard errors for η in the third-step regression.

Engle and Yoo (1991) compare the EG two-step procedure with the Johansen ML procedure. They emphasize that although the Johansen approach has some advantages over the standard EG technique, this can be reached at the cost of

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computational complexity. However, three-step estimator achieves the same limiting distribution as the Johansen approach in an additional OLS regression from the two-step estimate.

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5.6.3. The Saikkonen Method

Banerjee *et al.* (1986) stress that ignoring the lagged terms in small samples is likely to create a bias in the estimated parameters. As noted earlier, in an attempt to estimate alternative cointegrating regressions, many have been interested in adding dynamic components (in the form of lags, leads or differences) to avoid the bias [for details, see, Inder (1993), Phillips and Loretan (1991), Saikkonen (1991); for the use of ADL models in estimating the long-run relationships, see Charemza and Deadman (1992, pp.157-8)]. At this point, the reader is reminded that, by including dynamic components, these methods are mostly interested in the efficiency of the long-run coefficients.

Among them, Saikkonen (1991) suggests a new asymptotically efficient estimator which is quite straightforward to compute using the OLS without any initial estimation. In practice, the proposed long-run estimator would take the following structure (note that the following is a simplified version of the Saikkonen approach) as far as for the regression (5.8) is concerned:

$$C_{t} = \beta_{0} + \beta_{1}Y_{t} + \beta_{2}\Delta Y_{t+1} + \beta_{3}\Delta Y_{t+1} + u_{t}$$
(5.19)

A time domain correction is reached by adding ΔY_{t-1} and ΔY_{t+1} to the classical Engle-Granger type (static) long-run equation (5.8) where Δ is the first-difference operator. In Saikkonen's words (Saikkonen, 1991, p.15): "...The idea is essentially to remove the asymptotic inefficiency of the OLS estimator by using all the

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stationary information of the system to explain the short-run dynamics of the cointegration regression. Increasing the amount of such stationary information may reduce the relevant error covariance matrix of the cointegration regression and there by improve the asymptotic efficiency...".

5.6.4. The Johansen Maximum Likelihood (ML) Method (VAR Model)

Due to the existence of VAR modelling within the Johansen Approach [see Johansen (1988, 1991), Johansen and Juselius (1990)], the entire concept of cointegration becomes more complicated, not only conceptually but also computationally. Thus, here, we present a simplified version. Let us assume that the vector of variables Z has the following representation:

$$Z_{t} = \sum_{i=1}^{m} A_{i} Z_{t,i} + E_{t}$$
(5.20)

where Z_t contains all n variables of the model and E_t is a vector of random errors. This model can also be represented in the form:

$$\Delta Z_{t} = \sum_{i=1}^{m-1} \Gamma_{i} Z_{t-i} + \Pi Z_{t-m} + E_{t}$$
(5.21)

where

 $\Gamma_i = -I + A_1 + ... + A_i$ (I is a unit matrix), $\Pi = -(I - A_1 - ... - A_m).$

It is now time to focus our attention on matrix Π . Matrix Π can be represented in the following form:

 $\Pi = \alpha . \beta' ,$

where α and β are both nxr matrices.

Matrix β is called the "cointegrating matrix" whereas matrix α is referred to as the "adjustment matrix" or the "feedback matrix". The Johansen method not only provides the direct estimates of the cointegrating vectors but also enables us to construct tests for the order of cointegration, r. It is important to note that in a VAR model explaining N variables there can be at most r=N-1 cointegrating vectors. It is commonly acknowledged that the statistical properties of the Johansen procedure are generally better and the cointegration test is of higher power compared to the Engle-Granger one. However, it is important to point out that they are grounded within different econometric methodologies and thus cannot be directly compared. In this regard, the Johansen method can be used for single equation modelling as an auxiliary tool, testing the validity of the endo-exogenous variable division. This may also be regarded as a confirmation test of the single equation model. Assume that the Johansen method suggests the existence of unique cointegrating vector. Then, if the estimated cointegrating coefficients have economically sensible signs and are roughly similar in size to those estimated by, say, the EG method, this could be regarded as some confirmation of the single equation model to which the EG method was applied [see Charemza and Deadman (1992, pp.201-2)].

Despite its theoretical advantages and superiority, the Johansen method is, in practice, also subject to some shortcomings. First, given the small sample size, the method cannot be regarded as an appropriate one since the point estimates obtained for cointegrating vector, β , may not be particularly meaningful. Second, some additional problems occur if we do not have a unique cointegrating vector. The problem of multiple long-run relationship is presumably best seen as an

(5.22)

identification problem [Granger (1986)], and can be resolved in, basically, two ways: either rejecting all but one such cointegrating vectors as economically meaningless or if the model is consistent with the underlying economic theory, it should consist of not one but two or more single equations. In this respect, Phillips and Loretan (1991) favour for the use of equation-by-equation approach of the single equation error-correction model since such a possibility is not available in complete systems methods such as the Johansen method.²⁰

5.7. Significance of Cointegration Analysis for Economists

The field of co-integration and unit root processes has been attractive not only for economists but also for statisticians and econometricians. In fact, before economists became interested in applying unit root econometrics, the theoretical research was undertaken mainly by statisticians and econometricians. The complexity of the theoretical studies of the statisticians and econometricians has made many economists not understand the nature and importance of the cointegration and unit root processes well in macroeconomic modelling. Hence, cointegration and unit root processes literature also need non-mathematical works by keeping the statistical content to a minimum and relating econometric results to economic theory. McDermott (1990), in that sense, provides a non-mathematical introductory survey to co-integration. Dolado and Jenkins (1987), and Diebold and Nerlove (1988), on the other hand, provide surveys of cointegration and unit root processes with more advanced statistical content respectively. Due to overall consideration, it is now clear that the time series econometrics literature provides two main areas of

²⁰At present, the multitude of available methods for estimation and inference in cointegrated systems is confusing and is still no overall agreement about the prescriptions for applied econometric research. However, many of these methods give particular emphasis on ECM representation, and such models currently represent the most common approach to modelling cointegrated variables.

significance for economists; unit root econometrics, and cointegrated process models.

As it is known, economic theory is generally interested in equilibrium conditions and has little to say about the nature of economic configurations in disequilibrium. While economic theory proposes that certain macro variables have equilibrium relationships with each other, the data does not confirm that these hold at all times. To overcome this difficulty, economists make a distinction between the short-run and the long-run. The appeal of cointegration for economists is that it provides a formal framework for testing long-run models from actual time series data.

5.8. Discussion

The introduction and development of cointegration analysis have provided the applied economists and econometricians with such a useful new technique. It appears to be the case that the cointegration analysis will be permanently adopted in empirical time series analysis in two main areas: integrated and cointegrated model processes. While the integrated process models involve the requirement to check the degree of integration of the time series data before carrying out a regression analysis, the cointegrated process models are concerned with testing, estimating and modelling long-run economic relationships from time series data.

The cointegration technique allows nonstationary data to be used so that spurious regression results are avoided. It also gives the chance to test the validity of an economic theory. If a postulated economic relationship exists, then the variables under consideration should be cointegrated. Testing for cointegration is, thus, a test for the existence of the equilibrium relationship postulated. In a sense, this is a test whether or not a model is well specified. Contrary to the popular belief, however, the concept of "cointegration" does not suggest any easy shortcuts in the construction and estimation of dynamic time series models in economics [for various advantageous and limitations with the employment of "cointegration" analysis in macroeconomic time series modelling, see, among others, Muscatelli and Hurn (1992), Perman (1991), Maddala (1992, pp.601-3)].

One important point needs to be clarified while using the cointegration tests: we do not prove that the relationship is really a long-run one, on the contrary, this is an assumption supported by relevant economic theory and cannot be statistically verified [Charemza and Deadman (1992, p.157)]. In this sense, whether or not cointegration exists is an empirical question but beliefs of economists appear to support its existence [Granger (1986, pp.226-7)]. One importance of the cointegration analysis is that it simply provides a formal framework for testing long-run economic relationships from actual time series data. In the literature, cointegration tests have been used for testing some economic theories such as the permanent income hypothesis, rationality of expectations, market efficiency in different markets, purchasing power parity theorem and export-led growth.²¹

In this chapter, we also tested and proved that many Turkish macroeconomic data are nonstationary in nature. This implies that unless they are cointegrated, the researchers could face spurious estimation results in case of Turkish macroeconomic series in levels. It, in a sense, justifies the use of "cointegration analysis" in our empirical time series analyses on Turkish macroeconomy in the following chapters.

²¹For testing the rational expectations and the market efficiency hypotheses, see Maddala (1992, pp.599-600). For testing purchasing power parity hypothesis, see Corbae and Ouliaris (1988), Kim (1990), Taylor (1988).

CHAPTER SIX

A FOREIGN TRADE MODEL AND APPLICATION TO TURKEY

6.1. Introduction

The aim of this chapter is to study the behaviour of Turkish exports which is said to have been the driving force behind the high creditworthiness levels of the country at the international credit markets, and imports at the aggregate level. In doing this, we focus on the estimation of aggregate export and import demand functions and hence on the determination of the relevant price and income elasticities, among others. It is well-known that the effectiveness of foreign trade policy is dependent on the significance and the size of the income and price elasticities of exports and imports. Besides this traditional role in examination of international linkages and trade policies, any knowledge or assumption of these elasticities is vital to designing policy responses to deal with the existing debt problems of LDCs. Knowledge of these elasticities is important both for debtor and creditor countries. From debtors' point of view, both structural adjustment and stabilisation policies, and debt rescheduling agreements depend very much on foreign trade projections which are clearly based on the choice of income and price elasticities. Additionally, the question whether the debtor countries are solvent or not depends upon their price competitiveness level and the sensitivity of their exports to growth in the world export markets. From the point of policymaking in creditor countries, the so called "feedback effects' are of crucial importance. For instance, a restrictive and protective economic policy in the industrial world, which reduces imports from debtor countries, is quite likely to feed back to creditor countries as a decline in exports and further problems in financial markets.

The organisation of the chapter is as follows. Section 6.2 presents and discusses the review of literature as far as income and price effects in LDCs foreign trade are concerned. Section 6.3 provides an evaluation of the post-liberalisation (i.e. post-1980), period of the Turkish foreign trade. The following section presents a foreign trade model. The application of this model to Turkey, including a detailed estimation procedure, data problems and specific problems regarding Turkish export and import functions, is given in Section 6.5. A brief discussion appears in the last section.

6.2. Income and Price Effects in LDCs Foreign Trade¹

Like the industrial-country foreign trade flows, the area of LDC foreign trade has been increasingly subject to empirical investigation in the post-war period.² As regards industrial-country trade, the "consensus view", as summarized in Goldstein

¹Traditionally, most researchers have assumed that foreign trade is determined by either income or price effects (or combination of both) [see equations (6.4) and (6.5)]. This 'orthodox' view has been especially influenced by traditional theories of current account (or balance of payments) such as the 'elasticities approach' on the one hand, and the 'absorption approach' on the other. These theoretical models emphasize the role of 'price' and 'income' effects in foreign trade respectively. Details of the models can easily be found in elementary textbooks of international economy. The essence of the 'elasticities approach' is embodied in the famous Marshall-Lerner condition. Formally, the (simple) Marshall-Lerner condition states that, given a balanced current account, a devaluation will improve the balance of payments on current account, if and only if the sum of the price elasticities of domestic demand for imports plus foreign demand for exports exceeds unity (in absolute terms). Given the rather strong assumptions of the simple Marshall-Lerner condition, any result should be treated as 'indicative' rather than 'conclusive' unless a modified version of the simple Marshall-Lerner is implemented.

²There have been considerable number of surveys on the industrial-country trade. Special mention should be made of the comprehensive industrial-country trade surveys of Goldstein and Khan (1985), Learner and Stern (1970), Magee (1975), Stern *et al.* (1976).

and Khan's (1985) comprehensive review of the literature, is that they generally have large (and significant) income effects on export flows, and small (and sometimes insignificant) relative price effects. Unlike industrial-country trade, an up-to-date and comprehensive survey of empirical trade models of LDCs still waits to be written.

The issue regarding income and price elasticities of LDCs is critical for the following reasons. First of all, these elasticities may have important role in analyses of international linkages and foreign trade policies. Whether LDC governments have sufficient confidence in "the rules of the game" in the international market to commit themselves to an export-led-growth (ELG) strategy and whether international financial institutions such as the World Bank and the IMF can continue to credibly support such a strategy will surely be dependent on the size and the significance of income and price elasticities of foreign trade flows (i.e. elasticity pessimism versus elasticity optimism argument).

Second, information about these elasticities, as mentioned earlier, is crucial to designing the necessary policy responses to the existing foreign debt problems of LDCs from both debtors' and creditors' standpoint. That is to say, whether debtor countries will, in general, be able to service their debt depend upon, among others, the size and the significance of income and relative price elasticities.

Third, it is observed that one of the most important aspects of the changing pattern of world trade during the post-war period has been the rapid export growth (especially of manufactured goods) from a number of LDCs which are commonly referred to as the Newly Industrialised Countries (NICs). In order to be able to explain the driving forces behind this export growth, researchers have had to deal with various inter-related questions, including not only the matter of income and price elasticities, but also process and product innovation, product cycles, "learning by doing" effect, increasing returns to scale, technological progress, fall in production costs due to an increase in comparative advantage, increasing capacity utilisation, among others.

Accordingly, an intense debate emerged during the post-war period regarding the size and significance of income and price effects in the demand for LDCs' exports. Advocates of the view of "elasticity pessimism" [see, among others, Lewis (1980), Nurske (1959), Prebisch (1950), Singer (1950)] have generally suggested that the income and price elasticities of export demand for LDCs are likely to be small. Others, in contrast, have stressed the noticeable success of those LDCs (such as the South Asian NICs) who have implemented ELG strategies during the post-war period as evidence of irrelevance of "elasticity pessimism" [see, e.g., Balassa (1971, 1978), Bhagwati (1978, 1988, 1990, 1991), Hill and Suphachalasai (1992), Khan (1974), Krueger (1978), Moran (1988), Riedel (1984, 1991), Rittenberg (1986)].

Much of the recent debate focus on the following question. What is the driving force behind the rapid growth of the NIC exports? The answer of this question lies in the estimated income and price elasticities which emerged from empirical studies of the demand for NIC exports. In other words, the key point of the debate is the issue of whether this rapid export growth of some LDCs is to be regarded as reflecting high and statistically significant price elasticities, high and statistically significant income elasticities, or both. The conventional "explanation" is that although price elasticities of demand for NIC exports are low (or insignificant), the world income elasticity of demand for the NICs' exports appear to be significant and high [for empirical studies, see, e.g., Bond (1985), Cline (1984), Dornbusch (1985), Faini *et al.* (1992), Goldstein and Khan (1982), Marquez and McNeilly (1988), Muscatelli *et al.* (1994), Muscatelli *et al.* (1991b)].

In contrast to the conventional "explanation", others [see, e.g. Riedel (1988),

Athukorala and Riedel (1991)]³ seem to show support for the "small country" assumption, finding no significant income effects in export demand equations and effectively infinite (or large enough) price elasticities of export demand. Accordingly, Riedel (1988) and Athukorala and Riedel (1991) dismiss the conventional "explanation" as implausible and argue that price elasticities for NIC exports must be high. It is important to note that Riedel (1991) refers to Turkey's export success as an evidence which strongly supports his view. One possible answer to the question of how it is that the NIC's have found themselves in a position of continuously facing highly income elastic demand curves comes from Krugman (1989) who suggests that the growth process of the NICs has been driven by a continuous process of product innovation and diversification. Krugman recognizes that the "close relation between growth rates and the relative size of income elasticities"4 could have two types of interpretation. On the one hand, income elasticities could determine growth by imposing a balance of payments constraint on demand. On the other hand, differential growth rates could affect trade flows in such a way as to create obvious differences in income elasticities. Krugman dismisses the first explanation that growth may be demand-constrained by the balance of payments. Instead, he argues that faster growth in one country leads to a greater supply of exports. Accordingly, as a country's relative growth rate changes, its apparent income elasticities change too, maintaining the 45-degree rule.

Although both these views (i.e. conventional wisdom versus Riedel's alternative paradigm) have proper answers to the relevant question, they are incompatible and have rather different implications for trade policies of LDCs who

³These studies concentrate on Hong Kong's total exports of manufactures and South Korea's exports of machinery.

 $^{^4\!\}mathrm{In}$ the literature, this is referred to as "Krugman's 45-degree rule". For a good discussion of it, see esp. Thirlwall (1991).

wish to follow an ELG strategy.⁵ In short, the absence or presence of "elasticity pessimism" appear to be the key issue in determining if ELG strategies are preferable compared to the alternative of import-substitution industrialisation (ISI) strategies.

6.3. Turkish Foreign Trade: Recent Developments (Post-liberalisation Period), and a Review of Estimates of Income and Price elasticities

Turkey experienced a foreign debt crisis in 1978 and rescheduled its debt over 1978-1980. A turning point in Turkish economic policy came in January 1980. At that time, the government announced a radical economic reform program after several unsuccessful attempts in 1978-1979 and two failed IMF programmes. Inward-looking economic strategy was replaced by an outward-oriented growth [or export-led growth (ELG)] strategy based on export promotion.

Turkey's recovery from its debt during the 1980s has been increasingly subject to investigation in recent years. The country has frequently been referred to as a "success story" and example for other debtor countries. The Turkish economy has, no doubt, achieved an impressive transformation in terms of foreign trade orientation, even in the context of rather impressive economic growth rates. In fact, Turkey is one of the few countries that managed to maintain high GNP growth, which is about 5% per annum in the 1980s, after rescheduling their debts in a rather unfavourable global economic environment of the 1980s.

One has to admit that the most successful aspect of Turkish experience was the considerable growth in exports during the period. Between 1980 and 1990,

⁵For trade strategy/policy issues in LDCs, see e.g. Athukorala and Riedel (1991), Cline (1982), Greenaway and Milner (1993), Muscatelli *et al.* (1991b, 1994), Riedel(1991), Rodrik (1992), and the volume edited by Milner (ed.) (1990a). For defining and measuring trade strategy, see also Bhagwati (1990), Liang (1992), Milner (1994) and the references therein.

exports grew at an average annual rate of 17.2%, while manufactured goods exports increased in current US dollars at an annual rate of 26.2%. The export growth rate of Turkey has been above the world export growth rate leading to an increase in Turkey's share in world exports (see Table 6.1).

Exports came from 2.9 billion US dollars in 1980 to 12.9 billion US dollars in 1990, and the export/GNP ratio rose rapidly (see Table 6.2). The export composition changed in favour of manufactured goods and the export/import ratio improved. The export boom was mainly in manufactured goods. In addition to the leading subsectors like textiles and clothing, iron and steel, several other subsectors also enjoyed remarkably increased expansion [see, e.g., Balkir (1993)]. Along with those manufactured sectors, many service export industries such as tourism, transportation and contracting also expanded their shares.

In addition to the above developments in exports sector, Turkey liberalised its import regime substantially from 1980 onwards. In short, nominal tariff rates were reduced remarkably, quantitative restrictions were abolished, and bureaucratic controls over imports were reduced continuously [see, e.g., Kazgan (1993) and Balkir(1993)].

In a World Bank study on liberalising foreign trade, Baysan and Blitzer (1991) concentrate on developments in the Turkish foreign trade sector between 1950 and 1984. They identify four dates over this period when noticeable attempts to reduce trade and other distortions were initiated, namely the years 1950, 1958, 1970 and 1980. In the first three cases, the authors conclude that the liberalisation was not sustained, and the reforms were not part of a planned programme to establish a liberal trade regime. Indeed, in none of these liberalising episodes do Baysan and Blitzer assess the reforms to have been sufficient to merit the status of

an "outward-oriented" regime.⁶ By contrast, 1980 liberalisation is viewed as the beginning of a more fundamental and sustained liberalisation; the index is set at 6 (within the restrictionist trade regime range) in 1980 and rises steadily to 14 (well into the "outward-oriented" range) by 1985 (see Figure 4.1).

Although there is a consensus on the "success" of the Turkish experience,⁷ the driving forces behind it have remained a matter of debate. Some have stressed Turkey's liberal provision of export incentives. Others have concentrated on the macroeconomic and import liberalisation policies that caused Turkey's aggressive nominal exchange rate policy to result in sustained real depreciation⁸ [see, e.g., Anand et al. (1990)]. However, Celasun and Rodrik (1989a) suggest that at most 30% of the increase in exports during the 1980s can be attributed to real depreciation, and find little empirical support for any effect of export incentives. They argue that Turkey's export boom in the 1980s had only little to do with the incentive regime or exchange rate policy, but mostly a result of Turkey's proximity to the Middle East. As Balkir (1993) puts it: "...The internal factors which contributed to this performance were export promotion policy, depressed domestic demand, exchange rate policy and the government's strong commitment to export growth...Thus the increase in exports had come mainly from increases in sales to Islamic countries in the Middle East and North Africa (p.105)...Export growth during the 1980s primarily occurred by exploiting idle capacity based on the

⁶The range 10-20 of their trade liberalisation index is reserved for "outward-oriented" trade regimes. The highest value given by the authors in these periods is 8 (see Figure 4.1).

⁷For more information and evaluation of the Post-liberalisation period, see, in addition to studies mentioned already, Anand *et al.* (1990), Aricanli and Rodrik (1990a, 1990b), Arslan and van Wijnbergen (1993), Asikoglu and Uctum (1992), Baysan and Blitzer (1990, 1991), Celasun and Rodrik (1989a), Nas and Odekon (eds.)(1992), Rodrik (1990), Senses (1989, 1990), van Wijnbergen *et al.* (1992).

⁸Note, however, that between 1988 and 1990, there has been real appreciation instead. It is also important to note that, beginning with 1988, the economy entered a stagflationary stage, with exports hovering around 11-12 billion US dollars, raising questions about the sustainability of the high export growth.

investments realized before 1980; this was then mobilized, thanks to import liberalisation supplying inputs and export growth creating demand for its output (p.107)...". Similar points are raised by Aricanli and Rodrik (1990b). They argue that the impressive export performance during the 1980s appears not to have produced an increase in private investment in tradables. They also stress the fact that exports during the 1980s have relied on existing capacity from the 1970s. Aricanli and Rodrik (1990b) suggest that the success of Turkish exporters in OECD market has less to do with macroeconomic policies than with (p.1347): "...(a) the natural learning process of Turkish merchants set off by exports to the Middle East; and (b) diplomatic efforts to alter quota restrictions in favour of Turkish exports...".

A recent study by Arslan and van Wijnbergen (1993), however, concludes that there was indeed a Turkish export miracle, and it was, much more than a response to explicit export incentives, a result of macroeconomic policies and foreign trade reform that allowed a steady real depreciation of the Turkish Lira (TL).⁹ Regarding the exports to the Middle East during 1980-87 period, they point out rather surprising result; that is, import growth in the Middle East in excess of import growth in the rest of the world has in fact made a "negative" contribution to Turkey's export boom over the period 1980-87. In contrast to many others, this evidence suggests that Turkey's proximity to the Middle East played less important role than expected in Turkish export success in the 1980s.

The issue is also controversial as regards the income and price elasticities

⁹Asikoglu and Uctum (1992), in that sense, point out the need of a credible exchange rate policy for the 1990s. As they put it (p.1511): "...It should be recognised that the success of the 1980s cannot be repeated in the 1990s by relying solely on the price effects of real exchange rate changes. As the excess capacity in nontradables is largely eliminated, the future of the export-led growth depends on invigoration of investment in nontradables...The primary task of the exchange rate policy should be to send credible and sustainable signals for continued outward orientation. This can be best achieved by a) preventing real appreciations and overvaluations, and b) maintaining internal consistency of economic policies, including the investment policy...".

of demand for exports and imports for Turkey.¹⁰ An early study of Khan (1974), using annual data for the period 1951-1969, reports elastic export demand for income (1.62) and price (-1.41) variables. As far as the import demand equation is concerned, he provides high price elasticity (-2.72) and low income elasticity (0.55). A recent study of Arslan and van Wijnbergen (1993) estimate separate export demand equations for Turkey (i.e. export demand from oil-exporting countries (mainly Middle East countries) and from other countries (mainly OECD)] using annual data for the period 1969-1987 and 1967-1987 respectively. They report a significant and moderately high price elasticity (-1.15) and a significant and high income elasticity (1.50) for the export demand from OECD countries. On the other hand, they find a significant and moderately high income elasticity (1.36), and surprisingly high (and also significant) price elasticity (-7.73) implying the fact that the Middle East market seem extremely price competitive. Tansel and Togan (1987) for the period 1960-1983 and using annual data, find considerably high and significant price elasticities (-2.53) along with high and moderately significant income elasticities (2.18) for export demand for Turkey. Regarding import demand equation, they report a low price elasticity (-0.47) and high income elasticity (1.41). These results for import demand equation seem to be confirmed by Guncavdi (1991). He estimates alternative import demand equations and the reported elasticities of price are all significant and varies between (-0.61) and (-1.24) while the income elasticities are also significant and varies around (2.00).

van Wijnbergen *et al.* (1992) also estimate separate export demand equations (i.e. Middle East and OECD countries) for Turkey using annual data for the periods 1969-1984 (Middle East) and 1968-1984 (OECD). They report significant and

¹⁰Some representative estimates of export and import demand for Turkey are presented in Table 6.3. The reported elasticities are the long-run ones unless otherwise stated.

extremely high price elasticity (-10.8), and significant and moderately high income elasticity (1.39) for export demand from Middle East countries. Regarding OECD countries' export demand for Turkish aggregate exports, they find significant and high price elasticity (-1.85), and significant and moderately high income elasticity (1.17). Uygur (1987), in line with others and as a part of his macroeconometric model of Turkey, estimates industrial exports and reports significant and quite high relative price (-2.55) and income (for OECD countries) (2.01) elasticities using annual data for the period 1960-1985. As regards import equation, he estimates significant and rather high income elasticity (2.82) and insignificant relative import price effect. Faini et al. (1992), using annual data for the period 1967-1983, estimates Turkish manufactured export demand equation, and report significant and extremely high relative price elasticities [(-8.89) with reference to LDCs and (-5.84, lagged one year) with reference to industrial countries (IC)]. They also report significant and rather high income elasticity (2.71). While testing if the "small country" assumption is valid or not for 23 LDCs, Faini et al. (1992) stress, among others, that the "small country" hypothesis could not be rejected for only Turkey, Indonesia, Kenya, Mexico, Paraguay and Singapore. Due to the reason that this result can be attributed to the lack of precision in the estimates, the authors tested for the opposite hypothesis, that export demand is totally price inelastic. As a result, only for Turkey the data lead to a clear rejection of the hypothesis of inelastic price.

In contrast to those rather significant and moderately high (in some cases very high) elasticities of price for export demand for Turkish exports, Ersel and Temel (1984) provide empirical evidence suggesting that Turkish exports are price inelastic. Their price elasticity of export demand lies between (-0.33) and (-0.66).

The elasticity results mentioned above and seen in Table 6.3, in general,

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imply that both income and price factors are the significant determinants of Turkish export and import. Regarding the export demand equations, it is worth mentioning that both income and price elasticities are reported to be significant and highly or in some cases moderately elastic.¹¹

The reliability of these results is, however, questionable. Many of the empirical models are estimated in levels with lagged values of the explanatory variables. Since these variables contain unit-roots, the relationships may yield "spurious" regression results in the Granger sense (see Chapter Five). To avoid this, we employ a rigorous modelling/estimation technique known as "cointegration analysis" (for details, see Chapter Five).

¹¹Compared to elasticity results of other studies in the literature, the price elasticities of export demand obtained by Ersel and Temel (1984) are quite low. This difference can stem from the fact that the authors derived their own price and quantity indices for exports.

Table	6.1 Share of	f Turkis	h Exports in Wo	rld Expo	rts, 1978-90 (US\$	bil1.)
Year	Total World Exports(FOB)	% Change	Total Turkish Exports(FOB)	% Change	Share of Turkish Exp.in World Exp.	% Change
1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1989	1,234.3 1,584.8 1,910.9 1,881.2 1,731.4 1,697.5 1,810.8 1,822.0 2,005.4 2,360.7 2,697.3 2,908.6 3 330.9	28.4 20.6 -1.6 -8.0 -2.0 6.7 0.6 10.1 17.7 14.3 7.8 14.5	2.288 2.261 2.910 4.703 5.746 5.728 7.134 7.958 7.466 10.190 11.662 11.625 12.959	 -1.2 28.7 61.6 22.2 -0.3 24.5 11.6 -6.2 36.5 14.4 -0.3 115	0.185 0.143 0.152 0.250 0.332 0.337 0.394 0.437 0.372 0.432 0.432 0.432 0.432 0.432	 -22.7 6.3 64.5 32.8 1.5 16.9 10.9 -14.9 16.1 0.0 -7.4 -2 8
AVG (a))	6.01		17.55	0.378	11.76

(a) Average of the ten-year period, 1980-90.Source: IMF, International Financial Statistics, Yearbook, (1993).

Table 6.2 Some Indicators of Turkish Foreign Trade, 1980-90	(%
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	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Exp/GNP(a)	5.0	7.9	10.6	11.1	14.2	14.8	12.7	14.9	16.5	14.4	11.9
Imp/GNP(a)	13.6	15.0	16.3	17.9	21.4	21.7	19.1	20.9	20.2	19.6	20.5
Exp/Imp	36.8	52.7	65.0	62.0	66.3	68.5	66.6	71.4	81.1	73.6	58.1
Share(b)	36.0	47.9	59.7	63.9	72.1	75.3	71.4	79.1	76.7	78.2	79.0

(a) Export and Import values include "goods" only, i.e. FOB and CIF respectively.
(b) Share of manufactured goods in total export.
Source: State Planning Organisation (SPO), Ankara.

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	Khan (1974)	Ersel & Temel (1984)	Tansel & Togan (1987)	Urgur (1987)	Guncavdi (1991)	van Wijnbergen et al. (1992)	Faini et al. (1992)	Arslan ƙ van Wijnbergen (1993)
DATA	Annual 1951-69	Monthly 1980(6)-84(8)	Annual 1960-83	Annua 1 1960-85	Annual 1970-87	Annual 1968-84	Annua1 1967-83	Annual 1967-87
COMMODITY	All Goods	All Goods	All Goods	Manufact. Goods	All Goods	All Goods	Manufact. Goods	All Goods
EXPORT Price Elast.	(-1.41)	(33 to 66)	(-2.53)	(~2.55)		-1.85) ^م م (-10.8) م (-10.8)	(~8.89) ^C d ^E (~5.84) ^d	(-1.15) ^a b ^e (-7.73) ^b
Incone Elast.	(1.62)		(2.18)	(2.01)		(1.17) ²⁸ 6 (1.39) b ⁶	(11.2)	(1.50) ^a b [£] (1.36) ^b
IMPORT Price Elast.	(-2.72)		(47)	U	(~.61 to -1.24)	Y		
facone Elast.	(0.55)		(1.41)	(2.82)	around (2.00)			

^b With reference to OECD countries. ^b With reference to Middle East countries. ^c With reference to Inclue East countries (lagged one year). ^d with reference to industrial countries (lagged one year). ^e It is not reported by the author due to statistical insignificance.

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6.4. The Model

We consider an imperfect substitutes model of trade, the key underlying assumption of which is that neither exports nor imports are perfect substitutes for domestic goods.¹² By definition, we have

$$TB\$_{t} = X\$_{t} - M\$_{t}$$
(6.1)

where TB\$, X\$ and M\$ are total merchandise trade balance, exports and imports in US dollars respectively. Let us now define export and import volumes as

$$XV_t = X _t/PX_t$$
 (6.2)
 $MV_t = M _t/PM_t$ (6.3)

where XV, MV, PX and PM are export volume, import volume, export price index and import price index in US dollar terms.

In line with the earlier parts of this Chapter, it is now our aim to develop export and import demand models, and to estimate the corresponding income and price elasticities for foreign trade of Turkey. As shown by Orcutt (1950) and Prais (1962) and pointed out by Goldstein and Khan (1985), among others, price elasticities in trade equations might be biased by simultaneity between prices and quantities. More clearly, simultaneity implies correlation between the explanatory variables in an equation and the disturbance term. In these circumstances, the basic conditions under which one can proceed to estimate an export or import demand equation that would be free of simultaneity bias are either that the supply-price

¹²For an evaluation of the imperfect substitutes model vs the perfect substitutes model, see Goldstein and Khan (1985, pp.1044-53).

elasticities for exports and imports are high enough, or that the demand functions are stable while the supply functions shifts around.¹³ The advantage of such an assumption is that it allows satisfactory estimation of the export and import demand equations by single-equation methods, since the prices of exports and imports can then be viewed as exogenous. However, the idea of handling supply relationships simply by assumption; that is, assuming that the export and import supply price elasticities facing any individual country are high enough, may not sound very realistic.¹⁴ Thus, at first, it is more appropriate to test for the presence of the orthogonality assumption by using the Wu-Hausman statistic, which is also known Wu's T_2 statistic.¹⁵ If the test results show the breakdown of the orthogonality assumption, then this will imply that there is a simultaneity bias and as a result the OLS estimator is inconsistent. A consistent estimator can then be obtained by the use of Instrumental Variables (IV) estimation method instead of the OLS. As

¹³For the same point, see Goldstein and Khan (1985, pp.1071-3). For a formal analysis, see e.g. Maddala (1977) and Learner (1981). While the assumption of "high enough" price elasticity seems reasonable a priori in the case of the world supply of imports to a single country, it may seem less reasonable when applied to the supply of exports of an individual country unless idle capacity exists in the export (or domestic) sector, or more generally, unless export production is subject to constant or increasing returns to scale. That is, if the assumption is met, an increase in the world demand for a country's exports can be satisfied without an increase in the price of its exports [Goldstein and Khan (1978)].

¹⁴As pointed out by Goldstein and Khan (1985), simultaneity is not a problem that can be dealt with by assumption. Instead, the correct procedure, they suggest, is to formulate and test the model, and then decide. This relationship is expressed very clearly by Magee (1975, p.223): "...This assumption appeals immediately to econometricians because simultaneous-equation bias in estimating price elasticities of demand disappears when supplies are ... elastic...". This simply implies that if one can prove that the "simultaneity bias" is <u>not</u> present by proper testing procedure, then it will be possible for the prices of export and import supply to be assumed highly elastic.

¹⁵See, among others, Wu (1973), Hausman (1978), Nakamura and Nakamura (1981), and Pesaran and Smith (1990). In the case of nonstationary variables, Kramer (1985) has investigated the asymptotic properties of the Hausman test in the presence of trended variables and illustrated that the asymptotic null distribution of the test remains standard. However, in case of nonstationary variables, it may be more appropriate to assume that standard orthogonality tests, such as Wu-Hausman test, are valid only approximately [Urbain (1993)]. For some illustrative applications of the Wu-Hausman test, see Stewart (1991, pp.144-5). For a computation of the test with an interactive econometric software package Microfit 3.0 version, see Pesaran and Pesaran (1991, pp.144-5). Let us now consider the following regression: $Y=\beta X+u$ where we test whether X (the regressor) is independent of u (the error term). Thus, the null and the alternative hypotheses of the test are as follows: H₂: X and u are independent, and H₁: X and u are not independent. The simultaneity bias is assumed away, only if the researcher cannot reject the null.

mentioned earlier, the absence of a simultaneity bias in price elasticities of the export and import demand equations implicitly imply that the corresponding supply elasticities are large enough.

In short, rather than assuming infinite supply elasticities in the first place, we want to make sure that there is no simultaneity bias in the Turkish trade equations by applying the Wu-Hausman test.¹⁶ In the absence of simultaneity bias, we then can safely assume that the corresponding price elasticities of supply are large enough, and thus proceed with the single equation OLS estimation method.

The conventional long-run export and import demand functions are as follows:¹⁷

EXPORT DEMAND: $XV = f_1[(PX/PW), YW)$	(6.4)
(-) (+)	

) (6.5)	IMPORT DEMAND: $MV = f_2[(PM/PD), YD)$
	(-) (+)

¹⁶The relevant Wu-Hausman test statistics are computed 1.01 and 1.23 for the export and import price variables in the trade equations for Turkey respectively. Using the corresponding critical values from F tables, one cannot reject the null hypotheses that the relevant price variables and the error terms are independent. The reported test statistics, i.e. 1.01 and 1.23, are not significant at even 1% significance level implying that there is no statistically significant simultaneity bias resulting from the price variables in both equations. Besides, in the literature, we have some empirical evidence which indicate that price elasticity of supply for exports for Turkey is likely to be sufficiently high to minimize the importance of the simultaneity bias [see, e.g., Tansel and Togan (1987)].

¹⁷As pointed out by Goldstein and Khan (1985), when the two-country model is left for the n-country real world, the symmetry between export and import demand equations disappears. This is due to the fact that a country's total imports face competition only from domestic producers, while a country's total exports face competition not only from domestic producers in the export market but also from 'third country' exporters to that market. Indeed, the traditional practice in specifying export demand equations is to assume that the major price competition occurs among exporters. Evidence by Arslan and van Wijnbergen (1990, 1993) suggests that the Turkish export firms compete with the firms from third countries exporting to the same market. We specify the variables in logarithms so that the coefficients are the relevant relative price and income elasticities. In what follows, all variables are also in logarithms unless otherwise stated. For the choice of the functional form (i.e. linear versus log-linear), see, e.g., Goldstein and Khan (1985)]. We also assume that both export and import demands are homogeneous of degree zero in prices (i.e. relative price restriction). For information about homogeneity postulate, see, e.g., Leamer and Stern (1970), Murray and Ginman (1976) and Goldstein *et al.* (1980), among others.

where XV and MV represent the volumes of export and import goods respectively; (PX/PW) represents the relative export prices, i.e., the ratio of export prices of the exporting country to world prices expressed in common currency units which we call "export price competitiveness"; (PM/PD) is the relative import prices, i.e., the ratio of import prices facing the importing country to domestic prices (preferably wholesale price index) expressed in common currency units which we call "import price competitiveness"; YW is a scale variable which captures world demand conditions; and YD is the real domestic income.¹⁸ The signs given in the parentheses are the expected ones.¹⁹

The choice of scale variable (YW) has tended to vary in previous trade literature. Khan (1974), Goldstein and Khan (1978), and Aspe and Giavazzi (1982) used world income as a scale variable. Given that world trade growth has grown about twice as fast as world income over the sample period, this will tend to bias the estimates of the elasticity of demand obtained, as pointed out by, among others, Funke and Holly (1990), Landesmann and Snell (1993), and Muscatelli *et al.* (1991b). Muscatelli *et al.* (1991b) stress that using world income as a scale variable does tend to increase the estimated scale elasticities.²⁰

Traditional models, such as the one presented above, estimate export and import demand as functions of relative prices and income but omit other factors which might be relevant and statistically significant. In line with the 'new theories

¹⁸For a detailed description of the variables employed in this Chapter and the data sources, see Appendix B.

¹⁹Economic theory provides insight into how each variable in Equations (6.4) and (6.5) should affect exports and imports. As regards the export demand equation, the higher the level of foreign real income activity, *ceteris paribus*, the larger would be foreign demand for the country's exports. The higher the price of the country's exports relative to those of other countries, *ceteris paribus*, the smaller would be the demand for the country's exports. The similar logic applies to the variables in the import demand equations.

²⁰Using real world income and imports facing Turkey, we obtained the following (statistically significant) elasticities respectively: 0.51 and 0.20 [see equations (6.11) and (6.15) respectively]. This findings for the case of Turkey confirms Muscatelli *et al.* (1991b). For a detailed analysis as to the choice of scale variables, see, among others, Muscatelli *et al.* (1991b) and Winters (1984).

of international trade and/or of growth', the following can be added to the right hand side of the export demand equation as possible explanatory variables: black market premium which shows the distortion level of the exchange rate, and non-price (supply-side) factors such as product types and quality, product and process innovation [Muscatelli *et al.* (1991b), Landesmann and Snell (1993)]. In a similar way, the relevant variables which may be included to the import demand equation as explanatory variables are as follows: indicators of import capacity and measure of liberalisation proxied by the extent of the deviations between black market and official exchange rates.

As long as the prices of goods and services do not correctly reflect their scarcity, price distortions exist. This is especially true for the foreign exchange market of the LDCs in which both black market rates and official market rates exist. In that sense, ERDI is a practical approximation to measure distortions in the pricing of foreign exchange. ERDI can also serve as a proxy for trade orientation or openness.²¹

In the late 1970s and the 1980s, substantial declines in private foreign lending and increased debt service costs reduced foreign exchange availability in most LDCs and limited import capacity. The level of international reserves and foreign exchange availability are mentioned in the recent trade literature as

²¹ In the present work, we prefer using information on the black market, exchange rate premium to capture the extent of distortions. The deviation between the black market rate and official exchange rate, expressed as a proportion of the black market rate, seeks to capture the effects of trade and other interventions (e.g. capital market); the greater the deviation the more distorted the economy or a reducing deviation being interpreted as increased liberalisation. In our long-run import demand equations (6.13), (6.18) and (6.20), we prefer interpreting the reducing deviation as increased openness, and thus more import demand. As regards export demand equations (6.11), (6.15) and (6.16), however, the proxy makes sense as a black market premium on the exchange rates; that is, interpreting the increasing deviation as more over-appreciated domestic currency, and thus less export demand. For the role of the exchange rate distortions on trade performance and applications, see, among others, Agarwala (1983), Fishelson (1988), Edwards (1992), Kamin (1993). Edwards (1992) use different types of black market premiums as proxy for trade intervention. For the definition of ERDI, see the Appendix.

indicators of import capacity.²² Similarly, we include RES and INFLOW in the Turkish import demand equation as indicators of import capacity. RES represents the level of international reserves (defined as the ratio of non-gold international reserves to import price index both expressed in terms of US dollar) while INFLOW, is foreign exchange availability (defined as the ratio of exports goods and services to import price index both expressed in terms of US dollars).

In addition, the following theoretical issues have to be addressed as well. First, it is stressed by Landesmann and Snell (1993) and Muscatelli *et al.* (1991b) that highly aggregated export models such as the one explained above by their nature do not address the effects regarding the transformation on the types and quality of goods produced and exported. That is why, as the composition of a country's aggregate exports change through time, one would expect structural changes in the estimated parameters. Given the relatively small sample at our disposal, rather than assume compositional change effects, we wanted to test directly for their significance using a practical proxy for commodity composition of Turkish exports goods.

Second, the fact of the matter is that non-price competition effects, namely quality, reliability, marketing strategy and etc., are generally excluded from standard export demand equations. We feel that even such a crude commodity composition index may give some clues considering non-price effects such as product innovation process.²³ Following Krugman (1989), a measure of the "range of goods" traded in export markets may be included in the foreign trade regressions to capture the supply effects. We believe that our exports commodity composition index, XCC, is a proxy for the range of goods traded in the export markets, and thus captures the

 ²²See, among others, Hemphill (1974), Khan and Knight (1988), and Moran (1989).
 ²³For the same point, see Muscatelli *et al.* (1991b).

supply effects in the Krugman's sense.²⁴

6.5. Application of the Model to Turkey

6.5.1. Econometric Method and Specification

In the light of the model outlined in the earlier Section, the long-run export and import demand equations i.e. (6.4) and (6.5) take the following forms:²⁵

EXPORT DEMAND:
$$XV = f_1[(PX/PW), YW, ERDI, XCC]$$
 (6.6)
IMPORT DEMAND: $MV = f_2[(PM/PD), YD, ERDI, CAPACITY]$ (6.7)

where ERDI and XCC represent exchange rate distortion index and export commodity composition index respectively; CAPACITY represents different measures of import capacity, i.e., foreign exchange inflows (INFLOW) and international reserves level (RES); and others as defined before. Scale variable YW can be substituted by MW which represents the world imports facing Turkey.

Data problems regarding the trade sector of a LDC²⁶ is no exception for Turkey. Thus, we have relatively small sample size (28 number of observation: 1961-1988) at our disposal (see Appendix.B). A rigorous econometric investigation proves that all the variables except RES are statistically significant for export and import demand equations for Turkey.²⁷ However, it is important to note that when XCC is included to the regression, the relevant price and income elasticities get smaller and moreover YW become statistically insignificant. We then estimate the export demand equation with XCC and without YW and report the results.

²⁴In examining the empirical relevance of Krugman's supply effects, Madsen and Damania (1994) employes the supply of manufactures as an instrument for the range of goods.

²⁵For detailed descriptions of the variables and data sources, see Appendix.B.

²⁶In addition to problems of availability, reliability and etc., LDC macro data are typically available in annual form only, and over relatively short time periods.

 $^{^{27}\}mbox{In}$ line with the empirical methodology developed in Chapter Five, we use Engle-Yoo correction procedure to get valid t-statistics.

As mentioned earlier, the aim of this econometric work is to estimate the relevant long-run and short-run elasticities as far as the Turkish export and import demand equations are concerned. Naturally, the study consists of two single long-run equations, namely, export demand and import demand equations for Turkey for the period 1961-1988 and 1965-1988 (annual data) respectively. We use rigorous "cointegration" analysis and the ECM presented in Chapter Five. In the empirical study, we mainly rely on the EGM supported by some other techniques such as the EYM, the Johansen and the Saikkonen (for details of the techniques, see Chapter Five).

6.5.2. Estimation and Empirical Results

Generally speaking, one may have two major problems as far as the estimation of the Turkish export demand function is concerned: a) the changing pattern of exports after 1980 in which the stabilisation program was introduced, and b) the specification problem. First, the OECD countries have traditionally been the main export market for Turkey until the 1980s. From 1980 onwards, the Islamic Countries from the Middle East and the Northern Africa has increased their shares in total Turkish exports. Thus, in order to avoid this main problem, we calculate the "world" price index, and the "world" real income index facing Turkey as far as the "Industrial countries market" (mainly, the OECD countries) and the "Middle East countries market" are concerned.²⁸ Second, the question is whether the Turkish export firms compete with the domestic firms in the export markets or compete with their foreign competitors' firms (not the domestic firms in the export markets) exporting to the same export markets. Arslan and van Wijnbergen (1990, 1993) and

²⁹The methodology, applied here to derive world price and income indices facing Turkey, is quite similar to the ones employed by Houthakker and Magee (1969) and Goldstein and Khan (1978). For details of the method, see the Appendix.

van Wijnbergen *et al.* (1992) suggest that the empirical results strongly favour that the Turkish export firms compete with their foreign competitors' firms exporting to the same export markets.

We have the following plan regarding the test and estimation procedure for the Turkish export and import demand equations: i) testing for unit roots, ii) testing the relevant variables if they are "difference stationary process (DSP)" or "trend stationary process (TSP)", iii) performing Perron (1990) integration level test for structural break, iv) test for cointegration, estimating the long-run equilibria and the short-run ECMOD.

i) Test for Unit Roots

At this stage, it is important to mention the noticeable differences of the reported critical values between Mackinnon (1991) and Charemza and Deadman (1992). These differences may result in confusion easily. To overcome this difficulty, one can have a look at the plots of the variables in levels and in first differences to decide if they are stationary or nonstationary. Due to overall consideration of the DF and ADF tests for the variables in consideration. We found that they are all likely to be I(1) in levels, but stationary in first differences (see Table 6.4).

ii) DSP versus TSP

Let us now see if the relevant variables are DSP or TSP since it is important to know the type of trend, i.e. stochastic or deterministic, in a time series. We prefer applying the Dickey-Fuller Likelihood Ratio (LR) joint test (F test, in other words)[see Dickey and Fuller (1981)]. The test accepts DSP as the null hypothesis, shown as:
$$X_{t} = \alpha + \rho X_{t-1} + \beta t + \sum_{i=1}^{n} \delta_{i} \Delta X_{t-i} + v_{t}$$
(6.8)

where $v_t \sim IN(0,\sigma^2)$, t=1,...n; α , t, and v_t represent the intercept term, time trend, and error term respectively. The term Δ stands for first differences.

As noted above, we test the null hypothesis of DSP, i.e. Ho: $\rho=1$ and $\beta=0$, against the alternative of TSP, i.e. Ha: $|\rho|<1$ and $\beta\neq0$. Under the null, the standard F table cannot be used here. For this reason, Dickey and Fuller (1981, p.1063, Table VI) provide the appropriate critical values. In practice, the following equation is preferred to equation (6.8):

$$\Delta X_{t} = \alpha + (1+\phi)X_{t-1} + \beta t + \sum_{i=1}^{n} \delta_{i}\Delta X_{t-i} + v_{t}$$
(6.9)

where $\rho=(1+\phi)$, and others are the same as in equation (6.8). The above regression is estimated by OLS, and suggests the null hypothesis of DSP, i.e. Ho: $\phi=0$ and $\beta=0$, against the alternative of TSP, i.e. Ha: $\phi<0$ and $\beta=0$.

As a result, the null hypothesis of DSP cannot be rejected for most of the variables in consideration (see Table 6.5). Thus, the variables in question are said to be DSP. However, a more careful observation suggest that especially those test statistics of the explanatory variables, i.e. 8.09, 6.10, 3.75, 3.14 and 2.64 seem to be too high to claim that we have DSP process here. The more reasonable explanation would be that we have a DSP dominant combined process [for a similar comment, see Charemza and Deadman (1992, esp. Chapter 5)].

iii) Perron Unit Root Test for Structural Break

The effect of structural changes in a time series can be analyzed within the context of the "intervention analysis". It is worth noting that in the early 1980s Turkey opted for outward-oriented ELG strategy after decades of inward-oriented ISI policies. Such a switch could easily lead to a structural break in the economy. In brief, a structural break in the mean level is a type of exogenous intervention to the series. It is clear that ignoring these effects can lead to an inadequate model specifications, poor forecasts, spurious unit roots, and improper policy implications. Perron (1990), in that sense, proposes a unit root test for structural break and provides the appropriate critical values.²⁹ The test can be regarded as an improvement in the direction of searching and creating more informative economic time series. What we are doing by applying the Perron test is that we remove a particular break from the noise function and add it to the deterministic part of the series. The noise function is then analyzed without the effect of the break.

Perron (1990) suggests two types of model regarding the test; namely, the "additive outlier model (AOM)" and the "innovational outlier model (IOM)". The first one is recommended for "sudden" changes while the second one would be more appropriate for "gradual" changes [see also Perron and Vogelsang (1992a)]. As mentioned earlier, Turkey has introduced its stabilisation program in 1980. Since the Reform Program included and resulted in some sudden and radical changes in the economic structure, the AOM version of the Perron test is preferred.³⁰

A brief description of the AOM version of the Perron integration level test

²⁹For a comprehensive study on nonstationarity and structural breaks in economic time series, see Noriega-Muro (1993).

³⁰However, for most of the variables considered, we also applied the IOM version of the Perron test for double check. Those results confirm our preferred AOM findings reported in Table 6.6.

for structural break is as follows.³¹ This is a two-step procedure. **1st step:** let x_t be the residuals from a regression (OLS method of estimation is employed) of X_t on an intercept term and DU_t where DU_t=1 if t>T_b and 0 otherwise. **2nd step:** run the following modified regression (OLS) and test the negativity of α by using appropriate critical values reported in Perron (1990, Table 4):

$$\Delta x_{t} = \sum_{i=0}^{k} w_{i} D(TB)_{t-i} + \alpha x_{t-1} + \sum_{i=1}^{k} c_{i} \Delta x_{t-i} + u_{t}$$
(6.10)

where $D(TB)_{i}=1$ if $t=T_{b}+1$ and 0 otherwise. T_{b} is the break year.

The test results for Turkey presented in Table 6.6 suggest that there seems to be no "spurious root" created artificially by the structural breaks that assumed to occur in 1974, 1977 or 1980. Since the effects of the exogenous break on the variables under investigation are insignificant, one can simply conclude that there is no spurious unit root generated by exogenous breaks in the examined series.

iv) <u>Test for cointegration, estimating the long-run equilibria and the short-run</u> ECMOD

Although the estimates of the static cointegrating regression parameters are said to be "superconsistent" [see, e.g., Stock (1987)], the bias might still be substantial due to the static structure of the cointegrating regression, and due to small sample size. As an attempt to develop alternative cointegrating regressions, some investigators took the lagged terms into account. To support and modify the results of the EGM results, we also employ the EYM, the Saikkonen and the Johansen methods (for details of the methods, see Chapter Five).

 $^{^{31}}$ In a sense, it is like the standard DF unit root test (i.e. it tests the null hypothesis of unit root against the alternative of stationarity).

We now know that all variables in question are integrated of order one; that is, the first condition of the EG method is met. The second condition requires the stationarity of the residuals of the cointegrating regression. If both conditions are met, then the variables are said to be cointegrated in the Engle-Granger sense (for definitions of the relevant variables and data sources, see Appendix.B):³²

EXPORT DEMAND MODEL (1961-1988):

 $\frac{1 \text{st Step of the EG Estimation Procedure (Long-run)}}{\mathbb{XV}_{t} = -5.85 - 3.12 \text{ (PX/PW)}_{t} + 0.51 \text{ YW}_{t} - 0.15 \text{ ERDI}_{t} + u_{t}$ (6.11) (-6.30)(-10.23) (2.35) (-3.63)

R²=0.964 R
²=0.96 CRDW=1.65 RSS=0.62 F-st.(3.24)=214.5 SE=0.16

³²The variables are expressed in natural logarithms so that the coefficient estimates give the relevant elasticities. All equations are estimated by the OLS, with annual sample, 1961-1988 for the export equation and 1965-1988 for the import one. The values given in parentheses are the relevant t-values. Note, however, that the estimated t-values in the cointegrating regressions have only descriptive roles due to nonstationary nature of the variables in consideration (for details, see Chapter 5). Throughout the Chapter, we assume that the explanatory variables are weakly exogenous. This is because it is believed that the value of each explanatory variable is determined outside the system and thus, independent of the error term. Our Wu-Hausman test results and the finding of unique cointegrating vector of the Johansen procedure are confirmative in this direction. The reported diagnostic test statistics obtained by Microfit 3.0 are as follows. R²: coefficient of determination; R²: adjusted coefficient of determination; CRDW: cointegrating Durbin-Watson test; RSS: residual sum of squares of the regression; F-st: F statistic of the regression; DW: Durbin-Watson test; NES: standard error of the regression; LM-F: F (i.e. Modified LM) version of Godfrey's Lagrange Multiplier (LM) test of the residual serial correlation up to the pth order; **RESET**-F: Ramsey's RESET test using the square of the fitted values; **HETEROSCED**-F: (i.e. heteroscedasticity) based on the regression of squared residuals on squared fitted values; NORM-CHI-SQ: (i.e normality) based on a test of skewness and kurtosis of the residuals (also known as Jarque-Bera statistic); ARCH-F: Autoregressive Conditional Heteroscedasticity test of the residuals up to the rth order by Engle (1982), and **PREDICT-F**: Chow's second test of adequacy of predictions [for details about these diagnostic tests, see Pesaran and Pesaran (1991)]. On the basis of Monte Carlo results, Kiviet (1986) has shown that in small samples the F version, which is also known in the literature as 'modified LM' statistic, is generally preferable to the LM version. Thus, the F versions are reported only. If the assumption of no multicollinearity is not satisfied, the program, Microfit 3.0 version, gives the error message (i.e. the program will proceed to the computation stage only when this assumptions is satisfied).

2nd Step of the EG Estimation Procedure (Short-run)³³ $\overline{\Delta XV_{t}} = -1.73 \ \Delta (PX/PW)_{t} + 1.60 \ \Delta YW_{t} - 0.06 \ \Delta ERDI_{t} - 0.70 \ u_{t-1} + e_{t}$ (6.12) (-4.56)(2.81)(-1.73)(-4.39) $R^2=0.61$ $\overline{R}^2=0.56$ DW=1.58 SE=0.11 RSS=0.30 F-st.(3,23)=12.04 RESET-F(1,22)=0.66 HETEROSCED-F(1,25)=0.01 NORM-CHI-SQ(2)=0.71 (F version is not applicable). LM-F(1,22)=1.71 LM-F(4,19)=0.77 PREDICT-F(5,18)=1.04 ARCH-F(1,22)=0.05 ARCH-F(4,20)=1.73 ARCH-F(5,18)=1.41 IMPORT DEMAND MODEL (1965-1988): 1st Step of the EG Estimation Procedure (Long-run) $MV_{t} = -7.62 - 0.41 (PM/PD)_{t} + 1.60 YD_{t} - 0.12 ERDI_{t} + u_{t}$ (6.13)(-16.6) (-3.08) (11.5)(-3.66) $R^2=0.947$ $\overline{R}^2=0.939$ F-st.(3,20)=119.0 RSS=0.32 CRDW=1.02 SE=0.13 2nd Step of the EG Estimation Procedure (Short-run) $\Delta MV_t = -0.10 - 0.24 \Delta (PM/PD)_t + 3.30 \Delta YD_t - 0.06 \Delta ERDI_t - 0.65 u_{t,1} + e_t$ (-2.17)(-1.63)(4.47)(-2.25)(-3.31)(6.14) $R^2=0.62$ $\overline{R}^2=0.54$ F-st.(4,18)=7.44 SE=0.09 RSS=0.14 DW=1.80 RESET-F(1,17)=1.24 HETEROSCED-F(1,21)=0.05 NORM-CHI-SQ(2)=2.02 (F version is not applicable) LM-F(1,17)=0.09 LM-F(3,15)=0.26 PREDICT-F(5,13)=0.95 ARCH-F(1,17)=1.48 ARCH-F(3,15)=0.58

The above test statistics compared to the corresponding critical values, as a whole, show that the underlying models are correctly specified (i.e. one can observe no clear breakdown of the classical normal assumptions). As regards cointegrating regressions (6.11) and (6.13), following the EYM presented in Chapter Five, we corrected the resulting long-run elasticity estimates and reached the valid t-statistics.

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³³In this thesis, the restricted modelling technique is employed in the second stages. Maximum lag is to be determined as one to save degrees of freedom. Accordingly, we first estimate shortrun ECMODs with one lags of each variable, eliminate lags with insignificant parameter estimates, and reestimate the simpler model. Since the variables in long-run regressions are contegrated, the corresponding error-correction terms are included in the short-run ECMODs. Further estimates with Instrumental Variable (IV) method, ensures that our OLS short-run ECMOD estimates are not jeopardized by the presence of some contemporaneous effects. The term Δ stands for the first difference. u_{c1} represents the corresponding error correction term (i.e. the estimated residuals of the long-run Turkish export and import demand regressions lagged one year) for export and import demand equations respectively.

Corrected EYM long-run elasticities for (PX/PW), YW and ERDI in (6.11) are - 2.7, 0.61 and -0.12 respectively. The corresponding valid t-statistics for (PX/PW), YW and ERDI in (6.11) are -9.64, 2.90 and -3.16 respectively. Similarly, the corresponding corrected long-run elasticities for (PM/PD), YD and ERDI in (6.13) are -0.49, 1.57 and -0.11 respectively. The corresponding valid t-statistics are - 3.77, 10.83 and -3.38 respectively. The EYM procedure ensures that the bias in the long-run regression estimates of (6.11) and (6.13) is very small (and indeed can be ignored) and all the variables included are statistically significant at 5 percent significance level.

Table 6.7 reports the ADF residual-based test results for cointegration. Taking the results into consideration, we have the following points to suggest that the variables in question are cointegrated for both (i.e. export and import demand) long-run equations [in other words, the long-run relationships among the variables are said to be "genuine" (not "spurious")]:

a) Based on the relevant test statistics and critical values reported in Table 6.7, one can clearly reject the null hypothesis of no cointegration for the corresponding residual obtained from the long-run export demand equation at 5% level of significance. However, the relevant test result for the residual of import equation is marginally below the rejection level (indeed, very close to "inconclusive' region) at 10% significance level. There might be two possible explanations for this. First, small sample size can be effective on the residual-based tests due to the fact that there might be an alternative explanation for the common failure to reject both the nulls of unit root and no cointegration. Second, the nature of the standard hypothesis testing ensures that the null hypotheses of unit root and no cointegration are not rejected unless there is a strong evidence against it, or equivalently standard

unit root tests may have low power against relevant alternatives.³⁴ As a result, as regards the import demand equation, a further investigation is needed to make sure that the variables at hand are cointegrated.³⁵

b) Second stage estimates of equations (6.12) and (6.14) provide interesting empirical evidence on the dynamics by which exports and imports adjust to their equilibrium levels respectively. In that sense, we have further evidence [i.e. in small samples, a negative and statistically significant estimate of the error-correction term provides further evidence that the variables in the equilibrium regression are cointegrated and the ECM is working satisfactorily]. This is exactly the case we have in (6.12) and (6.14).³⁶

c) The relevant "residual correlograms (RCO)" (i.e. the sample autocorrelation functions of the residuals) and the residual plots (against "time") of both long-run trade equations also favour for the existence of cointegration among the variables. This implies that we have stationary error terms for both long-run regressions (see Figures 6.1 to 6.4).

d) In fact, the distribution of the CRDW test has not been fully investigated

³⁴For a recent review of the concept and proposals for alternative tests, see Kwiatkowski *et al.* (1992). This issue has become rather controversial in recent years. Some [see, e.g., Nelson and Plosser (1982), Phillips (1987), Phillips and Perron (1988), Said and Dickey (1984)] suggest that most macroeconomic time series have a unit root [see also Dejong *et al.* (1989) for a list of empirical studies confirming the finding that economic time series contain unit root]. However, this view has not gone unchallenged [see, e.g., Kwiatowski *et al.* (1992) for a survey of the challenging views].

³⁵It is, however, important to note that with the inclusion of the 'DEBT' variable in 6.20, one is able to reject the null of nocointegration as regards the long-run import demand relationship (see Table 6.7). In the light of the overview in Chapter Five, it is now clear that, while using the cointegration tests, we are <u>not</u> trying to prove that the relationship is really a long-run one, on the contrary, this is an assumption which should be supported by the economic theory [for this point, see Charemza and Deadman (1992, p.157)]. That is, whether or not cointegration exists is an empirical question but beliefs of economists as regards the long-run should be supporting its existence [Granger (1986, pp.226-7)]. In that sense, we do not see any major contradiction between the general cointegration methodology outlined in Chapter Five and adding new explanatory variables such as the variables 'DEBT' and 'INFLOW' as long as there exists a robust theoretical support behind it, and as long as we are able to reject the null of nocointegration.

³⁶Engle and Granger (1987) shows that there is a mutual relationship between the existence of cointegration and ECM, which is known as "Granger Representation Theorem". In short, if the variables under investigation are cointegrated, there should be an error-correction representation and vice versa.

yet, and thus its critical values are not known accurately [Charemza and Deadman (1992)]. Nevertheless, it might still be used to confirm the main findings. The relevant critical values can be obtained from the following sources:

i) CRDW critical value (n=50, the two variable case): 0.78 at 5% level of significance and 0.69 at 10% level of significance [Engle and Yoo (1987), Table 4], and

ii) CRDW critical value (n=100, the two variable case): 0.386 at 5% level of significance and 0.322 at 10% level of significance [Engle and Granger (1987), Table II].

As reported earlier, the relevant CRDW test statistics are 1.65 and 1.02 for the long-run Turkish export and import demand equations respectively. The basic rule is that the smaller is the CRDW, the bigger is the chance that the null hypothesis of no cointegration is <u>not</u> rejected. Banerjee *et al.* (1986), on the other hand, propose simple and quick rule; that is, if CRDW>R², the null of no cointegration is more likely to be rejected. Since 1.65>0.96 and 1.02>0.95 and the values of CRDW are reasonably high, we can evaluate the results as evidence for the existence of cointegration for both long-run regressions. High R² in the cointegrating regressions suggest that the OLS estimator is not substantially biased in our case. Table 6.8 provide evidence in the same direction.

e) In what follows, we simply apply the dynamic cointegrating regressions; namely, the Johansen and the Saikkonen methods, as a check on the static Engle-Granger (EG) results (for details of the methods, see Chapter Five). In contrast to the EG procedure, the short-run dynamics are included in the model, thus reducing the possible bias present in the first stage results, but at the expense of a smaller number of degrees of freedom. In case of more than two variables (i.e. multivariate case) one may not have a unique cointegrating regression (the presence of more than one cointegrating vector). The existence of multiple cointegrating vectors is seen as an identification problem³⁷ and can be dealt with if we can reject all but one such cointegrating vectors as economically meaningless. The Johansen results suggest that we have unique cointegrating vectors as far as the long-run export and import demand regressions are concerned. Given the problems which arise with the static and dynamic cointegrating regressions, we have implemented each method in turn in order to examine if robust long-run elasticity results emerge. Table 6.8 provides the estimated long-run elasticities of income and price by the three different approaches; namely, the Engle-Granger, the Johansen, and the Saikkonen. As seen, although the choice of estimation method has a certain effect on the results obtained, one can reach reasonably robust estimates for the long-run elasticities of interest.

As mentioned earlier, one can also use "world imports" instead of "world income" as a scale variable in the export demand equation for Turkey. Our estimation with world imports facing Turkey, (MW), as a scale variable produces the following export demand equation:

 $XV_t = -4.01 - 3.49 (PX/PW)_t + 0.20 MW_t - 0.17 ERDI_t + u_t$ (6.15) (-18.2) (-15.3) (1.69) (-3.90)

 R^2 =0.96 \overline{R}^2 =0.955 RSS=0.68 CRDW=1.86 F-st.(3,24)=194.2 SE=0.17 ADF=-5.87

The relevant test results strongly suggest that the variables in equation (6.15) are cointegrated (see also Figures 6.5 and 6.6). Note that the inclusion of MW_t instead of YW_t as a scale variable made the long-run scale elasticity more inelastic. This result confirms the point made by Muscatelli *et al.* (1991b), among others.

Let us now see if the inclusion of XCC_t (represents the exports commodity

³⁷See Charemza and Deadman (1992, pp.201-2), Granger (1986), and Muscatelli et al. (1994).

composition) to the export equation and the inclusion of $INFLOW_t$ (represents the foreign exchange availability) to the import equation will bring any significant change to our earlier results. Consider the following EG two-step estimation results:³⁸

EXPORT DEMAND MODEL (1961-1988): $\frac{1 \text{st Step of the EG Estimation Procedure (Long-run)}}{XV_t = -2.95 - 2.73 (PX/PW)_t + 0.26 XCC_t - 0.13 ERDI_t + u_t}$ (6.16)(-9.79)(-6.49) (2.51)(-2.76) $R^2=0.965 \quad \overline{R}^2=0.961 \quad CRDW=1.651 \quad RSS=0.60$ F-st.(3,24)=220.3 SE=0.16 ADF=-4.28 2nd Step of the EG Estimation Procedure (Short-run) $\Delta XV_t = 0.04 - 1.32 \Delta (PX/PW)_t + 0.19 \Delta XCC_t - 0.06 \Delta ERDI_t - 0.69 u_{t-1} + e_t$ (1.50) (-2.91) (1.57)(-1.67)(-3.95) (6.17)R²=0.55 R
²=0.47 DW=1.83 SE=0.13 RSS=0.35 F-st.(4,22)=6.7 RESET-F(1,21)=0.98 HETEROSCED-F(1, 25)=0.39 NORM-CHI-SQ(2)=1.21 (F version is not applicable). LM-F(1,21)=0.19 LM-F(4,18)=0.27 PREDICT-F(5,17)=0.92 ARCH-F(1,21)=0.32 ARCH-F(4,18)=0.61 ARCH-F(5,17)=0.92 IMPORT DEMAND MODEL (1965-1988) 1st Step of the EG Estimation Procedure (Long-run) $MV_t = -6.40 - 0.37 (PM/PD)_t + 1.37 YD_t - 0.09 ERDI_t + 0.17 INFLOW_t + u_t$ (-8.33) (-2.94) (7.71)(-2.63)(1.91)(6.18) $R^2=0.955$ $\overline{R}^2=0.946$ F-st.(4,19)=101.9 RSS=0.27

 $R^{2}=0.955$ $R^{2}=0.946$ $R^{2}=0.19$ RS CRDW=1.29 SE=0.12 ADF=-3.32

³⁸It is important to note that the inclusion of XCC, made YW, (world income) statistically insignificant and thus excluded from the equation. As regards cointegrating regressions (6.16) and (6.18), following the EYM presented in Chapter Five, we corrected the resulting long-run elasticity estimates and reached the valid t-statistics. Corrected EYM long-run elasticities for (PX/PW), XCC, and ERDI in (6.16) are -2.0, 0.39 and -0.09 respectively. The corresponding valid t-statistics for (PX/PW), XCC and ERDI in (6.16) are -4.55, 3.55 and -1.96 respectively. Similarly, the corresponding corrected long-run elasticities for (PM/PD), YD, ERDI and INFLOW in (6.18) are -0.24, 1.12, -0.07 and 0.15 respectively. The corresponding valid t-statistics are -1.44, 4.31, -1.57 and 1.36 respectively. The EYM procedure ensures that the bias in the long-run regression estimates of (6.11) and (6.13) is not substantial, but some of the variables turn out to be statistically insignificant.

 $\begin{array}{l} & \underline{\text{2nd Step of the EG Estimation Procedure (Short-run)}} \\ \Delta MV_t = -0.12 + 0.27 \ \Delta (\text{PM/PD})_{t-1} + 3.14 \ \Delta YD_t - 0.05 \ \Delta \text{ERDI}_t \\ & (-2.84) \ (2.00) & (4.73) \ (-2.09) \\ & + 0.18 \ \Delta \text{INFLOWt-1} - 0.47 \ u_{t-1} + e_t \\ & (1.68) \ (-2.61) \end{array} \tag{6.19} \\ & (1.68) \ (-2.61) \\ \hline R^2 = 0.69 \ \bar{R}^2 = 0.60 \ F-st.(5,17) = 7.53 \\ SE = 0.08 \ RSS = 0.12 \ DW = 2.06 \\ RESET-F(1,16) = 6.64 \ \text{HETEROSCED-F}(1,21) = 1.15 \\ NORM-CHI-SQ(2) = 0.02 \ (F version is not applicable) \\ LM-F(1,16) = 0.07 \ LM-F(3,14) = 0.36 \ PREDICT-F(5,12) = 1.51 \\ ARCH-F(1,16) = 0.25 \ ARCH-F(3,14) = 0.49 \end{array}$

Regarding the export equation, as expected, inclusion of the export commodity composition index, XCC, in log terms resulted in smaller income and price elasticities and insignificant scale variable [see equations (6.16) and (6.17)]. This is so because the commodity type effects are implicitly captured by the income and price effects if they are not represented in the regression. As we understand from equation (6.16), export commodity composition change from agricultural to manufacturing can statistically explain the increase in Turkish export volume. This also shows the significant effect of product innovation process undertaken in Turkey. As regards the import equation, addition of an indicator of foreign exchange availability, namely, INFLOW, turned out to be a statistically significant variable to explain the change in Turkish import demand [see equations (6.18) and (6.19)]. By analogy with XCC, inclusion of INFLOW decreases the elasticities within the import equation.³⁹ Evidence suggest that the variables in cointegrating regressions (6.16) and (6.18) are cointegrated (see also Figures 6.7 to 6.10).

So far we dismissed some potential effects of Turkey's external indebtness on its import demand. That is, external debt service may be regarded one of the

³⁹Note that the variables in (6.16) and (6.18) are both proved to be cointegrated. This is also supported by the evidence obtained by dynamic cointegration procedures such as the Johansen and the Saikkonen.

factors which determine the import capacity of an indebted country such as Turkey. Thus, we now want to see whether the Turkish import demand is constrained by its external debt transfers to creditors. It is important to note that data availability in no exception in this field. For the period 1965-1988, we were able to find the figures of Turkey's total debt service (interest+principal) in US dollars. This enabled us to use both the debt service ratio (i.e.debt service/exports of goods and services including workers' remittances; call this "DEBT") and the debt service in real terms as measures of import capacity. When included, both improved the relevant test results of the long-run import demand regression for Turkey and turned out to be statistically significant with correct (negative) signs. In the following long-run and short-run equations (6.20) and (6.21), we report the estimation results including the debt service ratio for Turkey:⁴⁰

 IMPORT DEMAND MODEL WITH EXTERNAL DEBT CONSTRAINT (1965-1988):

 1st Step of the EG Estimation Procedure (Long-run)

 MV_t = -4.83 - 0.26 (PM/PD)_t + 1.25 YD_t - 0.07 ERDI_t + 0.26 INFLOW_t (-4.2)(-1.82)

 (6.82)
 (-2.11)

 (2.58)

 - 0.16 DEBT_t + u_t

 (-1.67)

⁴⁹As regards the cointegrating regression (6.20), following the EYM presented in Chapter Five, we corrected the resulting long-run elasticity estimates and reached the valid t-statistics. Corrected EYM long-run elasticities for (PM/PD), YD, ERDI, DEBT and INFLOW in (6.20) are -0.25, 1.18, -0.06, -0.18 and 0.23 respectively. The corresponding valid t-statistics for (PM/PD), YD, ERDI, DEBT and INFLOW in (6.20) are -2.18, 7.56, -2.25, -2.46 and 2.87 respectively. That is, all variables are statistically significant at 5 percent significance level. Note also that the corresponding Johansen estimation results ensure that there is a "unique" cointegrating vector and the coefficient estimates are not biased substantially as far as the equation (6.20) is concerned. As regards the shortrun regression (6.21), we failed to find a significant effect of ΔDEBT on ΔMV.

The corresponding critical values at 5 and 10 percent significance levels for residual-based ADF test for 25 number of observation are reported as -4.25 and -3.83 respectively [see Charemza and Deadman (1992, the Appendix)]. There is little doubt that the inclusion of debt service ratio (i.e. DEBT) to the long-run import demand improved the test results as regards the long-run relationship among the variables (i.e. higher CRDW and smaller residual-based test statistic). Those test statistic in (6.20) and satisfactorily working error-correction mechanism in (6.21) suggest that the variables in (6.20) are cointegrated (see also Table 6.7, and Figures 6.11 and 6.12). In what follows, a discussion concerning the findings and their economic implications are provided.

Table 6.4	DF/ADF Tests	for Unit Roots				
	LEV	ELS	1ST	DIFI	FERENCES	
Variable	DF	ADF		DF	ADF	
EXPORT EQ.	(1961-1988)	******				
XV (PX/PW) YW ERDI XCC MW	-0.37 -3.32 -1.44 -2.25 -0.87 -1.79	-0.40 -1.81 -1.41 -1.83 -0.49 -1.60		-4.90 -3.94 -5.02 -5.92 -6.05 -3.55	-4.22 -3.41 -5.55 -3.90 -3.53 -3.12	
IMPORT EQ.	(1965-1988)					
MV (PM/PD) YD ERDI INFLOW DEBT	-0.14 -1.09 -1.50 -2.27 0.88 -1.05	-0.71 -1.01 -1.30 -1.93 1.09 -0.52		-4.52 -5.10 -3.31 -5.41 -4.82 -6.22	-3.33 -3.32 -2.52 -3.54 -3.40 -3.60	

Comment to Table 6.4: All variables are expressed in logarithms. The relevant critical values for small samples are given in Mackinnon (1991) and Charemza and Deadman (1992). The corresponding critical values with intercept for 25 number of observations at 5% significance level are obtained as -2.98 from Mackinnon (1991) and -2.33 (lower value) from Charemza and Deadman (1992). It is worth noting that the intercept terms are included in the relevant DF and ADF equations. In most of the cases, an augmentation of one appeared to be sufficient to secure lack of autocorrelation of the error terms. In some cases, however, no augmentation was necessary. All econometric computations in this study have been carried out by Microfit 3.0 version [see Pesaran and Pesaran (1991)].

Table	6.5	DF	Likelihood	Ratio	(LR)	Joint	Test	for	DSP	vs	TSP

Variable	Test Statistic	Critical Value (n=25) 5% 1%
EXPORT EQ.	(1961-1988) n=28	
XV (PX/PW) YW ERDI XCC MW	2.23 8.02 6.10 3.14 3.75 2.20	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
IMPORT EQ.	(1965-1988) n=24	
MV (PM/PD) YD ERDI INFLOW DEBT	2.00 2.27 2.08 2.64 1.49 1.45	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Comment to Table 6.5: All variables are expressed in logarithms. The corresponding critical values obtained from Dickey and Fuller (1981, p.1063, Table VI) are 7.24 for 25 number of observations at 5% significance level, and 10.61 for 25 number of observations at 1% significance level. In most of the cases, an augmentation of one appeared to be sufficient to secure lack of autocorrelation of the error terms.

Table 6.6 Perron Unit Root Test for Structural Break: The Additive Outlier Model (AOM) for Turkey______

	TEST S	TATISTIC	CRIT	ICAL	VALUE
Variable	In Levels	1st Differences	∦=0.5 (5%)	∕a⊫0.7 (5%)	λ=0.9 (5%)
EXPORT EQ. (1961	-1988) n=28				
XV [1980] (PX/PW) [1980] (PX/PW) [1974] ERDI [1980] XCC [1980] MW [1980]	-1.12 -0.06 -0.84 -2.62 -1.22 -1.59	-5.20 -6.37 -5.21 -5.71 -4.66 -5.37	-3.67 -3.67 -3.67 -3.67 -3.67 -3.67 -3.67	-3.53 -3.53 -3.53 -3.53 -3.53 -3.53 -3.53	-2.89 -2.89 -2.89 -2.89 -2.89 -2.89 -2.89
IMPORT EQ. (1965	-1988) n=24				
MV [1980] MV [1977] (PM/PD) [1980] YD [1980] YD [1977] ERDI [1980] INFLOW [1980] DEBT [1977]	$ \begin{array}{r} -1.68\\ -0.61\\ -0.68\\ -1.07\\ -2.63\\ -1.78\\ -1.58\end{array} $	-4.61 -4.71 -5.99 -5.86 -5.88 -5.16 -4.64 -6.67	-3.67 -3.67 -3.67 -3.67 -3.67 -3.67 -3.67 -3.67	-3.53 -3.53 -3.53 -3.53 -3.53 -3.53 -3.53 -3.53	-2.89 -2.89 -2.89 -2.89 -2.89 -2.89 -2.89 -2.89 -2.89 -2.89

Comment to Table 6.6:The critical values which corresponds to the break fraction (λ =Tb/T) given by Perron (1990, Table 4) and Perron and Vogelsang (1992a). For smaller sample sizes, the critical values of the additive outlier model have been tabulated by Rybinski (1994) recently. Here, we report those critical values of Rybinski for 30 number of observations. The break year for Turkey is assumed to be 1980 for most of the series. For instance, for the break year 1980, this implies that the corresponding break fraction is λ =20/28=0.71 for the export equation and λ =16/24=0.67 for the import equation. For some variables, the break years are determined as 1974 and/or 1977. Dates given in brackets after the variable names refer to corresponding break years. In this case, the corresponding critical values differs. An augmentation of one appeared to be sufficient to secure lack of autocorrelation of the error terms.

Table 6.7 ADF Residual-based Test for Cointegration: The Long-run Export and Import Equations for Turkey

	TEST S	TATISTIC	CRITICA	L VALUE
Equations	DF	ADF	5% lower upper	10% lower upper
Export (6.11) Import (6.13) Import (6.20)	-4.30 -2.84 -4.60	-4.74 -3.03 -3.94	-3.69 -3.49 -3.69 -3.49 -4.22 -4.05	-3.30 -3.13 -3.30 -3.13 -3.83 -3.65

Comment to Table 6.7: The critical values are obtained from Charemza and Deadman (1992) without intercepts for the residuals of the long-run import and export demand equations with 25 number of observations for m=3 [export equations (6.11) and (6.13)] and m=5 [import equation (6.20)]. For different sources of critical value tables, the reader can also refer to the following: Mackinnon (1991), Engle and Granger (1987, Table II and III), Engle and Yoo (1987, Table II and III), and Hall and Henry (1988, p.63, Table I).

Table Compa:	6.8 Esti rison of Alt	mated Lo ernative	Methods	id Import Demand	i Elasticities: A
			LONG-RUN	ELAST	ICITIES
			Engle-Granger	Johansen	Saikkonen
EXPOR	T				
Price Scale	Elasticity Elasticity	(PX/PW) (YW)	-3.12 0.51	-3.63 0.27	-3.05 0.46
IMPOR'	T				
Price Scale	Elasticity Elasticity	(PM/PD) (YD)	-0.41 1.60	-0.51 2.02	-0.53 1.67

_ . . *с* 0 Estin ated L ----A Rlasticiti - 4-- -_

Comment to Table 6.8: VAR=2 and VAR=1 are used in the Johansen procedure for the export and import demand equations respectively. For more details about the methods, see Chapter Five.



Figure 6.1 Plot of Residuals of the Export Demand Cointegrating Regression







Figure 6.3 Plot of Residuals of the Import Demand Cointegrating Regression







Figure 6.5 Plot of Residuals of the Export Demand Cointegrating Regression with World Imports facing Turkey as a Scale Variable











Order of lags



Figure 6.9 Plot of Residuals of the Import Demand Coint. Reg. with the Inclusion of INFLOW as an Additional Explanatory Variable







Figure 6.11 Plot of Residuals of the Import Demand Coint. Regression with Debt Service Constraint



Order of lags

6.6. Discussion

On the basis of the cointegration analyses employed, we observe genuine long-run relationships among the variables regarding the export and import cointegrating regressions.

Our findings, to a greater extent, confirm the recent estimates of export and import demand equations for Turkey (see Table 6.3). The sum of the long-run price elasticities of demand for exports and imports for Turkey [i.e. ((-3.12)+(-0.41)) =-3.53] exceeds one (in absolute terms) easily. Thus, if the Marshall-Lerner condition is regarded as the separating line between "elasticity optimism" and "elasticity pessimism", one is supposed to regard the elasticities reported as firm evidence in favour of the camp of elasticity optimism. Overall, our elasticity estimates for Turkey suggest that ELG strategies are preferable compared to the alternative of ISI strategies. One important implication of our high price elasticity estimation of demand for Turkish exports is that markets seem highly price competitive. Since the long-run income elasticity for export demand is also statistically significant and moderately high, it can be noted that the remarkable export growth of Turkey is to be regarded as reflecting not only high price elasticity but also moderately high income elasticity. However, once we include the proxy for non-price and supply effects (i.e. XCC, measure for range of goods or composition), world income becomes less elastic and also statistically insignificant in the long-run export demand regression.

As regards the recent debate of conventional wisdom versus Riedel's alternative paradigm on the size and the significance of the income and price elasticities for export demand, we, in the first place, provide some econometric evidence suggesting that both income and price effects have been the driving forces behind the success story of Turkish exports. Once non-price and supply effects are captured by a simple commodity composition index, XCC, the story changes; statistically insignificant world income, significant non-price and supply effects, and significant and highly elastic prices for the Turkish export demand. Overall, our results appear to justify Riedel (1991) in referring to Turkey's successful export drive to support his view. We, however, feel that, to reach more definitive conclusion, further studies, which incorporate some other non-price effects, such as quality, reliability and marketing strategy, into the export demand equation are needed.

It is also important to note that the change in the type of exports goods from agricultural to manufactured is one of the factors that significantly explains the increase in the Turkish exports. The inclusion of our exports commodity composition index, XCC, decreases the relative price elasticity only slightly. Overall, estimation results support the view that the success of Turkish exports in export markets cannot only be attributed to high level of devaluation occurred during the 1980s. Non-price factors such as the exports commodity composition index, XCC, even in such a simple and crude fashion, are shown to be significant to explain the successful export drive of Turkey. When evaluated in the Krugman's sense, our XCC implies significant supply effects in assessing the success story of Turkish export performance.

The reported long-run relative price elasticities of export and import demands are observed to be greater than the short-run ones. This implies that the full effect of the exchange rate depreciation on the overall trade balance takes, *ceteris paribus*, some time (in our case, more than one year). However, since the short-run price elasticities still have correct negative signs, the "J-Curve" phenomenon is said <u>not</u> to be present in the Turkish foreign trade.

As mentioned earlier, different estimates of the price and income elasticities

of export demand functions lead to different implications for trade policies and different strategies for foreign debt problem of a LDC. In that sense, our evidence suggest that the liberalisation of trade and exchange rate adjustments, together with the increasing world demand, have been effective to lead to a massive boosts in the export growth in Turkey.

As regards external debt strategy, the implications appear to be mixed. High price elasticity for Turkish export demand implies price competitive export markets for Turkey (i.e. exchange rate adjustments matter), and there seems to be no shortage of foreign exchange needed to service the country's debt. This leads to smaller debt/exports ratios and thus, higher creditworthiness in the international credit markets for Turkey. However, in policy debate, the effectiveness of exchange rate adjustment policy is frequently questioned on the grounds that, in domestic currency terms, it automatically increases the servicing burden of external debt denominated in foreign currency, and tends to reduce national income and spending, and jeopardize the current account through this channel. This confronts debtors with the unpleasant dilemma that they have to achieve an improved level of competitiveness in order to increase the export performance to service their debt, while this process of improving their competitiveness increases the real burden of that debt. There is little doubt that decreasing debt/exports ratios of Turkey in the 1980s ensured the country's creditworthiness in the international credit markets. It is also important to note that a recession or stagflationary and protectionist policies in the export markets can easily lead to substantial reductions in export demand, ceteris paribus, if world income is a statistically significant factor. This can be given as a reason why Turkey appears to be vulnerable in case of a recession in its main export markets since world income is shown to be statistically significant for its exports.

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Some researchers suggest that, *ceteris paribus*, having high level of openness coupled with export-oriented economy is considered more creditworthy than an economy that turns away from international trade [see, e.g., McFadden *et al.* (1985)]. Based on our descriptive examination of the Turkish economy in this Chapter and Chapter Four, we believe that successful switch and commitment of the Turkish economy from ISI to ELG strategies with a more open economy was one of the significant reasons behind the high creditworthiness levels that the country has enjoyed during the 1980s. Nevertheless, the relationship between trade and external debt strategies still remains a controversial issue in the relevant literature [see, e.g., Borensztein and Ghosh (1989), Diwan (1990), Laird and Nogues (1989)].

Our empirical results suggest that the Turkish import demand is constrained by its own external indebtness. It is important to note that the inclusion of the debt service ratio as an additional explanatory variable makes income and price elasticities more inelastic. Significant debt service ratio with negative sign in the import demand regression might have following possible implications: i) the more Turkey services its external debt to creditors, the less import demand it will have, ii) the less import demand Turkey has, the less exports earnings OECD countries will get from Turkey, and iii) a decrease in the import demand of intermediate goods and/or raw materials can constraint the national production level (i.e. confirmative indirect evidence in the direction of possible "Turkish debt overhang" due to substantial debt service transfers to foreign creditors).

Following points should also be kept in mind regarding the evaluation of the estimation results. First, since the trade analysis introduced in this Chapter is a variant of partial equilibrium one, some possible advantages of the larger scale macroeconometric models are missing. However, in some cases, less complicated model structure of the partial models can make them more appealing for the

researchers.

Second, due to data problems, we had no choice but to use "aggregate data" for trade equations for Turkey. Thus, resulting elasticities (especially, price elasticities) need to be used with care and caution. It is important here to note that price elasticities differ across commodity groups, with price elasticities higher for manufactures than for agricultural products. The same also applies to the income elasticities of demand. It is also argued by some researchers [see, e.g., Muscatelli et al. (1994, 1991b), Thirlwall and Gibson (1992)] that income elasticity of export demand captures all non-price factors excluded from the equation and this can explain why "traditional' estimates of income elasticity are so high. As pointed out recently by Landesman and Snell (1993), highly aggregated export models such as the one presented in this chapter by their very nature do not effectively address the effects of transformation concerning the types and quality of goods produced and exported. Following Muscatelli et al. (1991b), and Landesman and Snell (1993), a type of commodity composition index was derived and included in the export demand equation for Turkey. The index proved to be a statistically significant determinant of the Turkish export demand.

Third, reconsideration of the points raised by Orcutt (1950) concerning the use of OLS, has suggested that [see, e.g., Learner and Stern (1970)] there might be many cases in which the OLS is reasonably applicable. Accordingly, we agree with the point that the traditional technique of the OLS, if handled with proper care, and, if employed in the light of the robust "cointegration" technique, can yield valid and meaningful estimates of income, relative price and other influences on the demand for a country's exports (imports).

Fourth, it is noted recently by Faini et al. (1992), Muscatelli et al. (1991a), among others, that focusing on the single LDC and its trade with the developed

world has tended to ignore the problem of intra-LDC competition in export markets. Thus, future research can focus on which LDCs compete with Turkey in export markets to sort out the importance of intra-LDC competition for Turkey.

Fifth, the model presented in this chapter, following the usual assumption, accepted underlying standard comparative advantage models of trade. The results may of course subject to change once we allow for market imperfections. This can also be regarded as a potential area for future research for the Turkish foreign trade.

Finally, it is also argued in the literature [see, e.g., van Beers (1992)] that intra-LDC trade has some characteristics (such as larger learning by doing effects) that will lead to additional gains in productivity for the economy as a whole. Whether this is true for Turkey or not, is an open field for further research.

CHAPTER SEVEN

SOLVENCY MODEL OF AN INDEBTED NATION AND APPLICATION TO TURKEY

7.1. Introduction

As mentioned earlier in the previous chapter, Turkey experienced a foreign debt crisis in 1978 and rescheduled a big proportion of its foreign debt through 1978-1980. From the technical point, the crisis was largely due to unfavourable foreign debt structure, i.e., in 1977, over half of its foreign debt was a short-term one, which was nearly three times its export earnings in the same year. Thus, the Turkish foreign debt crisis occurred in 1978 might be referred to as a "severe liquidity crisis" [Aricanli and Rodrik (1990b)].

A turning point in the economic strategy came in January, 1980 and the country's real GNP grew by 5.2 per cent per year on average between 1980 and 1990. By comparison, severely indebted middle income countries on average grew only by 1.7 per cent during the same period of time (see Table 4.1).

Turkey's uninterrupted debt service for more than a decade provides evidence that the country has recovered from the crisis. However, as mentioned earlier, this does not necessarily imply that the country managed to overcome its heavy foreign debt burden. The Turkish economy still suffers from a considerable external debt burden (see Table 2.4 and Table 2.6).

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As an indebted country, Is Turkey said to be solvent? Is it regarded as creditworthy by the creditors? How do the international credit markets perceive the solvency and the creditworthiness issues of an indebted nation? What are the consequences of being solvent/insolvent or creditworthy/uncreditworthy of an indebted nation for the creditors, debtor governments, policy makers, and relevant international institutions? What are the implications? To be able to answer these questions, in this Chapter, we develop a solvency index based on the approach pioneered by Cohen, D. (1985).

In this framework, the solvency index, generally speaking, is a measure of the share of resources that a country should transfer to its creditors in order to be referred to as "solvent". As Cohen, D. (1991) points out, the key element of the index is that it weights the debt/GDP or the debt/exports ratio by an average measure of the difference between expected growth and real interest rates in the future. In that sense, a country with a small foreign debt and slow growth prospects may be less solvent than a country with a larger foreign debt and fast growth. All static measures of solvency such as debt/GDP, debt/exports, debt-service/GDP or debt-service/exports ratios omit the dynamic aspects of the solvency issue. In particular, a static measure of solvency such as debt/GDP ratio will clearly fail to explain the important role of the growth rates and the real interest rates; that is, the "hierarchy" between these two, in time. The solvency index that is proposed by Cohen, D., and also followed here in this paper to a greater extent, instead takes this possibility into account explicitly.

Generally speaking, there are, at least, two main steps in constructing an economic model. First, describing the environment; and, the second, describing the relevant social organizations which exist in the environment and the equilibria that are generated. Accordingly, in what follows, Section 7.2 explains the model. The

application of the model to Turkey is presented in Section 7.3. The final Section draws some concluding remarks and a brief discussion.

7.2. The Model

7.2.1. The Finite Wealth of an Infinitely Lived Economy¹

A nation, like a government or a household, faces a budget constraint, the balance of payments. In the short-run, a country may be able to sustain current account deficits arising from, say, high levels of national consumption by borrowing from abroad, but if the deficit persists, then, at some point, the ability to service and repay its debt will be in doubt. Since we are dealing with the solvency of an indebted "nation", we assume that the government is a social planner with an unlimited potential claim on its resources. It implies that the domestic budgetary problem is omitted, and thus the government's wealth would be exactly that of the nation. What we are interested in is the solvency of a nation not a government. Relying on this set-up, let us now define the wealth of a nation as the present

¹Dynamic (intertemporal) macroeconomics has gained increasing attention among economists especially during the 1980s. The seminal contributions of Solow (1956) on growth theory, Diamond (1965) on national debt and Lucas (1972) on rational expectations started forming this newer approach to macroeconomics at first; and then expanded rapidly in the 1980s. Nowadays most active research is conducted with the tools of neoclassical growth theory and expressed in the symbolism of dynamical mathematics [Azariadis, (1993, Foreword xi)]. In his comprehensive textbook, Azariadis (1993, Foreword xii) notes that the main idea of the new paradigm is that macroeconomics is about 'human interactions over time". Some economists [e.g., Blanchard and Fischer (1989, esp. Chapter 2) point out the common ground of this new paradigm noting that both neoclassical and neokeynesian macroeconomics have important contributions to form this new macroeconomic approach which is mainly based on micro and mathematical foundations. Among dynamic macroeconomic models, the "optimal growth model" pioneered by Cass (1965) and Koopmans (1965), who built on earlier work by Ramsey (1928) and the "overlapping generations model" pioneered by Diamond (1965). Optimum growth particularly refers to a class of economies that typically, though not necessarily, consist of a representative infinite-lived agent. Optimal growth theory is a shorthand name for a class of neoclassical growth models beginning with Ramsey's; these are populated by a single infinite-lived representative individual whose saving plans are "optimal" since they are equivalent to the choices of a central planner [Azariadis (1993, p.72)]. The "overlapping generations model", however, features finitely lived agents and its simplest version, due to Diamond (1965), assumes that agents live for only two periods. In this construction of population, there are two generations alive in any one period, the period in which they overlap [see also McCandless and Wallace (1991)]. Despite their differences, both the "optimal growth model" and the "overlapping generations model" are genuinely dynamic structures built on solid microeconomic foundations. In that respect alone, they have to be regarded as significant improvements over the static IS-LM model [for further information on both models and their use and comparison, see esp. Azariadis (1993)].

discounted value of the nation's income. If the Y_t is the country's GDP at time t, the wealth of the nation is

$$W = \sum_{t=0}^{\infty} \frac{Y_t}{\prod_{s=0}^{t} (1+r_s)}$$
(7.1)

Here we assume that the wealth of a nation, W, is finite. The central point of this analysis is the "hierarchy" between the growth rates and the real interest rates (let us name them n and r respectively). We have then two possibilities:

a) The rate of interest is above the rate of growth of the economy (r>n); in this case, the country's wealth is said to be finite, in present value terms, and a fixed fraction of country's resources should be serviced to creditors in order to be declared "solvent", or

b) The rate of interest is below (or equal) the rate of growth of the economy (r<n), then the country's wealth is infinite, and there is no solvency problem. In this case, the debtor country need only stabilize the trade balance to GDP ratio and never run primary surpluses.

Following the argument drawn in Chapter Three (see esp. pp.66-9), we assume that eventually real interest rates exceed the growth rate of the economy in the long-run. Claiming the opposite of this statement is to imply that the discounted future stream of income (or wealth) of a nation is infinite. In this case, the debtor country has infinite net worth and can therefore borrow as much as it wishes and remain solvent. As long as r<n time can solve any external debt crisis: rescheduling the external debt always reduces the debt/GDP or debt/exports ratios of a fast growing LDC economy. Since such a debtor country does not offer very

interesting economic problems, and presumably does not attract the attention of economists, the case in which r<n is ruled out and the restriction r>n is imposed.² Necessarily, this rules out everlasting "Ponzi games": the nation cannot forever pay the interest on its outstanding external debt by borrowing more. At some stage the external debt must be serviced by running primary surpluses.

The economic environment in which r>n simply implies that the world interest rates will not be systematically smaller than the growth rates of the debtor economy. As regards empirical evidence, Currie and Levine (1991, p.44, Table 3.1.) compare annual individual GDP growth rates for G7 countries from 1970 to 1987 with global real ex post short-term interest rates. It is apparent from their illustration that the 1970s decade was one in which r<n whereas in the 1980s r>n. Cohen, D. (1991, p.20) stresses that any casual observation of the three decades from the 1950s to the early 1980s shows that a hierarchy of n>r has been the case. This hierarchy, however, suddenly changed in the early 1980s.³ Ghatak and Levine (1994) is supportive by focusing on r>n since this has reflected the situation for most LDCs since the beginning of the 1980s.

As a whole, here we are dealing with the situation in which the real interest rate is systematically greater than the growth rate of the economy. This implies that the equilibrium wealth of the nation is finite, and the nation cannot play a successful "Ponzi game" (i.e. no-Ponzi-game condition). This criterion will play an important role in our search of the country's external solvency.

²For more information about why r>n is assumed in the long-run, see, e.g., Blanchard and Fischer (1989, Chapter 2), Buiter (1990a, 1990b), Cohen, D. (1991), Currie and Levine (1991), Eaton (1989, p.1338), Eaton (1993), Ghatak and Levine (1994), Levine (1991), Sargent and Wallace (1981). This is also a feature of Ramsey or Yaari-Blanchard consumption models in a "balanced growth" steady-state. See also footnote (1).

³Cohen argues that the economic environment of the 1980s completely changed the rules of the game inherited from the earlier decades. Time was no longer on the debtor side and the sudden change of the hierarchy towards r>n in the early 1980s worsened the debtors situation and led to the crisis. Cohen's analysis simply focuses on the comparison between r and n to explain the occurrence of the debt crisis of the 1980s.

According to our framework, the only relevant constraint faced by the social planner is the external debt constraint which is imposed by the lenders. At any time t, the nation as a whole produces Y_{t} , consumes C_{t} and G_{t} , and invests I_{t} . Let us now define total absorption as the nation's aggregate spending:

$$\mathbf{A}_{t} = \mathbf{C}_{t} + \mathbf{G}_{t} + \mathbf{I}_{t} \tag{7.2}$$

The difference between the country's GDP, Y_t and the country's aggregate spending, A_t , is exported if positive or imported from abroad if negative:

$$Y_t = A_t + (X-M)_t$$
 (7.3a)

or equivalently

$$TB_t = (X-M)_t = Y_t - A_t$$
 (7.3b)

where the trade balance of the nation $(TB_t = X_t-M_t)$ is defined as the difference between the country's resources (i.e. its GDP) at time t and its aggregate spending at time t. X_t and M_t represent exports and imports of the country at time t respectively.

At any time t, call D_t the outstanding net external debt, n_t the country's rate of growth, r_t the world real rate of interest. In an open economy framework, D_t consists of all financial flows between a nation and the rest of the world. In this case, the constraints faced by the nation are determined as follows:

$$Y_{t} = (1+n_{t})Y_{t-1}$$
(7.4)

$$D_{t} = (1+r_{t})D_{t-1} + A_{t} - Y_{t} = (1+r_{t})D_{t-1} + M_{t} - X_{t}$$

$$D_{t} = (1+r_{t})D_{t-1} - TB_{t}$$
(7.5)

where $TB_t = Y_t - A_t = X_t - M_t$ and $A_t = C_t + G_t + I_t$. $TB_t - rD_{t-1}$ is the current account of

the country. It measures the net flows of goods and financial services between the country and the rest of the world. In that sense, the current account surplus measures the nation's net resource transfer to the rest of the world if national income is taken as the origin.⁴

Depending upon this framework, let us now express the intertemporal budget constraint that the nation obeys. We simply assume that the nation obeys a budget constraint that reflects the budget constraint obeyed by each of its members (either households or firms). Accordingly, aggregating each of the nation's member's own budget constraint yields the following intertemporal budget (solvency) constraint of the nation:⁵

$$\sum_{t=0}^{\infty} -\frac{A_{t}}{\prod_{s=0}^{t} (1+r_{s})} - \sum_{t=0}^{\infty} -\frac{Y_{t}}{\prod_{s=0}^{t} (1+r_{s})} = -D_{0}$$
(7.6)

where D_0 represents the initial external debt. This necessarily implies that a debtor country must run primary surpluses in future:

$$\sum_{t=0}^{\infty} \frac{TB_t}{\prod_{t=0}^{t} (1+r_s)} = D_0$$
(7.7)

⁴The primary surplus, on the other hand, measures the nation's net resource transfer to abroad when domestic income is accepted as the origin. As already explained, the primary surplus focuses on the "location" of resources and the income streams. The current account surplus, however, stresses the "ownership" of resources and the related income streams by national residents, irrespective of the location of the resources [see Buiter (1990a, p.428)].

⁵Solving (7.5) forward in time, one can transform the national budget identity into an intertemporal solvency constraint (7.6) or equivalently (7.7). For details, see, e.g., Currie and Levine (1991), Ghatak and Levine (1994).

i.e. the discounted sum of primary surpluses equals the initial external debt. Both (7.6) and (7.7) follow from the national budget identity (7.5) that the following alternative form of intertemporal solvency condition holds:

$$\lim_{t \to \infty} \frac{D_t}{\prod_{s=0}^{t} (1+r_s)} = 0$$
(7.8)

This is called the "transversality or no-Ponzi-game condition" [see, e.g., Michel (1982)]. It implies that the present discounted value of a nation's external debt must tend toward zero in the long-run, when the nation is subject to the intertemporal budget constraint as expressed by (7.6) and (7.7). The only constraint that transversality condition imposes on the debt is that r>n. That is, the numerator in equation (7.8) must grow less rapidly then the denominator. However, there is another problem: due to threat of default, creditors impose a credit ceiling on the debtor country. This is why a debtor country, under these circumstances, is not free to choose any consumption pattern in accordance with the intertemporal budget constraint. The main idea is directly derived from the standard finance literature: the value of an asset is the sum of the discounted values of all the dividends attached to it. Implemented to the external debt of a nation, this basic criterion is expressed as follows: the value of an external debt is equal to the present discounted value of all future debt service [see, e.g., Cohen, D. (1985, 1988a)]. More precisely, solvency of an indebted nation will require that the present value of future debt goes to zero in the long-run. This does not, however, imply that the debt should go to zero, nor even toward a finite value. It simply requires that the external debt of an indebted country must grow at a rate strictly less than the rate of interest. Then, we have the following important implications:

a) If r<n, then the debtor country's wealth is, in present value terms, infinite and there is no solvency problem, and any fraction, however is small, of its resources can repay any level of initial debt in finite time (however, we have already omitted this possibility in our analysis; that is, the nation cannot play a successful "Ponzi game");

b) If, however, r>n, then the debtor country's wealth is finite and the debt level should be compared with the resources of the country if any possibility of insolvency is wished to be avoided. In this case, transversality condition imposes the restriction.

The "no-Ponzi-game" condition (7.9) provides another way of checking the equivalence between the intertemporal budget constraint (7.6) or the equivalence (7.7) that the country must obey and the finiteness of the wealth. The important point here is that the country, due to the threat of repudiation, is not free to choose any aggregate consumption ($CG_t = C_t+G_t$) that lies along the intertemporal budget constraint (7.6) or (7.7). This means that lenders wish to make sure that the external debt of the country is not so high as to make the debtor country prefer defaulting rather than servicing it.

7.2.2. The Choice of Proxy for the Country's Resources

Up to now, we assumed that the wealth of a country could be measured by its endowments in a single good (home good). Let us now assume that the country produces two goods: a home good which is <u>not</u> subject to international trade and an export good. Then, sectors are referred to as the home goods sector (sector A) and the exported goods sector (sector B). We also assume that resources can costlessly transfer from one sector to another. The production of the home good is decentralized, and to avoid the issue of domestic finance, we assume that the government owns the export industry (see, e.g., Cohen, D. (1988a)].

The main problem to define a country's resources in such a framework is the following: how to define the best "proxy" for the country's resources. Is it appropriate to take GDP, export volumes, or any other intermediary measure? Cohen, D. (1991, p.100) points out that creditors are faced with the following "moral hazard" problem: "...If they decide to base their lending on the GDP measure, they will encourage the debtor country to change its relative price structure in such a way as to increase artificially the value of its GDP (by overvaluing its currency). Conversely, if lenders base their calculations on the export measure, they will induce the country to change its policy in the opposite direction: the country will devalue its currency inefficiently...". In that sense, both measures will create distortions. An appropriate measure would be the weighted average of these two. In what follows, we will call it "resource base" or in short "RB":⁶

$$RB = \rho X + (1-\rho)Y \tag{7.9}$$

where RB: real resource base; X: real exports; Y: real home output (GDP); ρ : the weight of the exports; (1- ρ): the weight of the home output. It is also important to note that X, Y and, by definition, RB are expressed in US dollars at constant prices and current exchange rates. That is, we are concerned with the real amounts.

In order to overcome the difficulty of choosing the appropriate weights in equation (7.10), we follow the approach suggested by Cohen, D. (1987, 1988a, 1988b, 1991) [see also Anand and van Wijnbergen (1988), van Wijnbergen *et al.* (1992)]. In order to avoid the moral hazard problem noted in the earlier paragraph,

⁶For deriving the RB of an intebted country, see the Appendix. Our RB is the same as the Invariant Measure of Wealth (IMW) in Cohen, D. (1988a) and (1991, pp.98-102).

RB is simply calculated as the linear combination which fails to depend (econometrically) on the real exchange rates. In other words, at the optimal choice of ρ , small changes in the real exchange rate does <u>not</u> affect RB:

$$\frac{dRB}{de} = \rho \frac{dX}{de} + (1-\rho) \frac{dY}{de} = 0$$
(7.10)

where e is the real exchange rate defined as $e=PW/PX^7$ where PW and PX represent the world prices facing the country and the domestic prices both expressed in terms of foreign goods (e.g. US dollars); *d* is the total derivative operator. This leads to the following expressions:

$$\rho = \frac{dY/de}{(dY/de) - (dX/de)} = \frac{(e/Y)(dY/de)}{[(e/Y)(dY/de)] - [(e/Y)(dX/de)]}$$

$$\rho = \frac{E_{eY}}{E_{eY} - [(X/Y)(E_{eX})]}$$
(7.11a)

where E_{ex} and E_{ey} represent the elasticities of X and Y with respect to real exchange rate, e, respectively. X/Y is the export share in home output.

It is important to note that the above equation (7.11a) is based on the original real exchange rate definition such as e=PW/PX where PW and PX as defined earlier. However, in our estimations of export demand and output supply equations, we redefined the real exchange rate (or equivalently "measure of competitiveness" or "relative prices") as e=PX/PW. This implies that the expected

⁷This is the <u>original</u> real exchange definition in Cohen's work. For the same definition see also van Wijnbergen $\frac{1}{et} \frac{1}{al.}$ (1992, Chapter 1).

signs of the long-run elasticities in our work will be the opposite. Accordingly, let us now rewrite our equation to calculate the appropriate weights for exports and output:

$$\rho = \frac{-(E_{ex})}{-(E_{ex}) + [(X/Y)(E_{ex})]}$$
(7.11b)

7.2.3. The Threat of Repudiation

Let us assume that any debtor country has the ability to repudiate its external debt. That is to say, if any option of default³ is available, however costly it might be, it will be realized. In other words, however large the costs of default might be, they are not infinite. This implies that there will always be some level of external debt at which a sovereign debtor will repudiate rather than servicing it in full. Following Cohen, D. (1991), let us assume that a debtor country has defaulted on its debt will be subject to two major sanctions:

a) It will suffer a loss of resources equal to a proportion a of its resource base, RB_t , forever after it has defaulted;

b) It will be forced to keep financial autarky forever after it has defaulted. This also implies that the defaulting country can never borrow or lend from the time it has defaulted onward.

Although these sanctions seem to be exaggerated given the historical evidence, they have the advantage of making the analysis more workable and manageable. Generally speaking, financial autarky requires that the defaulting country consumes exactly whatever resources it may have, and the cost of default

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⁸ The distinction between "repudiation" and "technical default" is of some use [see, e.g., Eaton *et al.* (1986)]. In this thesis, for simplicity, "repudiation" is assumed to be the equivalence of "technical default".

scales down RB_t by a factor a. Indeed, the sanctions impose that the consumption⁹ path of a defaulting country is the following:

 $CG_{dt} = (1-\alpha)RB_t \tag{7.12}$

7.2.4. Equilibrium in the International Credit Market

The solvency index will eventually measure the fixed fraction of a country's resources, defined as RB, that a country should allocate to repay its external debt. Here "repay" implies, as Cohen, D. (1991) points out, that the sum of transfers made to creditors (measured in discounted terms) exactly matches the external indebtness of the country. This definition implies that a country which can generate such a sequence of primary surpluses (PR) over the infinite future is said to be solvent.

As mentioned above, neither exports nor GDP are a good indicator of a country's income and thus, one, instead, should look for a "resource base (RB)" which, in this framework, is a linear combination of exports and GDP which fails to depend upon the real exchange rate.

Another important question is whether the country should <u>pre-commit</u> itself indefinitely to transfer a fixed fraction of its resources (RB) to be declared solvent or not. We assume that it is enough for an indebted country to be observed <u>at some</u> time t only to pass the test of solvency to be declared solvent.

Let us now outline the equilibrium conditions in the credit market. As has already been mentioned, a defaulting country will not only suffer a loss of output equal to a proportion α of its resource base (RB) forever, but also forced to maintain financial autarky forever. This implies that the cost of debt repudiation

 $^{^{9}}$ Note that at any time t the aggregate consumption expenditure, CG_v is the private consumption expenditure, C_v plus the government consumption expenditure, G_v.

scales down RB by a factor α . In other words, according to this framework, the cost of debt repudiation is (α RB). Now, as far as the credit market and the lending strategy are concerned, two possibilities can face the creditors: α =1, or α <1.

If α =1, then the threat of debt repudiation is not said to be credible. In this case, the lenders' sanction wipe out all of its RB. This implies that the indebted country has not got an option to repudiate its external debt (an extreme case). Under these circumstances, the credit markets work efficiently, and the only constraint that the indebted country faces is the intertemporal budget constraint.

If, however, $\alpha < 1$, then this cause a threat of debt repudiation. Accordingly, this would require a credit ceiling that lenders should impose on borrowers in order to prevent from a default decision. Under the circumstances, what should be the credit ceiling? The following assumptions are made:

Assumption 7.1: One credit ceiling is less "tighter" than another if it does not encourage a country to borrow less and if, at least once, it encourages the country to borrow more; that is, a "tight" credit ceiling is one that can never be relaxed without encouraging the indebted country to default.

Assumption 7.2: On any interval during which the country reaches the limit imposed by a "tight" credit ceiling (as defined by Assumption 7.1), the indebted country will never be willing to pay its creditors more than the cost of debt repudiation (α RB).¹⁰ Then the following applies: the threat of financial autarky only is <u>not</u> sufficient to keep an indebted country from defaulting.

Indeed, provided that $\alpha=0$, the creditors have a threat of "financial autarky" as a bargaining power to force the indebted country to repay its debt. In this case, as one can understand from Assumption 7.2, nothing can prevent a debtor country from defaulting its debt, <u>if any positive amount</u> of external debt is asked for

¹⁰For the proof of Assumption 2, see, e.g., Cohen, D., (1991).

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As a result, one is able to find the credit ceiling that the creditors should impose, in accordance with the assumptions and the points made above. Now, the creditors know that the indebted country would never pay more than the cost of repudiation, i.e. αRB , when the credit ceiling binds. In addition, agreeing with paying αRB all the time must not be worse than default decision, so that the creditors are safely able to set the following credit ceiling (a "tight" one, as defined earlier):

$$\overline{D}_{t} = \sum_{s=1}^{\infty} \frac{\alpha RB_{t+s}}{\prod_{j=t+1}^{t+s} (1+r_{j})}$$

Let us now define

$$W_{t} \equiv \sum_{s=1}^{\infty} \frac{RB_{t+s}}{\prod_{j=t+1}^{t+s} (1+r_{j})}$$

as the present discounted value of the country's future resources. Then, the following inequality can simply be written to refer to characterize the credit ceiling:

$$D_t \le \alpha W_t \tag{7.13}$$

 $^{^{11}\}mathrm{For}$ another framework in which the same point is stressed, see, e.g., Bulow and Rogoff (1989).

According to the above inequality, creditors should not let the indebted country to borrow more than a fraction (α) of its wealth. In the framework presented here, this fraction is simply the cost of repudiation itself.

So far, we described the economic environment that is going to be used in what follows. Putting all these ideas together, a "solvency index"¹² can be derived. Indeed, one can easily guess the general characteristics of the index, even at this stage.

7.2.5. Definition of the Solvency Index

The main question is the following: how can one rely on a straightforward solvency index to evaluate whether a debtor country would default its debt rather than service it? According to the framework that we have already outlined, there would be no problem, if the creditors (or economists) were to know the cost of debt repudiation exactly. In this case, a natural solvency index would be

$$\lambda = \frac{D_t}{\alpha W_t}$$

If $\lambda \leq 1$ then the country is solvent, and any index $\lambda > 1$ would imply that the country will <u>not</u> want to repay its debt fully.

We now, at this stage, assume that the above natural index is irrelevant since creditors do not know the cost of debt repudiation precisely. Instead, the following definition applies:

Definition 7.1: An indebted country, whose external debt, at time t, is D_t , is said to be "solvent" if and only if there is a path of external indebtness which satisfies the transversality condition [i.e. equation (7.8)] and which the country is

¹²For the original idea, see Cohen, D. (1985).

willing to repay rather than defaulting at time t.

Then, when is a debtor country solvent? To be able to answer this question, let us call β the fraction of a country's resources, which has already defined as RB, that satisfies

$$D_{t} = \sum_{s=1}^{\infty} \frac{\beta R B_{t+s}}{\prod_{j=t+1}^{t+s} (1+r_{j})}$$
(7.14)

What equation (7.14) implies is that a debtor country will be willing to repay, at time t, a fixed fraction (βRB_{ν}) to its creditors rather than a default <u>if and only if</u> it is "solvent". That is, β is simply the fixed fraction of the country's resource base, RB, that should be allocated to the repayment of the external debt to satisfy the intertemporal external solvency (or transversality) condition. It is important to note that this is the minimum fixed fraction satisfies the country's solvency. As Cohen, D. (1991, p.96) put it:"...The service of debt is designed to make sure that the sum of transfers that are henceforth generated exactly matches the face value of the country's outstanding debt...". The index β , here, is simply proportional to the debt/RB ratio and to the difference between growth and real interest rates. What is needed to stabilize the debt/RB ratio, in this case, is the payment of βRB_{t} . Moreover, we already know that the transversality condition is the equivalent to the intertemporal external solvency condition.

Unlike the conventional measures, such as debt/GDP and debt/exports, our solvency criterion implies that a debtor country need repay neither the principal nor even all the interest falling due on its outstanding debt in order to maintain its solvency. Solvency, according to the framework outlined, requires only that the outstanding external debt grows slower than the real interest rate. This also implies that the debt does not grow faster than the debtor's resources.

We now know that if α were known precisely to the creditors, they could easily evaluate whether or not a debtor country is solvent by comparing β to α . However, α is not known accurately. What happens then? In any case, creditors will have some opinion about α . Call this α_i . Although there is no reason to believe that α_i is the correct one, the creditors themselves have little doubt about its accuracy.

Now let us assume that $\beta = \alpha_i$, i.e., the creditors think that the country's credit ceiling is binding. In that case, as shown earlier, the country is asked to transfer βRB_t . What happens <u>next</u>?

If this hypothetical indebted country (i.e., the one that is considered to have reached its credit ceiling) is <u>observed</u>, at time t, to prefer giving up a fixed fraction of its resources (βRB_{i}) rather than defaulting, one may have an indication that, *ceteris paribus*, it is a choice that the country will be willing to make later on as well. Then, the country is said to be solvent. Otherwise, if it prefers defaulting rather than paying βRB_{i} , it is necessarily insolvent (if the country has been observed prefer repaying the necessary fixed fraction for a period of time before t and also at time t, *ceteris paribus*, this will, no doubt, strengthen the country's position, as far as the creditors judgements are concerned).

In conclusion, if the country prefers servicing the fixed fraction βRB_t rather than defaulting, it will, <u>by implication</u>, be willing to do the same later on as well. However, if it prefers defaulting rather than repaying the fixed fraction βRB_t , it implies that it cannot service its debt in full and rescheduling, in this case, is not going to help either.

Cohen D. (1985) suggests that most indebted countries in the wake of the

1982 debt crisis which were asked to repay the debt falling due were solvent according to the solvency condition. His estimates indicate that a debt service amounting to 15% -in average- of a country's exports was good enough to protect the country's solvency at the time. According to D. Cohen's calculations, among other countries, Brazil and Mexico successfully passed the test of solvency in the mid-1980s.

7.2.6. Evaluating the Creditworthiness

It is important to distinguish the concepts of solvency and creditworthiness. Although solvency involves the ability to pay only, creditworthiness involves both the ability and the willingness to pay.¹³ For most countries, the constraints imposed by solvency condition may not be very restrictive. Since the debtor's ability-to-pay does not necessarily imply its willingness-to-pay, creditworthiness (which relies on the creditors evaluation of not only ability but also willingness to pay) often imposes much tighter constraints than solvency alone.

For the following reasons, evaluating the creditworthiness of an indebted country is not an easy task [see e.g. van Wijnbergen *et al.* (1992)]:

1st Reason: How should an accurate indicator of creditworthiness of an indebted country be chosen?

2nd Reason: How should the value of the indicator chosen be evaluated whether it is too high or not?

First, it is a matter of definition of the external debt burden of the country. Which indicator is the most appropriate one? Debt/GDP ratio, debt/exports ratio or any other? As shown earlier, neither debt/GDP ratio nor debt /exports ratio gives

¹³In addition to those studies related to solvency and willingness to pay approaches reviewed in Chapter 3, see also van Wijnbergen *et al.* (1992).

the accurate and unbiased indicator. Instead, a weighted average of these two might be the accurate one. We already called this "resource base" (RB). The method was introduced to the relevant literature by Cohen D. (1987, 1988a). It simply suggests that debt/RB ratio guarantees the situation in which there is no incentives to overvalue or undervalue the exchange rate. As explained earlier, this ratio is influenced by the export demand elasticity on the one hand, and output supply elasticity on the other.

Second, evaluating the creditworthiness requires whether the cost of repudiation is less than the cost of servicing the debt. However, we already assumed that no one precisely assess the cost of repudiation. In other words, no one exactly knows how high that cost is. We follow D. Cohen's simple but effective method: If a country, at time t, is observed to prefer repaying a fixed fraction of its resources (βRB_i) to creditors rather than defaulting, by implication, ceteris paribus, the country will also be willing to repay it in the future as well. To put it other way, if a country has not defaulted at the current (at time t) value of its debt/RB ratio, that value is, by implication, not yet too high (see also van Wijnbergen et al. (1992). Otherwise, it would have defaulted already. Under these circumstances, as Cohen D. (1991) and van Wijnbergen et al. (1992) point out, creditworthiness can be maintained by avoiding the debt/RB ratio to increase further. This implies that a feasible external debt strategy that keeps a country's creditworthiness at least at present levels consists of a time path for external borrowing that will not lead to a rise in debt/RB ratio. At this stage, one can simply argue that the model presented here, reaches a fair balance between ability-to-pay and willingness-to-pay models.

From Equations (7.9) and (7.10), we already know that $\mathbb{RB} = \rho \mathbb{X} + (1-\rho)\mathbb{Y}$. Let us now define the growth rate of RB, n_{RB} , as:

$$n_{RB} = \frac{1}{RB} \frac{dRB}{dt} = \frac{1}{\rho X + (1-\rho)Y} [\rho X + (1-\rho)Y]$$
$$n_{RB} = \frac{1}{[(X/Y)\rho + (1-\rho)]} [((X/Y)(\rho/X)(dX/dt)) + ((1-\rho)(1/Y)(dY/dt))]$$

$$n_{RB} = \frac{1}{[(X/Y)\rho + (1-\rho)]} [(X/Y)(\rho)(n_X) + (1-\rho)n_Y] = \frac{[(X/Y)(\rho)(n_X) + (1-\rho)n_Y]}{[(X/Y)\rho + (1-\rho)]}$$

$$n_{RB} = \frac{(X/Y)(\rho)(n_X)}{[(X/Y)\rho + (1-\rho)]} + \frac{(1-\rho)n_Y}{[(X/Y)\rho + (1-\rho)]}$$
(7.15)

where n_x and n_y represent the growth rates of exports and home output (GDP) respectively. n_x can be associated with output growth, n^* , in the countries Turkey is exporting to:

$$n_{x} = [(1/X)(dX/dt)]$$

$$n_{x} = [(Y/X)(dX/dY)] * [(1/Y)(dY/dt)]$$

$$n_{x} = (E_{yx})n^{*}$$
(7.16)

where $E_{\rm YX}$ represents the elasticity of Turkey's exports for output in the countries purchasing Turkey's exports.

By this definition, the following necessarily holds to have a constant external debt burden:

$$D - RB = 0$$
 (7.17)

where D and RB are the real values of the external debt and the resource base both expressed in terms of foreign goods respectively, defined as $D=DN/P^*$ and RB=RBN/P^{*} where DN and RBN are the nominal value of the external debt and resource base in terms of foreign goods respectively; and P^{*} is the foreign prices facing the debtor country in the export markets. It is worth noting that RB, by definition, is already expressed in constant prices and in terms of foreign goods [see equation (7.9)].

7.3. Application of the Model to Turkey

The main question is the following one: Is Turkey, as an indebted country whose external debt burden still keeps its high level, said to be solvent and creditworthy according to the criterion developed in the earlier section? Here, we assume that, due to the country's persistent high level of external debt burden, the creditors (most of them if not all) believe that the threat of repudiation have been increasing, and thus the credit ceiling binds. Under this scenario, what we want to learn is that whether Turkey, at time t, transfers a fixed fraction of its resources (BRB,) to the creditors to be declared solvent or not.

In what follows, to be able to answer this question, we first calculate the resource base (RB_t) for the country. The crucial step to calculate RB_t is to estimate two long-run elasticities,¹⁴ namely, export demand elasticity and GDP supply elasticity with both respect to real exchange rates. The long-run character of the study and nonstationary nature of the series make it essential to apply rigorous cointegration analysis to test, estimate and model the variables and the regressions.

¹⁴According to the solvency model developed, the anticipated long-run path of the difference between the growth and the interest rates matters. That is why we use the long-run elasticities rather than the short-run ones.

We use RB_t to calculate the solvency index. RB_t is also used to calculate the debt/RB ratio to evaluate the creditworthiness of the country.

7.3.1. Calculation of the Resource Base (RB)

According to equation (7.11), we need two long-run elasticities and the export share in GDP to be able to calculate the weights of exports and GDP. Accordingly, we have two single long-run regressions to be estimated, namely, export demand equation and GDP supply equation, to be able to calculate the solvency index developed earlier.

In Chapter Six, using cointegration analysis, we estimated three separate long-run export demand equations, (6.11), (6.15) and (6.16), with the corresponding long-run elasticities (with respect to real exchange rates) -3.12, -3.49 and -2.73 respectively. It might be appropriate to use the arithmetic average of the three: [(-3.12)+(-3.49)+(-2.73)]/3 = -3.11.

The next step is to estimate the GDP supply equation for Turkey and get the long-run elasticity (with respect to real exchange rates). In testing, representing and estimating, we again use the appropriate long-run estimation method (i.e. cointegration method).

Specification

Our long-run GDP supply function is given by:¹⁵

$$YD = f[(PX/PW)]$$
 (7.18)
(+)

¹⁵According to the framework outlined earlier in this Chapter, we are primarily interested in the real GDP supply elasticity with respect to real exchange rates. That is why we focus on the real exchange rates only and exclude the other possible explanatory variables that can affect the real GDP supply as regards (7.18) and (7.19). It is also important to note that 'TIME' variable, which may also capture some effects of those omitted variables, appears to be significant in (7.19). High R^2 in (7.19) is an indicator of a 'genuine' long-run relationship among the variables involved.

where YD is the real GDP of Turkey; and (PX/PW) is the real exchange rate as defined in Chapter Six. The underlying mechanism works as follows: an appreciation results in a decrease in producer real wages. This will, in effect, result in an increase of employment and thus an increase in home output (GDP). Hence, the sign of the long-run relationship between home output supply and the real exchange rate variables is supposed to be positive.

Estimation

Most of the relevant test results regarding YD and (PX/PW) have already been provided in Chapter Six. Those results simply suggest that both variables are nonstationary and integrated of order one (see Table 6.4 in Chapter Six). Dickey-Fuller LR joint test for DSP versus TSP proves that "deterministic trend" (together with "stochastic trend") has some effects on both variables (especially, on the real exchange rate) (see Table 6.5). Thus, it might be better to include the "TIME" variable and see if it is statistically significant and improving the results. It is important to note that only if we include the time trend into the long-run output regression, we are able to reach economically sensible (both in magnitude and sign) long-run elasticity estimates.

Let us now estimate the long-run and short-run regressions and test for cointegration:¹⁶

¹⁶Due to data availability and obtainability, we had to use Turkish GNP series instead of a GDP one. For definitions and sources, see the Appendix. As regards cointegrating regressions (6.11) and (7.19), following the EYM presented in Chapter Five, we corrected the resulting long-run elasticity estimates and reached the valid t-statistics. Corrected EYM long-run elasticities for (PX/PW) and TIME in (7.19) are 0.72 and 0.07 respectively. The corresponding valid t-statistics in (7.19) are 2.72 and 12.0 respectively. The EYM procedure ensures that the bias in the long-run regression estimates of (7.19) is very small (and indeed can be ignored) and all the variables included are statistically significant at 5 percent significance level. We assume that the value of explanatory variable (PX/PW) is weakly exogenous. This is because it is believed that the value of explanatory variable is determined outside the system and thus, independent of the error term.

<u>1st Step of the EG Estimation Procedure (Long-run)</u>	
$YD_t = 1.16 + 0.06 TIME + 0.58 (PX/PW)_t + u_t$	(7.19)
(16.1) (24.8) (5.02)	
$R^{2}=0.99$ $\overline{R}^{2}=0.989$ CRDW=0.82 RSS=0.05	
F-st.(2,25)=1193.3 SE=0.05 ADF=-2.85	
2nd Step of the EG Estimation Procedure (Short-run) ¹⁷	
$\Delta YD_{t} = 0.03 + 0.41 \ \Delta YD_{t-1} + 0.06 \ \Delta (PX/PX)_{t-4} - 0.22 \ u_{t-1} + e_{t}$	(7.20)
(3.04) (2.16) (1.81) (-1.87)	
$R^2=0.28$ $\overline{R}^2=0.19$ DW=2.07 RSS=0.01 SE=0.03	
F-st.(3.23)=2.96 Durbin's h-statistic=-0.85	
LM-F(1,22)=0.18 LM-F(4,19)=0.61	
ARCH-F(1,22)=0.05 ARCH-F(4,19)=0.26	
ARCH-F(5,18)=0.46 PREDICT-F(6,18)=0.25	

HOME OUTPUT SUPPLY MODEL (1961-1988):

The above test results suggest that the underlying models are correctly specified. Let us now see whether the estimated residual from the long-run equation (7.19) is stationary (i.e. whether the underlying long-run relationship is "genuine" or "spurious"). The corresponding ADF residual-based test statistic is -2.85. However, a word of caution is essential concerning the use of this ADF test statistic. Although the corresponding critical values at 10% significance level (without intercept) and for m=2 (n=25) are reported by Charemza and Deadman (1992, Appendix, Table 2) as -2.94 (lower value) and -2.78 (upper value), the presence of deterministic component ("TIME") makes the whole process more difficult to assess. Note that the reported test statistic, -2.85, appears to be inconclusive (or marginally below the rejection level) at 10% significance level. The following possible explanations can be offered for this situation: a) small sample size can be effective on the residual based-tests due to the fact that there might me an alternative explanation for the common failure to reject the null of no

¹⁷The term Δ stands for the first difference. u_{t-1} is the corresponding error-correction term (i.e. the estimated residuals of the long-run regression lagged one year).

cointegration, and b) the nature of the standard hypothesis testing ensures that the null hypothesis of no cointegration is not rejected unless there is a strong evidence against it, or equivalently standard tests for unit roots may have low power against relevant alternatives.

Let us now provide more evidence: the plots of residuals (see Figure 7.1) and the relevant residual correlogram (see Figure 7.2) favour for the existence of cointegration between YD and (PX/PW). Moreover, the reported CRDW=0.82 of (7.19) compared to critical values look reasonably high enough. High R^2 value, R^2 =0.99, appears to confirm that the bias in the long-run regression is small. Finally, satisfactorily working ECM in the short-run equation (7.20) should be regarded as a further (and sufficient) evidence in favour for cointegration. As pointed out earlier, if the ECM works well in the Engle-Granger sense, then the relevant variables should be cointegrated, and vice versa. This is known as "Granger Representation Theorem" [see Engle and Granger (1987)]. The additional evidence suggest that the underlying long-run relationship is a "genuine" one.

Based on the theoretical framework developed earlier, let us now recall equation (7.11b) and calculate the RB for Turkey:

$$\rho = \frac{-(E_{eX})}{-(E_{eX}) + [(X/Y)(E_{eX})]}$$
(7.11b)

where E_{ex} and E_{ey} represent the elasticities of X and Y with respect to real exchange rate, e, respectively. X/Y is the export share in home output.

Let us now replace the relevant long-run elasticities to the equation:

$$\rho = \frac{-(0.58)}{-(0.58) + [(0.2)^{*}(-3.11)]} = \frac{-(0.58)}{-(0.58) + (-0.622)} = \frac{-(0.58)}{-(1.202)} \approx 0.48$$

Let us recall equation (7.9) and calculate the weights for Turkey:

(7.9)

 $RB = \rho X + (1-\rho)Y$ RB = 0.48X + (1-0.48)Y $\underline{RB} = 0.48X + 0.52Y$

According to our calculations, the corresponding weights for exports and output are found to be 0.48 and 0.52 respectively.¹⁸ In other words, the resource base (RB) of Turkey is the sum of 48% exports and 52% output at any time t.

¹⁸It is important to note that the value of the weights heavily depend upon the exports share (the exports include all goods and services) in output. On the other hand, by using this technique, Cohen, D. (1988a) finds the weights 0.90 and 0.10 for the exports and the GDP respectively for the Brazilian case. van Wijnbergen *et al.* (1992), on the other hand, finds the corresponding weights as 0.60 and 0.40 for the Turkish case.



Figure 7.1 Plot of Residuals of the Output Supply Cointegrating Regression



Order of lags

7.3.2. Hypotheses on the Calculation of the Solvency Index

To calculate our solvency index for Turkey, one needs to know the following components: the wealth, the external debt, and the interest and the growth rates, all expressed in real terms. For data sources and some calculations, see Table 7.1.

W=<u>The Wealth</u>: We take, as explained earlier, RB instead of exports or GDP only as a good measure of the country's resources. RB is the weighted average of the GDP and the exports of the country. Since it is insensitive to the real exchange rate by the definition, it is able to represent the country's resources much better than the exports and the GDP only. GDP, exports and by definition RB are all expressed in billions of US dollars at constant prices (1980 prices).¹⁹ Exports include all goods and services including workers' remittances from abroad.

<u>The External Debt</u>: The external debt, D_t , includes all short, medium and long term. It is a net debt concept: We subtracted from the gross external debt all foreign assets including interest earning reserves, country's monetary authorities holdings of special drawing rights (SDRs), it reserve position in the IMF, its holdings of foreign exchange, and its holdings of gold (valued at year-end London prices). This is the total outstanding net external debt of the country at the end of each period in billions of US dollars at constant prices (1980 prices).

<u>The Growth and the Interest Rates</u>: The growth rate that we choose is the growth rate of the resource base (RB) of the country (neither GDP nor exports). Then, let $n_t \equiv (RB_t/RB_{t-1})-1$ be the growth rate of the RB of the country. It important to note that the growth and the interest rates are both expressed <u>in real terms</u>. We need to make some hypotheses about <u>future</u> growth and interest rates.

¹⁹In order to reach the real amounts with 1980 prices (expressed in US dollars) for GDP, exports and external debt, we used the foreign price index (PW) (which was already derived for Turkey in Chapter Six; for the details, see Appendix.B) to deflate the nominal amounts. To be more specific, PW is the world price index facing Turkey in export markets (expressed in US dollar terms).

Table 7.1 Basic External Debt Ratios of Turkey, 1973-90 (billions of US dollars)

Debt (as%) (as	/EXP NetDebt/RB %) (as%)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	14 0.058 85 0.161 66 0.381 15 0.438 83 0.301 47 0.399 83 0.411 67 0.456 62 0.505 85 0.584 72 0.689 20 0.802 07 0.843 66 0.794 19 0.687

Comment to Table 7.1: All stock values [i.e. GDP, Exp (exports), net external debt and, by definition, RB (resource base)] are expressed in billions of US dollars at constant (1980) prices. Exports include goods and all services including workers' remittances. RB is the resource base as defined earlier: RB=0.52GDP+0.48Exp Sources: Central Bank of Turkey; SPO; World Bank, World Debt Tables, various issues; OECD Country Surveys: Turkey (various issues); and own calculations.

7.3.3. Calculation of the Index

We can now, putting all these hypotheses together, calculate the solvency index, β . Recall now equation (7.14):

$$D_{t} = \sum_{s=1}^{\infty} \frac{\beta R B_{t+s}}{\prod_{j=t+1}^{t+s} (1+r_{j})}$$
(7.14)

As described earlier, β is simply the fixed fraction of the country's resources (RB) that has to be allocated to the service of debt. For simplicity, we assume that the real growth (of RB) and the real interest rates are <u>constant</u> (r_i=r, and n_i=n):

$$D_{t} = \sum_{s=1}^{\infty} \frac{\beta RB_{t*s}}{(1+r)^{s}} = \sum_{s=1}^{\infty} \beta [\frac{(1+n)}{(1+r)}]^{s} RB_{t} = \beta RB_{t} [\frac{(1+n)/(1+r)}{1 - [(1+n)/(1+r)]}]$$

 $D_t = \frac{\beta RB_{t+1}}{(r-n)}$ then, the following holds

$$\beta = (r-n) \frac{D_t}{RB_{t+1}}$$
(7.21)

Equation (7.21) is the practical definition of β that we will use. The index β , here, is simply proportional to the debt/RB ratio and to the difference between growth and real interest rates. In this case, transferring β RB to the creditors as a debt service is required to stabilize the debt/RB ratio. Then, the following are also true:

$$D_{t+1} = (1+r)D_t - \beta RB_{t+1}$$

(7.22)

i.e.,

$$D_{t+1} = (1+t)D_t - (t-t)D_t$$

$$D_{t+1} = (1+t)D_t$$
(7.23)

The external debt has the same growth rate as RB, so that the debt/RB ratio is stabilized. As we know already, from the definition of β , that such a strategy amounts to transferring the face value of the external debt to the creditors.

7.3.4. Application of the Index to Turkey and Some Simulation Results

It is our intention to calculate the value of solvency index, β , for the early and late 1980s. Let us note again that all variables in equation (7.21) are expressed in real terms.

Let us, first, take 1989 as time t. Accordingly, to compute β for 1989, one needs to know the external debt at the end of 1989, and the resource base of the country at the end of 1990. One also needs to make hypotheses on the "future" growth of the RB and the real interest rates. What we want to learn is, in the first place, whether Turkey is declared solvent or not at time t (1989). Then, we make three different hypotheses about the difference between "future" growth and interest rates: pessimistic, moderate, and optimistic. These different scenarios are quite important due to Turkey's vulnerable position to external shocks. Thus, this will enable us to evaluate the country's solvency under different future conditions.

The average real interest rate on the country's external debt has been 7%.²⁰ On the other hand, the average growth rate of the resource base (RB) of the country

²⁰This is based on the data published by Central Bank of Turkey. See also World Bank (1990).

has been around 5-6% during the last decade. Bearing these average values in mind, we present three scenarios²¹ under which the difference between <u>future</u> growth and interest rates is assumed constant (due to the reasons explained, we dismiss the possibility that n>r in the long-run):

SCENARIO 1. Pessimistic View: (r-n) = 5.5%SCENARIO 2. Moderate View: (r-n) = 2.5%SCENARIO 3. Optimistic View : (r-n) = 1.0%

Let us, now, calculate the Turkish RB for 1990:

The exports (1990): 22.47 billions of US dollars, and The GDP (1990): 96.64 billions of US dollars.

Based on the weights obtained earlier,

RB(1990) = (0.48 * 22.47) + (0.52 * 96.64)

RB(1990) = 10.79 + 50.25

RB(1990) = 61.04 billions of US dollars.

Provided that D(1989) = 34.62 billions of US dollars, and RB(1990) = 61.04 billions of US dollars, then, according to the practical solvency index given by equation (7.21), we have the following results for Turkey:

 $\label{eq:scenario_scenario_scenario} \begin{array}{l} \underline{SCENARIO\ 1} \\ \beta_p = 5.5\% \ * \ (34.62\ /\ 61.04) = 5.5\% \ * \ 0.57 = 3.14\% \\ \\ \underline{SCENARIO\ 2} \\ \beta_m = 2.5\% \ * \ 0.57 = 1.43\% \end{array}$

²¹The projections of World Bank and OECD were also taken into account before setting the scenarios. See World Development Reports; World Debt Tables; and OECD Country Survey: Turkey (various issues).

 $\frac{\text{SCENARIO 3}}{\beta_{o}=1.0\% * 0.57} = 0.57\%$

These are the fixed fractions of the RB(1990) of the country which have to be allocated to the foreign debt service to be declared solvent under different scenarios, namely, pessimistic, moderate, and optimistic. Now what we have to do is to compare these fixed fractions of the RB(1990) with the actual total debt service that Turkey realized in 1989. Let us now calculate the required fixed fractions of the country's resources to be allocated to the foreign debt service in order to be declared solvent for each of the scenarios:

<u>SCENARIO 1</u>: 3.14% * 61.04 = 1.92 billions of US dollars; <u>SCENARIO 2</u>: 1.43% * 61.04 = 0.87 billions of US dollars; <u>SCENARIO 3</u>: 0.57% * 61.04 = 0.35 billions of US dollars.

Let us compare each of these values with the actual total debt service that Turkey realized in 1989: the country's total debt service (interest + principal) was amounted to <u>6.97 billions of US dollars</u>. Call β_a the actual (realized) fixed fraction of the RB(1990) and compare this with β_p , β_m , and β_o , one by one. A simple calculation (6.97/61.04 = 0.114) suggests that Turkey, as a debtor country, serviced 11.4% of its resource base (RB) to its creditors in 1989-1990 period. As a result, what ever the scenario is, Turkey is declared solvent:²²

 $\beta_a > \beta_p > \beta_m > \beta_o \ : \ 11.4\% > 3.14\% > 1.43\% > 0.57\%$

²²The results would still stay valid, even if we based our calculations on the interest payments only, rather than the total debt service (i.e. interest + principal). In 1989, the country's interest payments on its external debt was amounted to, about, 3 billions US dollar in real terms. Approximately, this is equivalent to 5% of the relevant RB. Since the required transfer is calculated to be (pessimistic scenario) 1.92 billions US dollars (or 3.14% of the RB), the country should still be declared solvent as far as the interest payments (only) are concerned.

These results rigorously suggest that Turkey passes the solvency test developed and is declared solvent for the period 1989-1990.

As known, the debt crisis of the 1980s was first experienced in 1982 with the declaration of Mexico. Afterwards, the crisis became a worldwide phenomenon. Contrary to many indebted countries, Turkey experienced a severe external debt problem in 1978. Let us now see if Turkey passes our solvency test for the year 1982 in which most debtor countries were facing substantial repayment problems. For the year 1982, we repeat the same procedure that has already been done for the year 1989.²³ According to our calculations, Turkey, for the year 1982, should transfer 2.92% (pessimistic view, i.e. r-n=5.5%); or 1.33% (moderate view, i.e. r-n=2.5%); or 0.53% (optimistic view, i.e. r-n=1.0%) of its resource base, RB in order to pass the solvency test. Since Turkey, in 1982, transferred 9.3% of its RB to its lenders, it is also declared solvent for the year 1982:

 $\beta_a > \beta_p > \beta b_m > \beta_o : 9.3\% > 2.92\% > 1.33\% > 0.53\%$

7.3.5. Evaluating Turkey's Creditworthiness

As already discussed in detail, creditworthiness requires that an indebted country is not only able to pay (i.e. solvent) but also willing to pay. Then, the question is that whether Turkey, in the international credit market, is said to be creditworthy or not.

<u>REMINDER</u>: If a country is observed to prefer giving up a fixed fraction of its resources (βRB_t), at time t, rather than defaulting, one may have an indication that, *ceteris paribus*, it is a choice that it will be willing to make it later on.

Turkey is already proved to be solvent for the years 1982 and 1989. Even

²³For the year 1982, we report the main results only.

the pessimistic scenarios confirm the country's solvency decisively. If the country repays this fraction in 1989 then, <u>by implication</u>, we assume that it will be willing to make it in the future. Furthermore, the country has yet to give up servicing its debt for more than ten years (from 1980 to present). This is a simple but forceful method first suggested by Cohen, D. (1987, 1988a).

Here, the same methodology can be applied. As mentioned earlier, no one knows the cost of default accurately. Again, following D. Cohen: If an indebted country has yet to default at the current value of its debt/RB ratio, that value is, <u>by</u> <u>implication</u>, not yet too high. Otherwise, it would have defaulted already. Creditworthiness, then, can be maintained by preventing the debt/RB ratio from increasing further. Now let us assess Turkey's creditworthiness.

According to the framework developed, the relevant debt/RB ratio of 1989 (i.e. 0.687) is not yet too high (see Table 7.1). However, the evidence provided by Table 7.1 suggests that the debt/RB ratio came from 0.438 in 1978 to 0.687 in 1989 and 0.605 in 1990. Even though these debt/RB ratios are not yet too high, an evaluation of Table 7.1 suggests some evidence that it has increased during the 1980s until 1988. The debt/RB ratios seem to have improved since then. Due to overall consideration, however, the country is said not to have been able to manage the debt/RB ratio to prevent from increasing further. On the other hand, our findings imply that present level of the debt/RB ratio is still not yet too high. However, there is little doubt that it is high enough to suggest that the country is still under heavy external debt burden. These findings about Turkey appear to confirm the results provided by van Wijnbergen *et al.* (1992) and Anand *et al.* (1990).

Secondary market prices of Turkey's external debt also confirm the country has been enjoying high creditworthiness during the 1980s. Turkey, as a lower middle income debtor country, has not had any serious problem to access the

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international credit loan market since its external debt has been rescheduled between 1978-80, although the existence of its high external debt burden and some future uncertainty on its economy. In this context, the Turkish case hardly confirms the hypothesis that the secondary market prices generally respond to economic fundamentals as well as creditor specific factors.²⁴ One can easily judge that Turkey's high creditworthiness (with very small discounts only) at the secondary market is mainly due to its uninterrupted debt service since 1980. If other country specific factors such as budgetary position, adjustment to external shocks, expectations of the future prospects of the economy, had been taken into account by the secondary market, then the secondary market prices of the country's external debt could have shown a worse creditworthiness level than it does at present.

The other important matter is that trading in the secondary market has been concentrated (80%) in a small number of countries, namely, Argentina, Brazil, Mexico and Venezuela, only. Remaining 20% is mostly shared by Chile, Philippines, Poland, and Yugoslavia [for details, see World Bank (1991)]. For other countries, as World Bank (1991, p.24) notes: "...market activities tend to sporadic, and continuous and reliable price quotes are not readily available: these indicative prices for thinly traded loans also tend to vary widely across reporting institutions...". Thus, when evaluating the figures that the secondary market shows for Turkey, one has to bear all these facts in mind as well.

7.4. Discussion

The model developed seems to get a fair balance among some important

²⁴We found contrasting evidence in the literature regarding which developments and factors affect the secondary market prices. Some stress about economic fundamentals and some about country specific factors [see, e.g., World Bank (1991)], while some others note that continuity of the debt service matters rather than other factors [see, e.g., van Wijnbergen *et al.* (1992)].

issues discussed in the relevant literature. First, a reliable proxy for country's resources for repayment is provided, and called "resource base (RB)". This is given by the weighted average of the country's real exports and GDP. Our empirical results suggest that it is the sum of 48 percent of real exports and 52 percent of real GDP for Turkey.

Second, according to the model presented, a debtor country is said to be satisfying its intertemporal external solvency condition so long as it allocates a fixed fraction, β , of its RB (i.e. β RB) sufficient to service the external debt. At an empirical level, Turkey successfully and overwhelmingly passes our solvency test both in the early and late 1980s. At this stage, the following problem emerges. According to our solvency index applied to Turkey, the required amounts to be declared solvent were 1.92 and 0.87 billions of US dollars for pessimistic and moderate case scenarios respectively in the period 1989-90. However, Turkey's total debt service was even substantially higher than the required amount to stay solvent. This result naturally highlights the potential danger mentioned in the relevant literature [see, e.g., Cohen, D. (1987), Edwards (1989) and World Bank (1987)]; that is, any amount beyond a "critical level" (in our model, β RB) of country's resources could seriously damage both the economy and the structural adjustment programs.

CHAPTER EIGHT

CONCLUSION

8.1. Summary, Concluding Remarks and Implications

The following concluding remarks and implications are drawn on the basis of this study.

a) There is little evidence to suggest that the external debt problem of LDCs is over. The Brady plan was slow to get going, and it is now too early to evaluate the full consequences of the Brady deals. However, recent evidence reveal results in favour of the deal especially in terms of achieving market access and reducing future uncertainty. Despite the successful early results of the Brady plan, the problems of the debt overhang (esp. on the poorest countries) has yet to be solved. The present situation urgently requires some effective solutions to overcome the fundamental problems of the sovereign debt, such as the "enforcement" and "free-rider" problems. A new international (possibly independent) organisation to deal with the bargaining and debt relief procedures between creditors and debtor countries has yet to be established. Accordingly, an international organisation, in line with the suggestions of Cohen, B. (1989a, 1989b) and Kenen (1990), can also be useful in allocating the risks efficiently in international debt market in an uncertain world) requires that lenders and borrowers share all risks arising a) from

fluctuations in the US \$ parity, and b) from fluctuations in international interest rates since both are universally observable and are hardly affected by the actions of any particular debtor country or creditor in the market. Unfavourable economic environment of the 1990s makes the problem even less easier to deal with. Overall, future prospects of recovery of the LDC debt seem uncertain.

We support the view that the LDC external debt problem must be analyzed in terms of strategic behaviour and country specific factors rather than mechanical concepts of solvency, liquidity, and willingness-to-pay. To a certain extent, each of these theoretical views has logical validity. While they share some qualitative implications, as a rule they point to very different policy strategies for debtors, creditors, and the relevant international institutions. From the global point of view, however, we acknowledge the fact that we have something closer to insolvency rather than pure illiquidity. The Brady Initiative, in principle, confirmed this point by recognizing the need for debt reduction together with rescheduling measures. It is also a fact that the international debt is "sovereign debt". The costs of default are not infinite; that is, there will surely be some level of foreign debt at which a sovereign debtor will default rather than repay. However, relaying on the willingness-to-pay view only, some researchers and most creditors tend to underrate the important role played by the debtor's true inability-to-pay. In the event of default, for instance, creditors, just by observing from outside, will find it very difficult to decide whether it is due to unwillingness or true inability of the debtor. In this context, one cannot dismiss the possibility of default owing to debtor's true inability-to-pay. Thus, creditors' prospective behaviours are driven by their own perception (i.e. subjective opinion) about a debtor's situation. Similarly, the lack of clear solvency criteria makes it rather difficult, if not impossible, to distinguish between solvency and illiquidity although, in theory, they differ fundamentally.

Accordingly, it is important to note that different explanations of LDC debt problems are not necessarily alternatives or substitutes. That is, a country might be illiquid but solvent; illiquid and insolvent; liquid but insolvent; liquid, solvent but unwilling-to-pay; willing-to-pay but illiquid and insolvent and etc. Given the confusing and complicated international debt game between creditors and debtor countries, one can appreciate how difficult (if not impossible) for creditors and third parties (such as IMF and World Bank) to put clear borderlines and to define the situation objectively.

Country specific factors appear to be the main determinant on which countries escaped from the crisis and which could not. For example, it is likely that some Latin American countries and many low income African debtors are having a situation closer to insolvency rather than pure illiquidity. However, Korea, for instance, have followed a very different path. That is, each country has its own characteristic and structure as far as the external debt problem is concerned. As a whole, a strategy dealing with the LDC debt problem should take into account not only some global factors but also those country specific factors.

b) As examined by our review in Chapter Four, a turning point in Turkish economy came in January, 1980. An inward-looking economic strategy of the 1960s and the 1970s was replaced by an outward-looking economic strategy based on export promotion (ELG). There is little doubt that the Turkish economy has achieved an impressive transformation from an inward-looking economy to an outward-oriented one. In fact, Turkey is one of the few countries that managed to maintain high GNP growth rates in real terms, after rescheduling their debts in the 1980s. The reforms of the 1980s are to be judged already to have been reasonably successful. As regards trade liberalisation, the 1980s reforms have been sufficient to merit the status of "sustained liberalisation". Yet, inflation remains high and the growing public sector budget deficits reveal a real warning for the economy. To sum up, the Turkish reforms of the 1980s have already produced a remarkable payoff, although a number of structural economic difficulties remain. A more accurate evaluation would, no doubt, require specification of what would have happened in the absence of the 1980 reform program. However, Krueger (1992, p.144) argues that if successive Turkish governments had attempted to continue the policies of the late 1970s, there is some reason to believe that real output would have continued to fall, and inflation would have accelerated further.

Some researchers suggest that, *ceteris paribus*, having high level of openness coupled with export-oriented economy is considered more creditworthy than an economy that turns away from international trade [see, e.g., McFadden *et al.* (1985)]. Based on our descriptive examination of the Turkish economy in both Chapter Four and Chapter Six, we believe that successful switch and commitment of the Turkish economy from ISI to ELG strategies with more open economy paid its price as one of the significant reasons behind the high creditworthiness levels that the country has enjoyed during the 1980s. Nevertheless, the relationship between trade and external debt strategies still remains a controversial issue in the relevant literature [see, e.g., Borensztein and Ghosh (1989), Diwan (1990), Laird and Nogues (1989)].

c) Turkey experienced a debt crisis in 1978 unlike those Latin American countries facing the crisis in 1982, and rescheduled a large amount of its external debt between 1978 and 1980. In fact, the debt crisis of Turkey was the first major crisis to surface. By the time the external debt of the LDCs became a widely known issue in 1982, Turkey had already re-entered the international credit markets and been acknowledged as an example for other debtor countries. However, like the Turkish economy itself, its external debt position suggests a series of puzzles as

well. Although the country is one of the few countries that have managed to maintain high GDP growth and uninterrupted debt service after rescheduling the debt, a worse picture would emerge if external debt and fiscal indicators of the late 1980s are examined more closely. The inconsistency of the underlying fiscal policy with the exchange rate policy and other fields of liberalisation program became increasingly obvious after 1986 when Turkey started to transfer net income abroad. Accordingly, foreign borrowing and outstanding foreign debt of Turkey have increased remarkably in the second half of the decade in parallel with increasing external finance needs. Foreign exchange and gold reserves, however, reached an all-time high in the late 1980s. Overall, Turkey is still one of the few highly indebted countries which recovered from the debt crisis of the 1980s. However, increasing external debt burden indicators (esp. in the second half of the 1980s) raise some doubts. The country's high level of vulnerability to external shocks such as unexpected negative events in world oil prices, world interest rates, and world trade are the additional evidence in the same direction.

It is also true that the external transfer problem and the budgetary problem are linked with each other. The substitution of domestic debt for foreign debt would worsen the budgetary position of the government provided that the domestic real interest exceeds the foreign real interest rate corrected for real exchange rate depreciation [Buiter (1990a)]. Since the external debt is, in most cases, government debt, if the budgetary problem cannot be solved properly, domestic debt will simply replace external debt and this process, if pushed too far and too fast, may seriously damage the economy. As D. Cohen (1991) concludes, in 1985, Brazil reached the point where repaying more external debt became potentially extremely damaging to its domestic economy and became counterproductive. Similarly, our descriptive and empirical examination suggests some indirect evidence that Turkey have, in recent years, pursued such a strategy [for the same point, see, e.g., Anand and van Wijnbergen (1988, 1989), Aricanli and Rodrik (1990b), Buiter (1990a)].

As far as Turkey, as an indebted country, is concerned, our empirical study, for both the early and the late 1980s, ensures its external solvency and creditworthiness in the intertemporal sense. That is, Turkey services more than a fixed fraction of its resources to the creditors. For instance, the country's debt service was about 6.9 billion US dollars although, according to our calculations with the pessimistic scenario, requires a transfer of about 1.9 billion US dollars to be declared solvent. That is, Turkey repays even substantially more than is required to stay solvent. Since the country's solvency is ensured, the resulting implication is that the ability of raising voluntary external borrowing should not be under threat.

This picture, however, highlights a potential danger mentioned earlier. As stressed in the relevant literature, any amount beyond a "critical level" (in our model "a fixed fraction of the resource base"; this is proved to be about 1.9 billion US dollars with the worst case scenario for Turkey) could seriously damage the economy and the structural adjustment programs. Less stable macroeconomic balances in the late 1980s may be partly due to this trade-off. As a result, due to possible substitution of domestic debt for external debt, the government's solvency (i.e. the fiscal dimension) may be questionable even if the country's solvency is ensured. It may be the case that the Turkish government is insolvent because of its inability to tax the resources needed, although the country itself is solvent. The amount of debt service is proved to be high enough to ensure Turkey's solvency although it may be too high <u>not</u> to jeopardize the budgetary balances and the structural adjustment programs of the Turkish government. This situation can have two possible policy implications for Turkey: i) the external debt service should be reduced to a level which would not jeopardize the domestic economy. We also

presented some descriptive evidence that the burden of external debt to the Turkish economy goes beyond the direct burden (i.e. a possible debt overhang). However, the presence of a little discount on Turkey's external debt at the secondary market makes it rather unlikely to realize the options of a "debt reduction" strategy since this would possibly affect market confidence and thus, the ability to raise voluntary borrowing. ii) The domestic taxes should be increased, which may not always be politically possible, and/or a more efficient tax collecting system should be introduced.

d) The solvency model presented has some advantages compared to those static external debt measures such as debt/GDP and debt/exports. First, it reaches a fair balance between narrow and broad sense solvency measures since we have RB as the proxy of country's resources rather than GDP or exports alone. Our "resource base (RB)" as a proxy for an indebted country's resources would avoid any possibility of moral hazard problem that creditors could face. That is, if creditors base their lending on the GDP measure, they would encourage the debtor country to change its relative price structure in such a way as to increase artificially the value of its GDP (by overvaluing its currency). In contrast, if lenders base their calculations on the export measure, however, would not create such a distortion. As a policy implication, it would be wise for creditors to base their calculations on RB instead of some type of GDP and debt/exports.

Second, the solvency index is simply dynamic unlike other static measures. It takes future (long-run) expectations of output growth and real interest rates into account. In this regard, a debtor with a large debt and fast growth might be more solvent than a country with a smaller debt and more gloomy growth prospects.

Third, the solvency index developed is a good, reliable and practical solution for the lack of clear solvency criteria in the relevant literature.

Fourth, given the complexity and uncertainty of the direct and indirect costs of default decision [see esp. Kaletsky (1985)], there is little doubt that calculating the direct and indirect costs of default accurately is extremely difficult if not impossible. Thus, our solvency model choose the following reasonable way to deal with this problem: if a debtor country has not defaulted at the current external debt burden, that burden is, <u>by implication</u>, not yet too high (otherwise, it would have defaulted already). Accordingly, relevant debt/RB indicators for Turkey suggest that the country still suffers from a high external debt burden. <u>By implication</u>, however, the current external debt is not yet too high (otherwise, the country would have defaulted already). Accordingly, a feasible external debt strategy that keeps Turkey's creditworthiness, at least, at present levels consists of a time path for external borrowing that will not lead to a rise in debt/RB ratio. Similarly, if the country is solvent at time t, it implies that, <u>by implication</u>, it will be willing to service its debt later on as well. Accordingly, the model maintains a good balance between the ability-to-pay and willingness-to-pay models.

e) All interested parties (i.e. debtors, creditors, relevant international institutions and policy-makers) can benefit from the presented solvency index. It is the index that an indebted country must calculate before deciding whether to default or fulfil its external debt. In a similar way, it is on the basis of optimum amount β RB that creditors will decide on the maximum level of credit they are prepared to extend. That is, the amount and the limits of credit rationing will be determined accordingly. Besides, policy-makers and international institutions can take the fraction β RB as a benchmark for their policy analysis for both debtors and creditors.

f) It is well-known that the effectiveness of foreign trade policy depends, among others, on the significance and the size of the income and price elasticities of exports and imports. Besides this traditional role in examination of international linkages and trade policies, any knowledge or assumption of these elasticities is vital to designing policy responses to deal with the existing debt problems of LDCs. Knowledge of these elasticities is important both for debtor and creditor countries. From debtors' point of view, both structural adjustment and stabilisation policies, and debt rescheduling agreements depend very much on foreign trade projections which are clearly based on the choice of income and price elasticities. Additionally, the question whether a debtor country is solvent or not depends, among others, upon its price competitiveness level and the sensitivity of its exports to growth in the world export markets. From the point of policymaking in creditor countries, the so called "feedback effects" are of crucial importance. For instance, restrictive and protective economic policy in the industrial world, which reduces imports from debtor countries, is quite likely to feed back to creditor countries as a decline in exports and as further problems in financial markets.

According to the econometric evidence provided, export markets seem highly price competitive. The exports are also driven by the income level at the export market, changing composition of the exports from primary to manufactured products, and the exchange rate liberalisation. The sum of the long-run price elasticities of demand for exports and imports for Turkey [i.e. ((-3.12)+(-0.41)) = -3.53] exceeds one (in absolute terms) easily. Thus, if the Marshall-Lerner condition is regarded as the separating line between "elasticity optimism" and "elasticity pessimism", one is supposed to regard the elasticities reported as firm evidence in favour of the camp of elasticity optimism. This suggests that the exchange rate policy matters for Turkey. Overall, our elasticity estimates for Turkey suggest that ELG strategies are

preferable compared to the alternative of ISI strategies.

As regards the recent debate on conventional wisdom versus Riedel's alternative paradigm on the size and the significance of the income and price elasticities for export demand, we provide some econometric evidence suggesting that both income and price effects have been the driving forces behind the success story of Turkish exports. Once non-price and supply effects are captured by a simple commodity composition index, XCC, the story changes; statistically insignificant world income, significant non-price and supply effects, and significant and highly elastic prices for the Turkish export demand. Overall, our results appear to justify Riedel (1991) in referring to Turkey's successful export drive to support his view. We, however, feel that, to reach more definitive conclusion, further studies, which incorporate some other non-price effects, such as quality, reliability and marketing strategy, into the export demand equation are needed.

Thus, results regarding our exports commodity composition index, XCC, suggest that the shift from primary export products to manufactured ones (i.e. product innovation process) is a significant determinant of the Turkish export performance. When evaluated in the Krugman's sense, our XCC implies significant supply effects in assessing the success story of Turkish export performance. This, we believe, is a strong evidence in favour of the export promotion policies that have been implemented for some time in Turkey.

As far as the external debt and the ability to service the debt are concerned, these elasticities of price and income have different implications. Although depreciation of the real exchange rate (i.e. a devaluation) increases the competitiveness of the external sector of the economy, this would lead to an increase at the real domestic resource cost of servicing foreign debt (at any given world real interest rate). Accordingly, debtor countries face a dilemma that they must achieve an improved level of competitiveness in order to gain some level of foreign exchange required to service their debt, while the very process of improving their competitiveness increases the burden of debt in domestic currency. Our regression results indirectly suggest that Turkey may be suffering from this dilemma.

Our empirical results suggest that the Turkish import demand is constrained by its own external indebtness. Significant debt service ratio with negative sign in the Turkish import demand regression might have, among others, following possible implications: i) the more Turkey services its external debt to creditors, the less import demand it will have, ii) the less import demand Turkey has, the less exports earnings OECD countries will get from Turkey, and iii) a decrease in the import demand of intermediate goods and/or raw materials can constraint the national production level (i.e. confirmative indirect evidence in the direction of possible "Turkish debt overhang" due to substantial debt service transfers to foreign creditors).

g) Our review in Chapter Five illustrates that nonstationary time series data can cause spurious regression results. Our Dickey-Fuller test results (both in Chapter Five and Chapter Six) suggest that most macroeconomic Turkish data are indeed nonstationary. This result has the following strong implication as far as the time series applications which use Turkish macroeconomic data are concerned: If the series contain a unit root, a regression of one series on another would produce spurious results. In addition, any forecasting using this macroeconomic time series data will be biased. In other words, our unit root test results for the Turkish macroeconomic data imply that all previous regression results and their implications using trended time series for Turkey should be questioned seriously. As an effective remedy, "cointegration analysis" can be employed. By using this modelling

technique, researcher can avoid potential spurious results. It is illustrated that any long-run regression result (either test statistics or coefficient estimates) obtained by using trended macroeconomic time series data can be reliable only if an appropriate technique, such as "cointegration analysis", is applied. Accordingly, our long-run elasticity estimates of price and income in Chapters Six and Seven avoid potential spurious results unlike many earlier studies.

8.2. Shortcomings and Areas of Further Research

Our solvency model and its application to Turkey do not take the budgetary problem into consideration. That is, we are interested in solvency of the nation. However, as described, it may be that the government is not solvent while the nation is. Descriptive examination of the Turkish economy in the late 1980s and some indirect evidence of our solvency application suggest that this might be the case for Turkey. Unfortunately, the relevant recent empirical literature does not provide robust evidence. Furthermore, as far as Turkey is concerned, recent time series methods such as "cointegration" have yet to be used in this area. Thus, a further research can examine the intertemporal solvency of the Turkish government by using rigorous time series techniques.

As described in Chapter Five in detail, the appeal of "cointegration" for economists is that it provides a formal framework for testing long-run relationships (to see if there is a "genuine" and stable long-run relationship) from actual time series data. Accordingly, "cointegration" is a necessary condition for the economy to be obeying its intertemporal budget constraint. Thus, related recent literature use the "cointegration analysis" to test whether government spending and revenue (when government's budget constraint is in consideration), and/or country's exports and imports (when nation's budget constraint is in consideration) are cointegrated [see, among others, Hakkio and Rush (1986, 1991), Hamilton and Flavin (1986), Husted (1992), Tanner and Liu (1994), Trehan and Walsh (1988, 1991), Wickens and Uctum (1993)]. In other words, the literature attempts to examine whether current account (for the nation) and/or fiscal (for the government) deficits are sustainable in the long-run or not; that is, whether the nation's and/or the government's behaviours are consistent with their intertemporal budget constraints or not. Further research in this area can contribute to the ongoing academic discussion on whether the fiscal and/or current account deficits of Turkey are sustainable in the long-run.

Although we present some descriptive and indirect empirical evidence in favour of "debt overhang" argument for Turkey, a rigorous study on the Turkish debt overhang has yet to be published [with the exception of Bauernfreund (1989)]. A further study in the area can follow one of the following lines: first, the Turkish Debt Laffer Curve can be estimated in line with Claessens (1990) to see if Turkey is on the right side of the curve or not. Second, Granger causality between the Turkish GNP growth and foreign indebtness [see, e.g., Afxentiou (1993)] or alternatively investment and foreign indebtness [see, e.g., Cohen, D. (1993)] can be examined to see if a valid argument can be made for a writedown of some Turkish external debt. As an appropriate proxy for foreign indebtness we can use our debt/RB ratio among some others such as debt service and interest service ratios.

Our foreign trade sector model can be more informative if inserted in a large macroeconometric model for Turkey [see, e.g., Ghatak and Levine (1994)]. A further study in this direction would also enable us to see the mutual relationship between the external and internal dimensions of the economy.

APPENDIX

APPENDIX.A

<u>Data Sources</u>

The Turkish macroeconomic data used in this study are annual for the period 1960-1991 and are taken from the following sources: (a) IMF, International Financial Statistics, Yearbook, various issues.

(b) OECD, National Accounts, Main Aggregates, 1960-1991, Vol.1, 1993.

Definitions of the Variables

MONEY: TL in circulation (M1+M2) in logarithms. Source (a).

GNPDEF: GNP deflator index in logarithms (1985=100). Source (a).

PRC: Consumer price index in logarithms (1985=100). Source (a).

XN: Nominal exports of goods and services in logarithms. Billion US\$. At current prices and current exchange rates. Source (b).

 $X\mathbb{R}$: Real exports of goods and services in logarithms. Billion US\$. At the price levels and exchange rates of 1985. Source (b).

GDPPER: Real GDP per head in logarithms. US\$. At the price level and exchange rates of 1985. Source (b).

GDPN: Nominal GDP in logarithms. Billion US\$. At current prices and current exchange rates. Source (b).

GDPR: Real GDP in logarithms. Billion US\$. At the price levels and exchange rates of 1985. Source (b).

CONN: Nominal aggregate (private+government) consumption expenditure in logarithms. Billion US\$. At current prices and current exchange rates. Source (b). CONR: Real aggregate (private+government) consumption expenditure in logarithms. Billion US\$. At the price levels and exchange rates of 1985. Source (b).

APPENDIX.B

Data Sources

The data used in this study are annual for the period of 1961-1988 and are taken from the following sources:

(a) International Monetary Fund (IMF), International Financial Statistics, Yearbook, various issues.

(b) United Nations (UN), International Trade Statistics, Yearbook, Vol.I, Trade By Country, various issues.

(c) Organisation for Economic Cooperation and Development (OECD), National Accounts, Main Aggregates, Vol.1-2, 1992.

(d) Organisation for Economic Cooperation and Development (OECD),

Statistics of Foreign Trade, Series B, Annual: tables by reporting countries, various issues.

(e) Organisation for Economic Cooperation and Development (OECD),

Economic Survey: Turkey, various issues.

(f) State Planning Organisation (SPO), Ankara, Turkey.

(g) State Institute of Statistics (SIS), Ankara, Turkey.

(h) Cowitt, P.P., World Currency Yearbook (previously known as Pick's Currency

Yearbook), various issues, International Currency Analysis, Brooklyn.

(i) World Bank, World Debt Tables, various issues.

(k) World Bank, World Tables, various issues.

Definitions of the Variables

 \mathbb{XV} : Exports of goods, volume index (1980=100) constructed on the basis of the following formula:

 $XV_t = X\$_t / PX_t$

where X\$ and PX represent exports in US dollars and export price index in US dollar terms respectively. Source (g) and (f).

(PX/PW): Relative export prices; that is, the ratio of export prices of Turkey to world prices, both expressed in US dollar terms. It can also be referred to as "export price competitiveness" or "real exchange rate" of the country [for same sort of real exchange rate definition, see e.g. Shone (1989)].

PX: The US dollar-based export price index (1980=100). Source (f).

PW: The US dollar-based, trade-weighted "world" export price index

(1980=100), which is defined as the weighted import price index of Turkey's two main export markets, i.e., "Industrial Countries Market (OECD countries mostly)" and "Middle East Countries Market". By analogy with Houthakker and Magee (1969), and Goldstein and Khan (1978), the "world" export price index (1980=100) series facing Turkey (referred to as country j) was calculated in the following way [Source (a), (e), (g)]:

$$PW_{i} = \sum a_{i}PMX_{i}$$

i=1,2. At this stage, we assume that Turkey has two major export markets, namely, "OECD Market" and "Middle East Market"). By implication, the following holds $\sum_{i} a_{ii} = 1$

where a_{ji} is the weight of market i in exporter j's (i.e. Turkey) exports to two main export markets. The weights are rescaled, so that they add up to 1, and calculated for each year separately.

PMX_i is the US dollar-based import price index in export market i (1980=100).

YW: The trade-weighted "world" real income (GDP) expressed as an index (1980=100) facing country j, i.e. Turkey, constructed on the basis of the following formula [Source (a)]:

$$YW_j = \sum a_{ji}Y_i$$

i = 1,2.

 $\sum_{i=1}^{n} a_{ii} = 1$ (same as defined earlier)

where Y_i represents the real income expressed as an index (1980=100) in export market i.

MW: The trade-weighted "world" real imports expressed as an index (1980=100) facing country j, i.e. Turkey, constructed on the basis of the following formula [Source (a)]:

$$MW_j = \sum a_{ji}M_i$$

i = 1,2. $\sum a_{ii}$ = 1 (same as defined earlier)

where M_i represents the real imports expressed as an index (1980=100) of export market i.

MV: Imports of goods, volume index (1980=100) constructed on the basis of the following formula:

 $MV_t = M_t/PM_t$

where M\$ and PM represent imports in US dollars and import price index in US dollar terms respectively. Source (g) and (f).

 $(\mathbb{PM}/\mathbb{PD})$: Relative import prices; that is, the ratio of import prices facing Turkey to domestic prices (wholesale price index), both expressed in US dollar terms. It can also be referred to as "import price competitiveness".

PM: The US dollar-based import price index (1980=100). Source (f).

PD: The US dollar-based wholesale price index (1980=100). Source (g).

YD: GDP volume index (1980=100). Source (c).

 \mathbb{ERDI} : Exchange rate distortion index constructed on the basis of the following formula:

 $ERDI_t = (BM_t - OEF_t)/BM_t$

where BM and OEF represent black market rates and official effective exchange rates both expressed in Turkish Lira per US dollar. Source (h).

 \mathbb{RES} : The ratio of non-gold international reserves in US dollar to import price index in US dollar terms. Source (a) and (f).

INFLOW: It represents foreign exchange inflows to Turkey. Annual earnings of total exports and services in US dollars is taken as proxy. Source (c).

DEBT: It is the ratio of total debt service (interest+principal) on long-run external debt to exports of goods and services including workers' remittences expressed in US dollar. Source (i) and (k).

XCC: As far as the export demand equation is concerned, the large scale and price elasticities may represent hidden structural breaks, due to substantial change in commodity composition towards high-technology products, product innovation and/or process innovation. In order to see the effects of these on export volume, we developed an index, XCC, which captures the increasing exports of manufactures of LDCs, especially those Newly Industrialising Countries' (NICs), in what is regarded high-technology products, whose demand tends to be income and perhaps price elastic. Such an index may then be introduced into the export demand equation to see if allowing for commodity composition, even in such a simple way, has a significant effect on the estimated scale and price elasticities of export demand. Accordingly, one would expect aggregate export demand to be positively correlated with this commodity composition index. As discussed in Chapter Six, XCC might also be seen as a proxy for the range of goods traded in the export markets of Turkey, and thus captures the supply effects in the Krugman's sense. The index, XCC, is constructed in the following way: first, export goods is divided into four commodity groups, $(C_1,...,C_4)$. These groups are selected in such a way as to include products with increasing technological content, as we move from C_1 to C_4 . The second stage is to construct an index, XCC, which lies over interval [0,1]. Muscatelli *et al.* (1991b) compute a commodity composition index for both Korea and Singapore, and introduce it on the export demand equations. In the case of Korea, the index proved to be a significant determinant of demand for export volume, and led to an improvement in the model, whereas no significant commodity composition effect was detected in the case of Singapore. We follow Muscatelli *et al.* (1991b) in constructing the index, and in choosing a symmetric distribution for the weights [i.e. the weights chosen are: $a_1=0,a_2=0.33,a_3=0.67,a_4=1$, over the interval (0,1)]:

$$XCC_{t} = \frac{\sum_{i=1}^{4} a_{t}C_{t}}{\sum_{i=1}^{4} C_{t}}$$

<u>Commodity Groups for the Index, XCC</u> [(the difference between the two versions of SITC, namely SITC Revised 2 and SITC Revised, has also been taken into account by converting SITC Revised into SITC Revised 2)(Source (b) and (d)]:

 C_1 : Total exports of <u>agricultural products and crude materials</u>, (SITC Revised 2 groups, 0 and 2).

 C_2 : Total exports of <u>traditional manufacturing sectors</u>, (SITC Revised 2 groups, 61, 62, 63, 64, 65, 69, 84, 85, 89).

C₃: Total exports of <u>scale-intensive sectors</u>, (SITC Revised 2 groups, 51, 58, 66, 67, 68, 76, 78, 79).

 \mathbb{C}_4 : Total exports of <u>specialised supply and science-based sectors</u>, (SITC Revised 2 groups, 71, 72, 73, 74, 75, 87, 88).

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