THE CAUSES AND PREDICTORS

OF

THE 2001 TURKISH CRISIS

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in

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by

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ABSTRACT

The Determinants and Predictors

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2001 Turkish Crisis

2001 was associated with the most serious financial crisis ever experienced in Turkey. The attempts to control two decades of chronic inflation had failed and the country had ended up in a very delicate position. The thesis, keeping in mind that the crisis did not occur just because of the events that took place in 2000 and 2001, tries to provide an explanation in the light of the determinants of real exchange rate. After the introduction of the Turkish economic performance prior to the crisis, the analysis starts with a literature survey. The general currency crisis literature is provided and then Turkey specific crisis literature is thoroughly discussed. The second part focuses on the reasons for devaluation. Based on a survey of the real exchange rate determinants literature, an error correction model is used to detect the long-term determinants of the crisis and the reasons for the crisis turn out to be in line with the real exchange rate determinants literature. Third, the predictability of the crisis is analyzed via a central bank survey data, macroeconomic variables and monetary variables. The results suggest that there were monetary, central bank survey and macroeconomic variables that helped to predict the crisis.

ÖZET

2001 Yılı Türkiye Krizinin Sebepleri

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Habercileri

2001, Türkiye için en ciddi finansal krizini yaşadığı yıl olarak akıllarda kalmıştır. Neredeyse 20 yıl kadar sürmüş olan kronik enflasyonu kontrol altına alma çabaları başarısızlıkla sonuçlanmış, ve ülke kendini belki de daha kritik bir durumda bulmuştur. Çıkan krizin sadece 2000 ve 2001 yıllarında olan olaylardan ötürü çıkmadığı unutulmadan, bu tez 2001 yılında çıkan krizin nedenlerini aramaktadir. Türk ekonomisi hakkında fikir veren bir kısımdan sonra, kaynak araştırmasıyla analiz kısmı başlamaktadır. Bu kısımda döviz krizi literatürünün yanında, 1994'te yaşanan krizle birlite, Türkiye'de yaşanan iki kriz de incelenmiştir. İkinci kısımda, reel kurun belirleyici sebeplerini inceleyen literatür yardimiyla kurulan bir hata düzeltme modeli (error correction model) ile devalüasyona sebep olan faktörler incelenmiştir. Literatüre uygun sonuçlar bulunmuştur. Üçüncü kısımda ise, krizin öngörülebilirliği, parasal, merkez bankası anket verileri ve makroekonomik veriler kullanarak korelasyon analiziyle saptanmaya çalışılmıştır. Bu kısmın sonuçları da, krizin kullanilan bu veriler ile öngörülebilir olduğunu gostermiştir.

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CONTENTS

PREFACE

Turkey was hit first by an earthquake in 1999 and then by a currency crisis in 2001. The most serious IMF backed stabilization program was first introduced in 2000. The program was basically a foreign exchange based stabilization program. However, approximately in one year, the pegged exchange rate regime collapsed, the currency was devalued, and the economic activity shrank by record levels. The first reactions were blaming the government, the Fund and individual economists.

The thesis starts with background information on the Turkish economic performance prior to 2001 crisis. Then, the determinants for the 2001 crisis are elaborated. The explanation provided for the crisis is generally politically biased or just myopic. It would be unfair to blame only the government of the time for the crisis, or just considering the short-term developments in the world economy. This thesis investigates both the long-term and short-term reasons of the crisis, based on the theoretical models on real exchange rate, using an error connection model. As a part of this section, the claim that the current account deficit was the major cause of the crisis will be tested as it is unlikely that the current account alone can have been the cause of the crisis. The data for this section is obtained from the Central Bank of Turkey and International Financial Statistics.

The next section is spared for the predictors of the crisis. The methodology is based on cross correlation of leading values of some selected macroeconomic,

monetary and central bank survey data, with a foreign exchange pressure index. Basically, the use of correlation makes the use of this methodology very practical. For this section, the data is obtained from the Central Bank of Turkey and International Financial Statistics again.

This thesis attempts first to identify the reasons of the 2001 crisis in Turkey in a precise way, by considering both the long-term and short-term reasons obtained from the literature survey, omitting only the political risk proxy variable because of lack of data. Although the methodology is replication of literature, the thesis provides the understanding of the mechanics behind the crisis.

CHAPTER 1

INTRODUCTION

Considering the chronic inflation record for the country, Turkey was late to launch a stabilization program in 2000. The program was based on a crawling peg exchange rate anchor, where the domestic currency was pegged to a basket, consisting of 1 US Dollar and 0.77 Euro. The Turkish Central Bank was liable to announce the value of the basket. The depreciation of the domestic currency was in line with the target inflation. The exit strategy from the peg was set and the pegged exchange rate regime was supposed to cover a period of three years. Moreover, the only way to increase the money supply for the Central Bank was to buy foreign exchange. That is the Bank was acting as a quasi currency board. There was a limit of -1,200 trillion for the net domestic assets. On the government budget side, the lack of discipline was overcome by primary surplus target of 2.8% of GNP in 1999 and 3.7% of the GNP in 2000. Finally, structural reforms and privatization were the last pillar of the program.

Although it was not backed by the whole society, the program was welcomed. Foreign capital started to flow into the country. Although it was not as fast as expected, inflation started to fall. Interest rates decreased to relatively low levels.

The mood started to change as the reforms slowed down. Capital inflows stopped. Although the situation was getting critical, the government did not react to it.

The commitment to close the budgetary funds was late. Only half of the funds were closed. Privatization schedule was not followed. The banking sector has already been problematic, since the control of five banks was taken over by the government before the start of the program, and the confidence to the sector had been diminished.

Things seemed to slowdown in December after Demirbank takeover, although nothing had changed. In January, the Treasury auction rates were in a range of 50% to 60%; whereas the target devaluation rate was 12%.

In February, a National Security Meeting ended up with a scandal. The Primary Minister announced the disagreement between the government and the President and called the situation a crisis. The next day, the interest rates on government bonds shot up to 155%. The overnight interest rates gradually increased to 7500%. The Central Bank sold USD 7.6 billion in two days to defend the peg. On February 22nd, the Turkish Central Bank released the pegged exchange rate regime. USD/TRL rate jumped from 685,000 to 960,000. The credibility of the government was wiped out and it was the first day of the most destructive crisis in Turkish history.

This thesis aims first at determining the reasons for the crisis that occurred in 2001 and second investigating the predictability of the program. The second chapter is an introductory chapter on Turkish economic performance prior to the 2001 crisis, starting from 1995. The third chapter is on the determinants of the crisis. This chapter considers the literature survey on the reasons for the devaluations and attempts to provide the causes of the devaluations. In the fourth chapter the predictability of the crisis is tested by using variables selected from literature.

CHAPTER 2

PRECRISIS TURKISH ECONOMIC PERFORMANCE

After the 1994 crisis, the scene for the Turkish economy did not change. The economy was characterized by a high real gross national product (GNP) growth, approximately 4.5% for the period considered by Figure 1. The beginning of the liberalization period allowed the country to experience seven consecutive years of real GNP growth. Until 1994, when the country experienced the first serious crisis after liberalization, the growth remained positive. The fluctuation in economic growth becomes apparent starting from 1988, after which there are five years where the growth rate is below 2%, where two of the observations are negative, around -6%, the first one, due to the crisis in 1994 and the second one due to an earthquake.

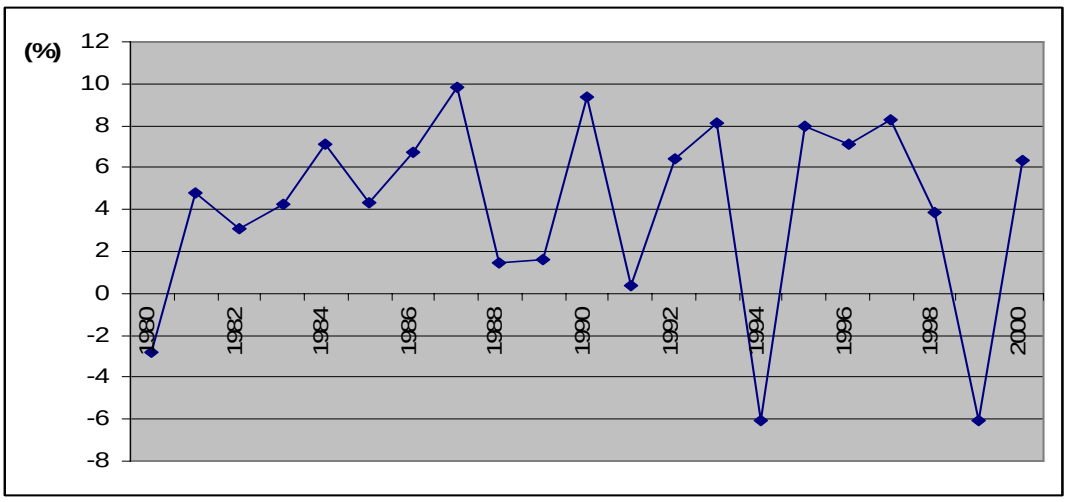

Figure 1 – Real GNP Growth, 1980 - 2000

Source: Central Bank of Turkey

Most of the time, the economic growth was accompanied by chronic inflation, which remained the most important problem for the country. The liberalization, undisciplined budget policies, political interference in the central bank's duties causing undisciplined monetary policy, and terrorist activities in the southeastern region, were the main causes of chronic inflation. Backward indexation was another reason why the chronic inflation persisted that long in Turkey. The program was launched in order to fight chronic inflation that was going out of control in both the economic and moral senses. Based on consumer prices, Fig. 2 shows that Turkey's inflation experience was unique. For about two decades, consumer prices inflation remained above 20% and became a way of life. Starting from 1988, the inflation rate started to fluctuate above 60% and even reached 110% after 1994 crisis.

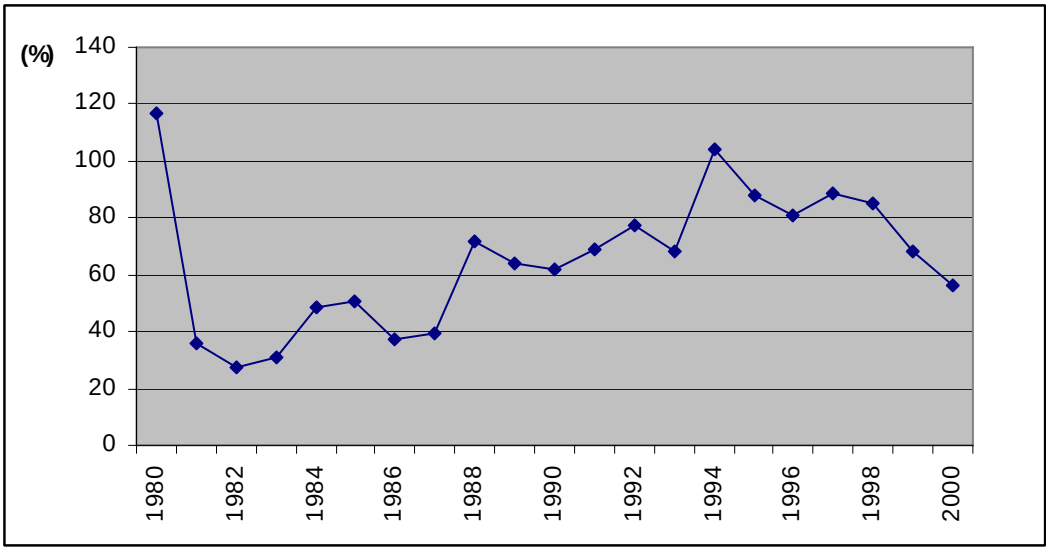

Fig. 2 – Inflation (Consumer Price Index), 1980 - 2000

Source: Central Bank of Turkey

The industrial production index and capacity usage rates show that the production side of the economy was stalled during the considered period. The data obtained from the central bank considers 1997 as the basis year for industrial

production index. However, to make clear that full employment level was not reached in 1997, the capacity usage rate was added to the graph. There is an upward sloping trend line for the production index but the capacity usage (which is measured in percentage terms) rate never exceeded 80% (Fig. 3). This may be attributed to an increase in productivity or new machinery or factories that work at the economy's average or both.

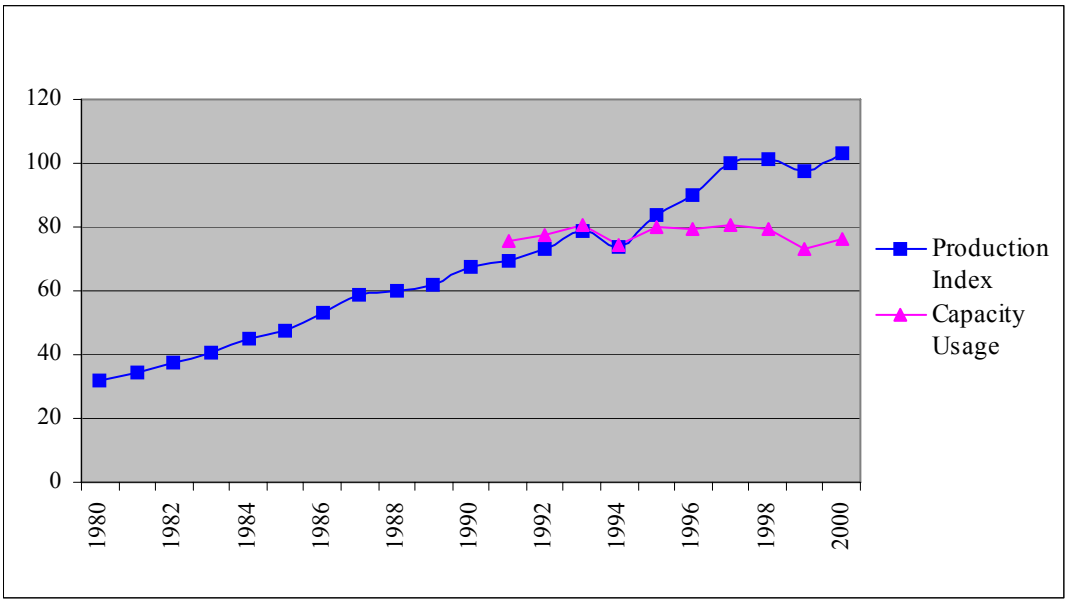

Fig. 3 – Capacity Usage and Industrial Production 1980 - 1999

Source: Central Bank of Turkey

The unemployment statistics show that the unemployment level never went below 6.5% for the decade preceding the crisis. However, it is still hard to tell that the Turkish unemployment statistics are accurate, because of several factors, such as the high seasonal employment rate which is not considered as a form of employment or people who are qualified for the work force but can never find a job for very long periods of time and have stopped looking for jobs, are not considered unemployed.

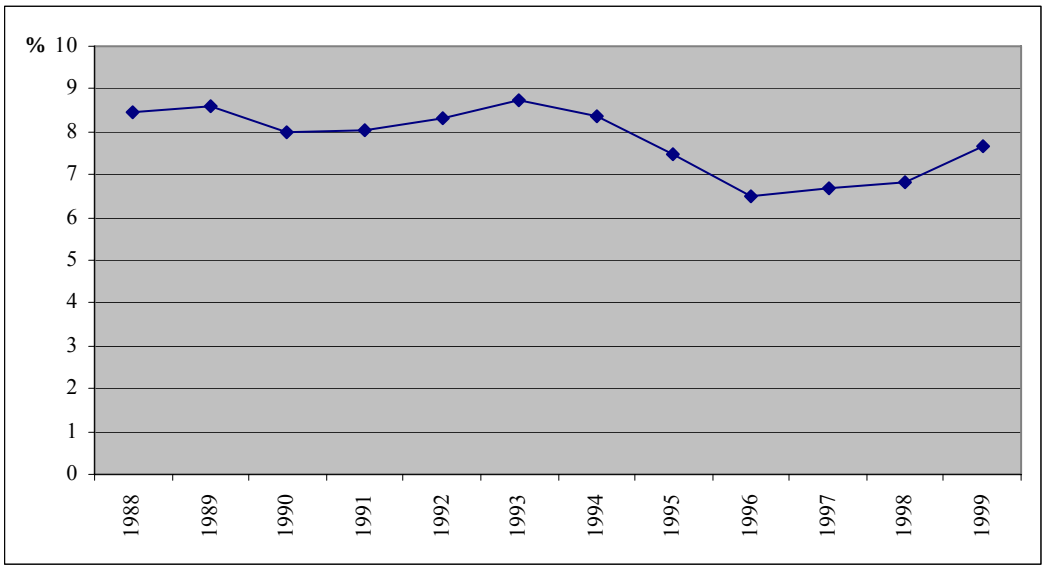

Fig. 4 – Unemployment: 1988 – 1999

Source: State Planning Organization

The exchange rate regime was a dirty float. The domestic currency is mostly overvalued during the period covered (Fig. 5). With the exception of 1986 – 1989 and 1994 – 1995 periods, the real exchange rate index remains above 100, meaning that the Turkish Lira was overvalued. The rationale behind an overvalued Turkish Lira may be the high real interest rate on the government bonds and treasury bills.

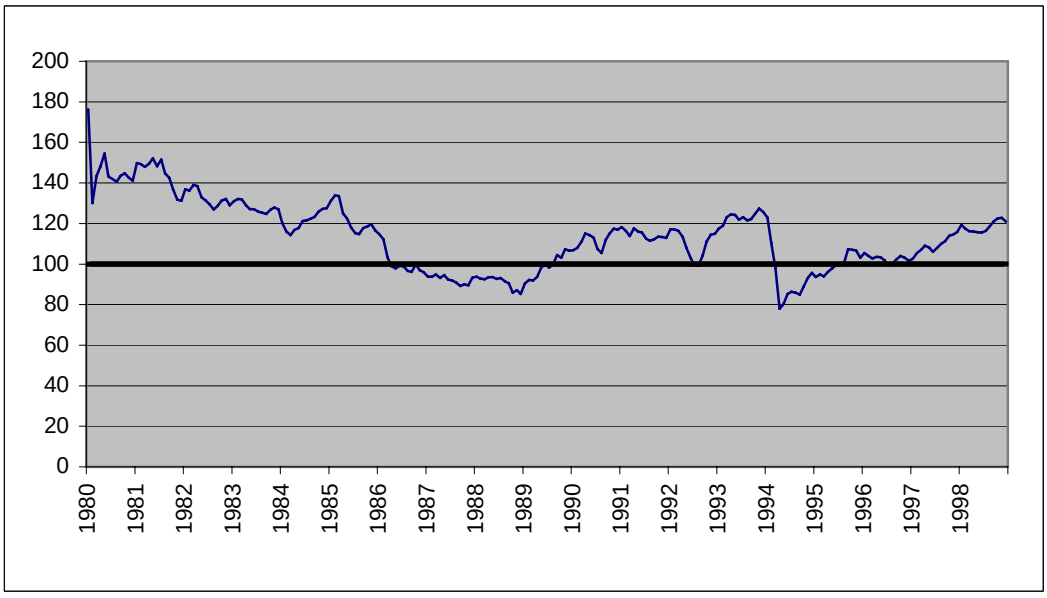

Fig. 5– Real Exchange Rate Index, 1/1980 – 12/1998

Source: Central Bank of Turkey

Despite the overvalued Turkish Lira, the current account balance over GNP ratio was more or less stable around 2% and -3%, with the exception of 2000, where the ratio reaches -5% (Fig. 6). Considering the undervaluation in 1986-1989 and 1994, the competitiveness is not reflected into the current account figures. This may be explained by the effect of high inflation dominating the effect of devaluation.

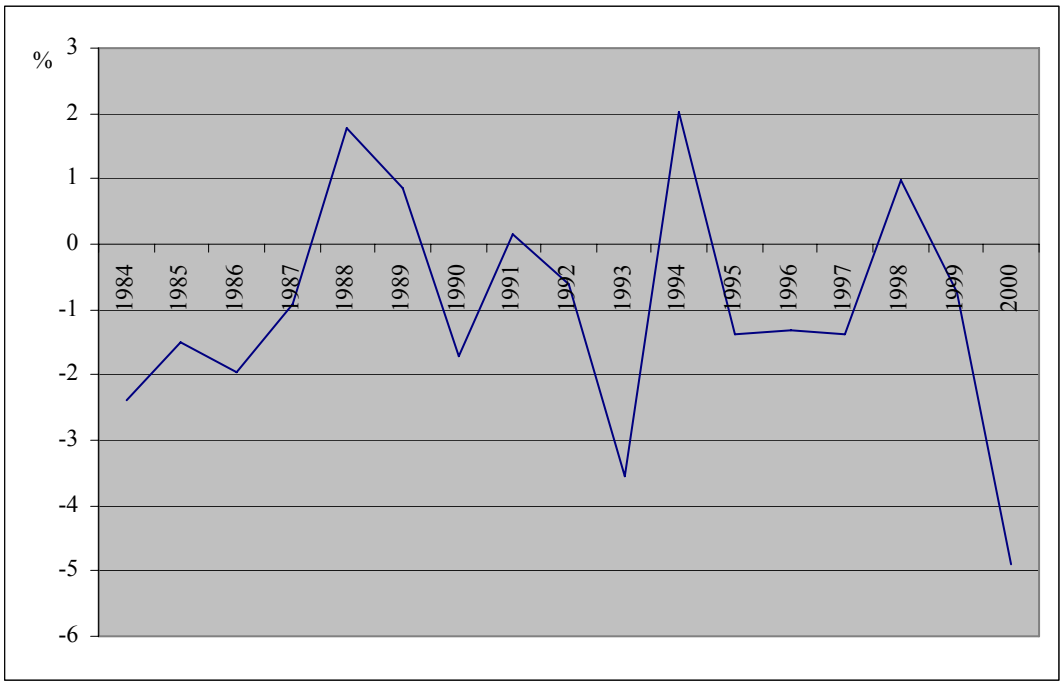

Fig. 6 – Current Account / GNP Ratio (1984 – 2000)

Source: Central Bank of Turkey

The foreign exchange reserves of the central bank to GNP ratio followed an upward sloping trend starting from 1980, where the ratio was almost 2%; but reached gradually 12.5% in 1999, and 11.1% in 2000 (Fig. 7). A more or less stable current account balance and an increasing level of international reserves are the proof of an economy where foreign currency reserves are accumulated. However, Fig. 8 shows that Turkey experienced a fast currency substitution period starting in the early 1990s. Currency substitution is measured by the ratio of foreign exchange denominated deposits over M2Y. That is, it basically shows the percentage of foreign exchange deposits in M2Y money supply. Although the foreign exchange reserves of the

country increased during the period considered, Turkish people apparently considered foreign currencies as safer than Turkish Lira.

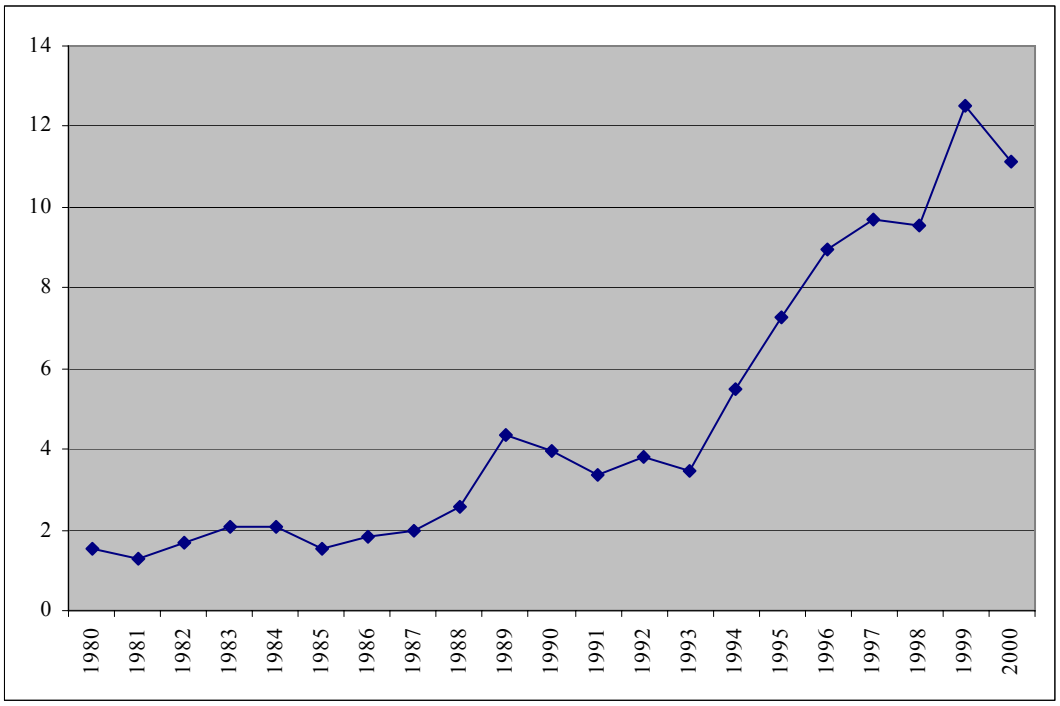

Fig. 7 – Foreign Exchange Reserves as percent of GNP (1980 – 2000)

Source: International Financial Statistics

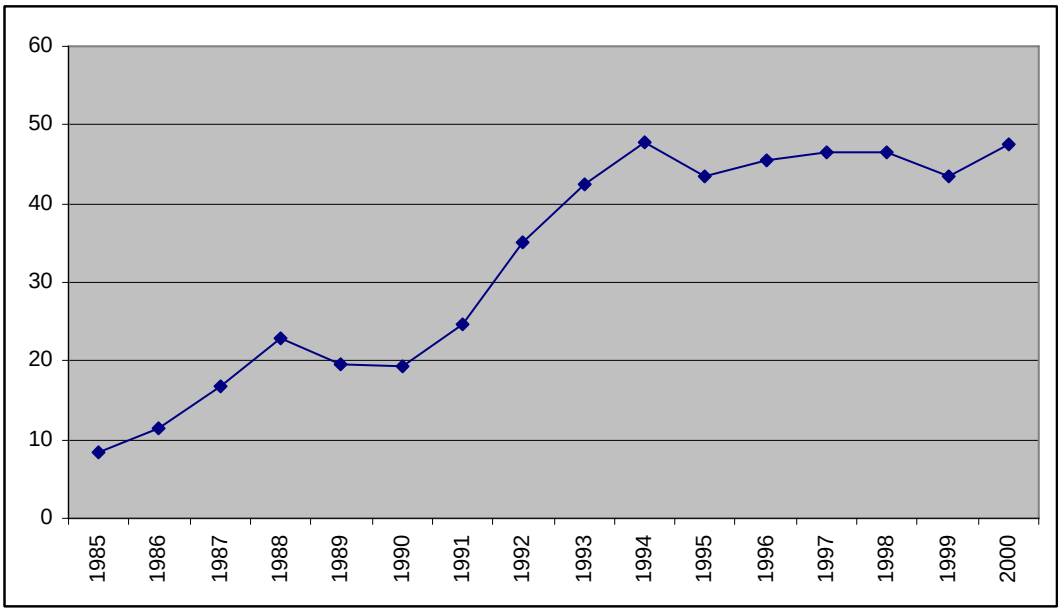

Fig. 8 – Currency Substitution measured by (M2Y-M2)/M2Y (1985 – 2000)

Source: Central Bank of Turkey

On the government side things were not in better shape. The government side had lacked fiscal discipline for years. The state banks' contribution to banking literature was a concept called "duty loss." For long period of times, Turkish government gave subsidies to different sectors via state banks, without allocating any source for these expenses. The banks that were lending below the market rates were forced to incur losses. Moreover, these losses were not assumed by government and the state banks financed their losses via borrowing. This procedure continued until 2001, when the duty losses were assumed by the Treasury. As a result, Turkey's public sector borrowing requirements reached levels as high as 12% and remained close to 5% of the GNP on the average (Fig. 9). The government debt piled up for years; however, the official figures of debt did not include such figures as state banks losses. Therefore, the budget figures provided before 2001, underestimate the government budget deficit (Fig. 11).

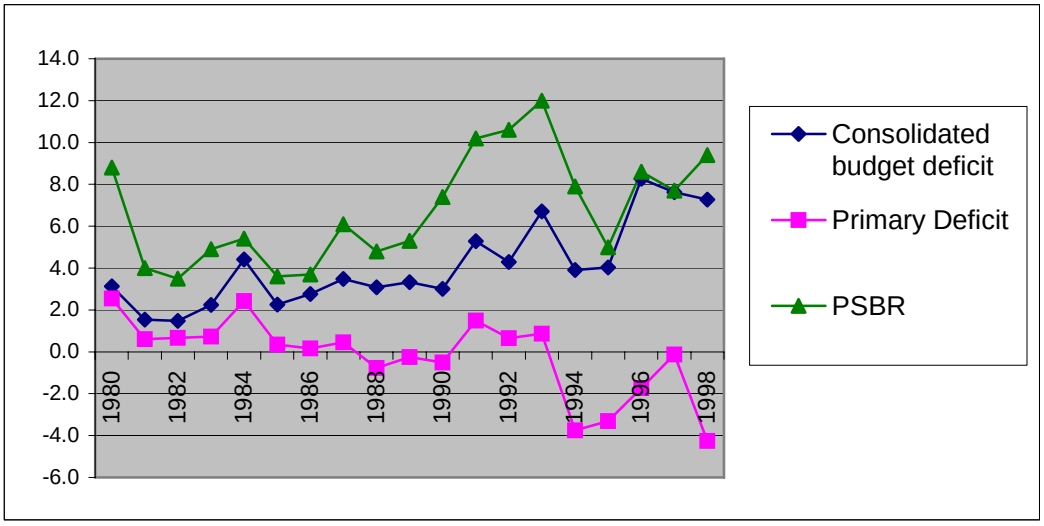

Fig. 9 – Selected Budgetary Figures as percent of GNP (1980 – 1988)

Source: State Planning Organization

Considering the lack of discipline in public finance, one would expect an increasing trend in the domestic debt to GNP ratio. Fig. 10 clearly shows that in the early 1990s, the ratio is around 15% and reaches 30% by the end of the decade. The

reason why the ratio is low is that although the public sector required borrowing, their debt was not assumed by the government. For example, the duty loss of the state owned banks was assumed only after the crisis. Following the crisis, the government assumed the debt, and the domestic debt stock to GNP shot up to 69.2% in 2001 according to Turkish Treasury statistics. Combined with the lack of discipline in the expenditures, the preference of the government to borrow in order to finance the budget deficit makes the trend for this ratio understandable. One can say that undisciplined budgetary policies did not stop, since there is no improvement in the debt stock even after the crisis.

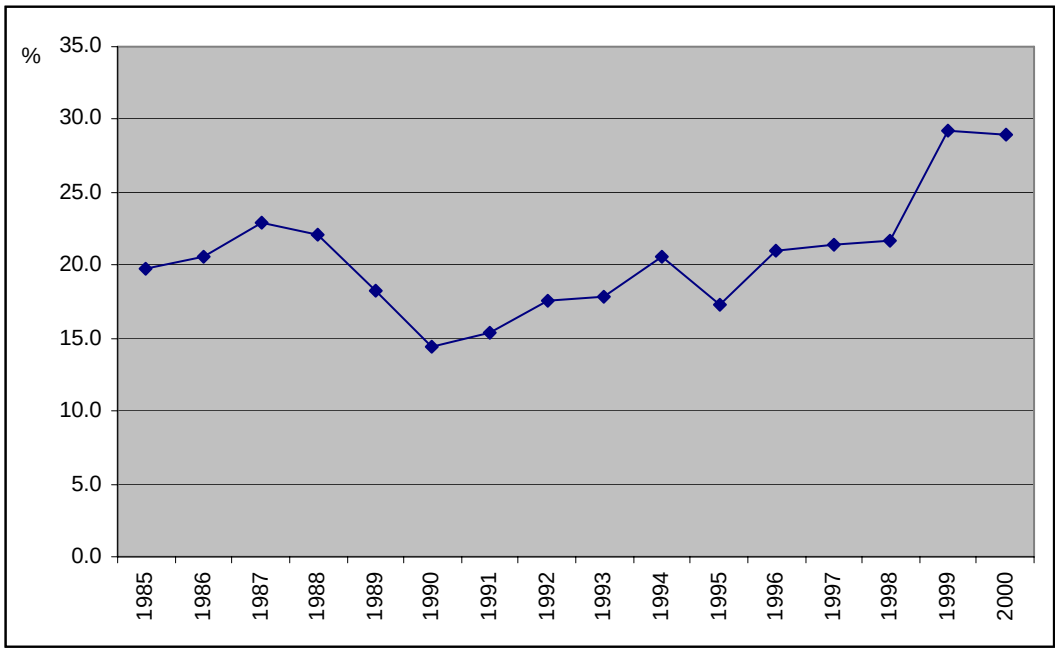

Fig. 10 – Domestic Debt Stock to GNP ratio (1985 – 2000)

Source: The Undersecreteriat of Turkish Treasury

Fig. 11 provides a more accurate debt stock ratio figure, since those numbers include the duty losses of the state banks. The ratio shoots up to almost 70% of the GNP right after assuming duty losses in 2001.

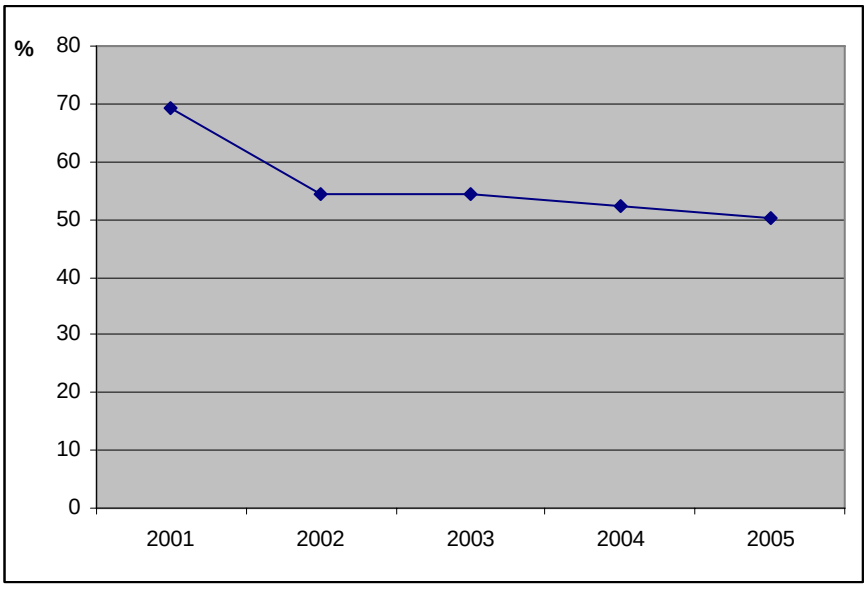

Fig. 11 – Domestic Debt Stock to GNP Ratio after Assuming Duty Losses

Source: The Undersecreteriat of Turkish Treasury

The macroeconomic variables show the seriousness of the situation. The implementation of a stabilization program was inevitable. However, the previous IMF assisted stabilization programs were not taken seriously and the Fund's assistance had just been temporary since the government lacked the commitment that was needed for a stabilization program. In order to overcome the credibility problem, Turkey had the IMF as the lender of USD 20 billion to defend the peg. As the implementation of the program proved some improvements in the economic conditions, the support that the government received from society increased.

Beside the macroeconomic situation, the banking sector's situation was delicate. The letter of intent included a section dedicated to the reform in the banking sector. The foundation of a banking sector watchdog was a performance criterion. Therefore, the fragility of the financial system was actually a known fact.

First, the capital structure of the Turkish banking sector was very poor (Table 1). After 1997, there is a downward sloping trend in the capital ratio, measured by

the shareholders' equity added with the total income, over total assets. In 2000, the ratio increases to 6.9% from 5.9% in 1999; but the number is still very small.

Table 1 – The Turkish Banking Capital Ratios

	1996	1997	1998	1999	2000
(Shareholders'Equity + Total Income) / Total Assets	8.9	9.4	8.9	5.9	6.9

Source: Banks Association of Turkey

In addition to the capital inadequacy, the asset quality was very poor. Sak and Özatay (2002) first focus on the asset quality of the sector. Nonperforming loans to total loans ratio is 2.2% and 2.4% in 1996 and 1997. This ratio increases to 7.2% in 1998 and reaches 10.7% in 1999 as Saving Deposits Insurance Fund started to take over the control of illiquid banks (Table 2). This increased the doubt about the information disclosure and rule enforcements.

Table 2 – Turkish Banking Sector: Asset Quality

	1996	1997	1998	1999	2000
Nonperforming Loans/Loans	2.2	2.4	7.2	10.7	11.6
Loans/Total Assets	43.1	45.5	38.3	30.1	32.9
FXAssets/ FXLiabilities	93.6	89.6	84.9	79.4	75.9

Source: Banks Association of Turkey

Third, the foreign exchange exposure of the system was typical (Table 3). The numbers for the open position in the system was USD 2.5 billion, USD 5 billion, USD 8.4 billion, USD 13.2 billion and USD 17.4 billion from 1996 until 2000 respectively. The table points at a significant increase in the foreign exchange exposure in the sector.

Table 3 – Open Position in the Turkish Banking Sector

	1996	1997	1998	1999	2000
FX Liabilities – FX Assets (Billion USD)	2.5	5	8.4	13.2	17.4
Open Position / Total Assets	0.03	0.05	0.07	0.10	0.11

Source: Banks Association of Turkey

Maturity mismatch was another problem for the sector. Table 4 shows that the liabilities were more of a short term nature as Sak and Özatay (2002) point out. The inclusion of repos that were non-balance sheet items, would deteriorate the situation even more. The maturity mismatch becomes more problematic in 2000, where the maturity of the liabilities becomes shorter.

Table 4 – Maturity mismatch in the Turkish Banking Sector

	1996	1997	1998	1999	2000
Assets/Liabilities (maturity<3months)	n.a.	45.8	45.7	46.3	40.8
Deposits(with maturity more than 6m)/Total Deposits	26.6	24.7	22.9	28.2	19.8

Source: Sak and Özatay (2002)

The liability feature of the private banks also may provide hints regarding the maturity mismatch and other risks (Table 5). High repo-to-Turkish Lira deposits ratio is a clue that may support the suggestion that the banks used repo as a method to finance their Turkish Lira bond portfolio. However, the maturity for the repo contracts was considerably shorter than Turkish Lira deposits. Another characteristic of the private banks' balance sheet is their heavy reliance on foreign exchange deposit. The dependency on foreign exchange deposits made the Turkish banking system more vulnerable to international illiquidity problems.

Table 5 – Selected Ratios of Turkish Private Commercial Banks

	1997	1998	1999	2000[a]	2000[b]
Repos/Lira Deposits	1.23	0.83	1.07	0.94	0.53
FXDeposits/Lira Deposits	2.12	2.01	2.75	2.80	2.09
Interest Earning Assets/Total Assets	0.68	0.63	0.63	0.62	0.58

a=June 2000
b=December 2000
Source: Central Bank of Turkey

The government of the time was a three-party coalition government. Led by Bülent Ecevit, Democratic Left Party formed a coalition government with The Nationalist Movement Party and The Motherland Party of Mesut Yılmaz. By initiating a series of investigations against corruption, like White Energy case, Ecevit was able to achieve public support for the stabilization program that the government would lack in the case of negative social effects generated by the program, like higher tax rates. At the end of 2000, the coalition government signed a stand-by agreement with the IMF to solve the problems mentioned above.

The Central Bank's commitment was made public by the monthly basket value announcement (Table 6).

Table 6 – Rate of Increase of the Foreign Exchange Basket

	The Value of the Basket as end of Month (USD 1+Eur 0.77)	Change in the Basket Value		
		Monthly Change (%)	Cumulative Change (%)	Daily Change (%)
December'99	959,020.46			
January'00	979,159.89	2.1	2.1	0.067
February'00	999,722.25	2.1	4.244	0.072
March'00	1,020,716.42	2.1	6.433	0.067
April'00	1,038,068.59	1.7	8.243	0.056
May'00	1,055,715.76	1.7	10.083	0.054
June'00	1,073,662.93	1.7	11.954	0.056
July'00	1,087,620.55	1.3	13.410	0.042
August'00	1,101,759.61	1.3	14.884	0.042
September'00	1,116,082.49	1.3	16.377	0.043
October'00	1,127,243.31	1.0	17.541	0.032
November'00	1,138,515.75	1.0	18.717	0.033

Table 6 – Rate of Increase of the Foreign Exchange Basket

December'00	1,149,900.90	1.0	19.904	0.032

Source: Governor's Remark: Disinflation Program for the year 2000: Implementation of Exchange Rate and Monetary Policy, Ankara, December 9, 1999.

In addition to the basket value commitment, for the first 18 months of the program, January 2000 and June 2001, the Central Bank was responsible to announce the rate of increase in the exchange rate which should be compatible with the target inflation, for the additional three months, at the end of every three months. Therefore, the rate of devaluation would be made public for the following year. For the following 18 months, July 2001 – January 2002, a widening band was designed as an exit strategy. The width of the band would reach 7.5% by December 31st, 2001, 15% by June 30rd, 2002 and 22.5% by December 31st, 2002. The Central Bank started to behave as a quasi currency board by increasing the money supply only by buying foreign exchange in return for Turkish Lira. Therefore, a net domestic asset constraint accompanied the commitment to the pegged exchange.

The second pillar of the program was the fiscal discipline. The government had to reach a primary surplus at the end of the fiscal year. The income policy was to set accordingly. Tax collection was as important as the saving in the expenditure side. The increase in tax revenue would decrease the borrowing requirement of the Treasury; in return both the debt to GNP ratio and the interest rates would decrease. With the announcement of the program, the interest rates started to fall from 100% in 1999, to 35% in January 2000. In order to evaluate the performance in the fiscal side, a quarterly performance criterion for the primary surplus was set. In order to attain those targets, the privatization revenues were of crucial importance. These primary surplus performance criteria were not inclusive of earthquake expenses. A new tax package including additional personal income tax, additional motor vehicle tax and

property tax were introduced in order to facilitate the realization of the primary surplus target. The calculation method for corporate profit was changed and the new method was expected to boost the corporate tax collections. On the income policy front, the increase in the wages was a set considering the target inflation.

The third pillar of the program constituted of privatization of state economic enterprises and structural reforms. The first reform mentioned in the letter of intent is the fiscal reform via which the tax inequality among the individuals was to be minimized. Provision of better service in the medium-term was another target of the fiscal reforms. The tools to be used for the reforms were agricultural reforms, pension reform, fiscal management and transparency.

The agricultural policies were to be substituted by more efficient ones. Instead of the old policies, a more direct income support system targeting the poor farmers was planned. New pricing strategies for different crops were introduced. The major aim was to avoid incurring loss. Credit subsidies were to be phased out and that way the loss of the state banks would diminish.

The pension reform was first aiming at minimizing the burden on social security system. The retirement age was raised, the minimum contribution time was increased and private pension funds legislation was prepared.

On the fiscal management and transparency front, the budgetary funds were to be closed. Enhancing the transparency and accountability in the budgetary figures became essential.

The fiscal management and transparency was backed by tax reforms. The government was committed to improve the tax system and make it more efficient and more equitable. Another target was to extend the tax base. The optimal tax rate was calculated according to the extension of the tax base.

In addition to the structural reforms, privatization was another essential point in the program. Privatization was important first to achieve the primary surplus target. The government had to design the appropriate method of privatization for each firm like Telekom and Turkish Airlines.

One of the most important reforms was designed for the banking sector. Even before approaching IMF for a stand by agreement, the government founded an independent banking watchdog. The letter of intent put the government under several commitments. The commercial banks were asked to decrease their open position to 20% of their capital. The government was committed to increase the independency of the Banking Regulation and Supervision Agency (BRSA) by issuing a Banks Act. The nomination of the board of the BRSA and the start of its operations in August were indicated as performance criteria. BRSA would have the control over licensing and de-licensing of the banks. Moreover, in order to fight fraud, the lending to a sole large borrower was limited to 10% of the equity. Another commitment was made by announcing the issuance of new stricter loan loss provisioning. The insolvent banks were to be taken from its owner by Saving Deposit Insurance Fund (SDIF). In return, those banks could be sold in full, partially or it could just be liquidated. In addition, SDIF would only provide liquidity to the banks under its control and not to the rest of the sector. The Banks Act was aiming at increasing the strength of the banking sector and thus eliminating the upward pressure on the interest rates due to increased need of borrowing. For the coming years, more reforms were on the way, like accounting standardization, capital adequacy including risk evaluation and finally internal risk assessment.

The letter of intent and the commitment to the stabilization program were welcomed by foreign investors who poured in funds and supported the program.

Interest rates were at relatively low levels. Economic growth was high compared to the performance in the same decade.

However, things started to slow down later on. Hristov (2001) shows the delays in the privatization of Turkish Airlines, Turkish Telecom, state banks and state monopolies as the proof of reform fatigue. The privatization performance was far from successful. Furthermore, this delay made it impossible to reach revenue targets for the budget. The reforms were not implemented. The disagreements among the coalition partners started to accumulate. Turkish Telekom, Turkish Airlines, state tobacco and alcohol monopolies and POAŞ were still not privatized.

The problems in the financial sector were not solved yet. The specific problem of the Turkish banking sector was the high levels of borrowing requirements of the government. The banks relied on the debt instruments issued by the government and the government debt instruments to total assets ratio remained above 60% in their balance sheet until the end of 2000. Because of the risk that they were carrying, credit lines to some banks were cut. The fragility in the banking sector then turned into a debt rollover problem. The need for liquidity pushed up the interest rate levels.

Right before the launch of the stabilization program, State Deposit Insurance Fund took over the control of five banks. Later on two other banks were added to the list. The owners and executives of these banks were arrested and bought to court. The news on these arrests increased the doubts on the health of the private banks in Turkey. Moreover, the costs that were taken over became another issue. The banks were recapitalized by government bonds which in return raised the doubts about debt rollover.

In late October, mid-sized banks that were borrowing overnight and lending to government in longer term, started to experience difficulties in financing their government bond portfolio. The Central Bank did not lend to those troubled banks because of the net domestic asset constraint. In order to access Turkish Lira, these banks started to sell their bond portfolios. The interest rate started to rise, forcing most of the banking sector to cut their positions in the debt instrument. The demand for foreign currency increased. This in return raised the debt sustainability issue even further. In order to control the interest rate hikes, central bank changed its strategy by lending to the banks. Although the increase in interest rate slowed down, the demand for foreign currency increased and the international reserves level started to decline. In late November, IMF announced a new credit line. However, the increase in interest rates did not stop. In early December, the Central Bank by lending to Demirbank, avoided the bank's default. Later on, the bank was taken over by the State Deposit Insurance Fund. A new agreement was made with the Fund, where the officially announced devaluation target did not change for 2001. However, in January 2001, the average auction rate remained above the officially announced devaluation rate. This was not a sustainable situation. There were two possible choices. Either the interest rates had to fall or the currency had to be devalued.

On February 19th, after meeting with the President, Bülent Ecevit declared the disagreement between him and the President. The problem was that the fight against corruption was very slow and that is why the President had criticized the Prime Minister. After this announcement, the interest rates shot up to levels as high as 7,500%. The banks started to buy foreign currency. The reserves of the Central Bank were depleted by USD 7.5 billion in two days. On February 21st, the crawling peg regime was released.

CHAPTER 3

LITERATURE SURVEY

International Experience

The currency crises literature was launched in order to investigate the causes of speculative attacks in Latin America during 1960s and 1970s. The theory was mostly based on the fiscal and monetary causes of these crises, which is actually pointing out the real causes of the attacks. These crises were called the first generation currency crises. However, things changed when economically sound countries experienced the same problem as the Latin American countries, just like in the case of European countries. The fundamentals were sound but the speculative attacks were there for those countries that had pegged their currencies to Deutsche Mark. These crises were later on called self fulfilling crises and labeled as the second generation. The last wave came with the so-called Tequila crisis in Mexico and the so-called Asian flu. This time, the crises were mostly because of the boost and busts in international lending and asset price bubbles. The basic problem with the research is that it is helpful in capturing the economic fragility at the early stages of the crisis or during the pre-crisis period, whereas it is deficient in detecting the changing nature of the crises and to foresee those crises that do not fit into a specific group.

Serious efforts in investigating the currency crises initiated with the seminal paper by Krugman (1979). In his work, Krugman attempted to model a government

that tries to keep its currency from depreciating while its foreign exchange reserves exhaust and its borrowing approaches a limit; and when the government is no longer able to defend a fixed parity because of the constraints on the possible policy measures, a crisis occurs. Krugman (1979) describes the steps of a "standard" crisis. The model assumes a pegged exchange rate and it is done through central bank intervention in the foreign exchange market. The reserves start to decrease gradually and at some point before the reserves deplete there is a sudden speculative attack that almost depletes the last part of the reserves and the regime is no longer maintained.

According to his work, if a government does not peg its exchange rate, assuming that the purchasing power parity holds, the change of the exchange rate is explained by at least one of the following three reasons: a change in the quantity of domestic money, a change in the foreign asset holding behavior or finally a change in the expected inflation rate. Then another assumption is made, which is namely financing the budget deficit by printing money and the deficit is adjusted so that the deficit/money supply ratio is constant. Two points are worth noting. Even the asset holding of the domestic residents is known; the exchange rate is still indeterminate. Secondly, Krugman's model exhibits a single path converging to a steady state. If the initial exchange rate is not chosen on this steady state, it will diverge further from this steady state.

The second case is the case where the exchange rate is fixed and the central bank has a reserve of foreign money and uses it to stabilize the exchange rate. In this case, as long as the economic agents believe that the peg will be maintained, expected devaluation rate will be equal to 0 and there will be a predictable relationship between wealth and money holdings. As long as the wealth increases, a portion of it, called w will be held as domestic currency and the rest, 1-w, will be

directed to foreign currency. As long as the government is committed to maintain the peg, it has no control over how the budget deficit is financed. If the domestic currency supply exceeds the demand by the private sector, then the private sector has always the chance to direct this excess supply to the central bank by buying foreign currency. Thus, the extent to which the government can finance its budget deficit by running down its reserves is constrained by the willingness of the private sector to buy foreign money. The conclusion that Krugman draws from this model is that, independent from the size of the initial reserves, a budget deficit will ultimately make the peg impossible to maintain. The only condition to maintain the peg is to have a balanced budget, which will not affect the change in reserves and the change of wealth of the private sector.

When the speculators anticipate that the peg will be abandoned, the crisis occurs. They try to acquire central bank's reserve of foreign currency. The important point is that, the crisis always takes place before the depletion of the reserves. According to the model, as long as the foreign currency reserves are not depleted, the domestic money supply will be determined by the portfolio preferences of the domestic agents. At the time when the reserves are exhausted, the portfolio preferences start to determine the price. Domestic investors may very well be reluctant to invest in the domestic currency and will reduce their holdings of this currency. When the price level starts to rise, the likelihood or the expectation of devaluation will be different than zero. When the probability of devaluation increases, the demand for domestic money falls and the price level shoots up. Thus, according to the model, the exhaustion of the reserves causes a discrete jump in the price level causing a capital loss for the investors.

In order to avoid this kind of loss, the investors try to shift from domestic currency to foreign money right before the depletion of the reserves. If the investors anticipate correctly the events, the reserves of the central bank will be depleted by a speculative attack and a possibility of a capital loss for the private investors would be eliminated. Thus, when the policy is certain, an economy with a balance of payment problem goes through 3 steps: gradually declining reserves stage, speculative attack stage and a post-crisis stage, during which the domestic currency depreciates gradually.

The next question Krugman tries to answer is what if the policy is not known. The paper elaborates the question what happens if the level of reserves that would be used by the central bank to defend the domestic currency is not known. To assess this question, the paper makes the assumption that the private investors distinguish between two types of reserves; first one being the primary reserve, R_1, which will be used during a speculative attack and a secondary one, R_2, which the central bank may or may not be willing to use during the attack. The answer for the question is that when the central bank is willing to use its secondary reserves to defend the peg, the speculative attack is reversed and the level of reserves is recovered. The reasoning is easy. When the private investors see that the possibility of a windfall loss is eliminated they sell back the foreign money for the domestic money.

Even though it is a cornerstone Krugman(1979) has some limitations. The first shortcoming is the simplicity of the model used in the paper and the second one is the limited number of assets available to the domestic investor. For example, a government may have ways to finance the budget deficit other than selling the foreign exchange reserves. The deficit can be financed via borrowing as well. As

long as doubts about rollover are raised, a government can finance its deficit via borrowing.

The obvious problem with the first generation models was that the currency crisis was assumed to be the consequence of poor economic fundamentals. This is considered to be a problem when European Exchange Rate Mechanism (ERM) failed in the beginning of the 90's. Obstfeld (1994) assessed this problem and tried to explain the causes of a series of currency crises in Europe.

Obstfeld assumes an exponential money demand function. The domestic interest rate is linked to the foreign nominal interest rate by the interest rate parity condition. The purchasing-power parity (PPP) holds and links the domestic and foreign price levels. A strong assumption of the model is that the domestic credit extended by the central bank grows at a constant rate regardless of events in the foreign exchange market. This assumption means a declining reserve level through time, while the exchange rate is kept fixed. The equilibrium involves a speculative attack and the lower limit on foreign exchange reserves is assumed to be zero. Again, the key feature of the equilibrium is that reserves take discrete jump to zero, which is the result of a sudden speculative, taking advantage of the central bank's commitment to the exchange rate.

The second part of the paper brings into account the fundamentals and raises the question whether the crises result from "fundamentals" or from "self-fulfilling expectations". Obstfeld (1994) answers the question by telling that the dichotomy mentioned above does not exist in reality, since the fundamental factors mentioned in the models are the dynamic-consistency problems implied by the preferences and constraints of governments. The limitations are endogenous through their dependence on the expectations of the agents. Institutions that tie authorities' hands

can eliminate any potential multiplicity. In case of absence of that kind of institutions, expectations will produce equilibria in which the authorities will abandon their exchange rate targets.

Wyplosz, Rose and Eichengreen (1994) focus on the second-generation currency crises models. Their attempt is to investigate the behavior of selected macroeconomic variables before and after the speculative attacks and to see if these variables' behavior differs for ERM and non-ERM currencies.

The analysis starts with the construction of an index of speculative attack pressure, which gathers both successful and unsuccessful attacks. The following index is constructed:

$$e + (i - i^*) - (r - r^*) = (d - d^*) - \beta(y - y^*) + (1 + \alpha)(i - i^*)$$

In this equation e is the log of the exchange rate, i is the domestic interest rate, y is the real income, r is exchange rate time reserves over base money and finally d is domestic credit over base money ratio. All terms with a star superscript stand for foreign country variables. The left hand side of the equation is the index of speculative pressure and says that the pressure increases as domestic reserves of foreign exchange decline, as interest rates rise and as the exchange rate depreciates. β is the income and α is the interest rate elasticity for money demand. Despite the fact that their approach poses two major problems, the theoretical background is rational for empirical use. The first problem with the model is that the weights attached to the components are arbitrary. Second, using a linear model as mentioned above, will be dominated by the highest volatility variable in the equation, which is the reserve variable in this case since it has the highest volatility among all other variables.

The data considers the 1967-1992 period for 22 OECD countries. The countries are chosen according to data availability for the non-ERM countries and developing countries. The analysis starts with the selection of attack episodes, which the authors refer to as "crises". In order to avoid the problem of volatility dominance, the variables are weighed so as to equalize the conditional volatilities of the exchange rate, the interest differential and reserves.

The most obvious result is the decrease in reserves, though a crisis may occur even without the depletion of the reserves. This finding is compatible with the empirical and theoretical background. For the non-ERM crises, there is a significant difference between the crisis period and non-crisis periods for the variables, fiscal ratio, inflation, exports to imports ratio and reserve growth. Kolmogorov – Smirnov test implies that the distribution of these variables for the crisis and non-crisis differ from each other. For the ERM case, however, only reserve growth and the interest rates to some extent, point out the crisis periods. For the non-ERM subsample, there is a significant difference in the behavior of budget deficits, inflation, exports to imports ratio domestic credit growth and international reserves in pre-attack and other periods. The absence of these findings for the ERM case supports the second-generation crisis model that is multiple equilibria and self-fulfilling attacks.

The third generation crises models emerged after the Latin American and Asian crises that took place in mid '90s. Especially the Asian cases were quite a surprise for the majority. The expectation was the gradual slowdown of the economies. The experience was totally different: collapse of the asset markets, bank failures, and bankruptcies of firms, that is, a much more negative downturn for the economies mentioned. The Asian crisis was not a result of bad fundamentals, like in the first generation models, nor did it have the characteristics of the self-fulfilling

traits of the European attacks, like in the case of second-generation crises. Instead, the crises in Asia were a part of a broader financial collapse. When the state of the economies are considered, it is way clearer to see that growth rate for the crisis hit countries was spectacular for long periods of time, the unemployment was low and inflation, for the goods and services market, was far from being a problem. The problem was the inflation in the assets markets and the moral hazard.

In his paper (1998), Krugman points out that the Asian economies did not fit into any of the models presented before. First, considering the first generation models, the economies were fiscally balanced, there were no irresponsible monetary expansion and the inflation rates were particularly low. Secondly, the second generation models considered, the unemployment rate was low, so there was no point in pursuing a more expansionary monetary policy, which was the case for the Europe during the period of crises. Third, there was a boom-bust cycle in asset markets, where the asset prices shot up and then plunged. Finally, financial intermediaries were at the heart of the crisis. These institutions were borrowing at short term and were lending these funds to much leveraged companies, as in Korea or to speculative investors that were mainly investing in the real estate, as in the case of Thailand. The lack of surveillance on these financial intermediaries and the implicit government guarantee on the deposits was the major point that initiated the crisis in Asia. Considering the government guarantee, the financial institutions were easily lending the funds that they were collecting. In case of a failure they were not assuming any responsibility for the sunken funds but the whole burden was on the governments' shoulder. The return, however, was huge and these institutions would absolutely benefit from huge profit margins created by high-risk investments. The overpriced assets showed up in the balance sheets of these intermediaries, making their financial

condition healthier than they really are. When the bubble burst, the whole process started to work in the opposite direction. The fall in the asset prices made the financial intermediaries more vulnerable and forced them to end their operations, leading to further fall in the asset prices.

The third generation currency crises were going hand in hand with financial system's collapse. The incidence was quoted as twin crises after the Latin American and Asian crises that took place in '90s. Kaminsky and Reinhart (1996) try to assess the twin crises. The paper focuses on 20 countries in Asia, Latin America, Europe and Middle East for the period 1970 till mid 1990s. This specific period contains 25 banking crises and 71 balance-of-payment crises.

The basic findings suggest remarkable results. First, the occurrences of the crises differ from decade to decade. For example, during the '70s, the number of balance-of-payment crises is 25 and the number of banking crises is only 3. For the following decades, while the number of balance-of-payment crises stays stable around the same figure, the number of banking crises quadruples in the periods following the liberalization.

Second, in most of the cases banking crises starts one or two years before the currency crises. This finding supports the idea that the bailing out of the failed banks spurs the credit creation that triggers the balance-of-payment crises. Even the bailout is not there, the fragile banking system ties the hands of the central bank in defending the domestic currency. To examine these links formally, the authors design a probit model where the binary measure of balance-of-payments crises is regressed against the index of banking crises, lagged under alternative specification, 12 and 36 months and a dummy for financial liberalization. The results show that the banking crises help to predict balance-of-payment crises but this is not the case for opposite.

Third, 75% of the banking crises occur in a 5-year period after the financial liberalization. It may be wise to think that the twin crises have the deregulation of the financial system as their common origin. The increase in credit that finances the import booms and the current account deterioration causes currency crises. Although, the financial liberalization is not significant in the probit model to predict balance-of-payment crises, it is significant to predict the banking crises.

Fourth, the speculative attacks succeed almost always, causing large devaluations, capital controls or switch in the exchange rate regime or a mixture of all these three.

Fifth, currency crises tend to have more dramatic consequences in developing countries compared to industrial countries.

Finally, most of the twin crises are grouped in periods where the real interest rate in United States is high. This may show two things. First, the external factors play a significant role in predicting currency crashes. Secondly, it may be just the contagion effect of the crises, causing a domino effect for the countries that may have similar fundamentals.

Bussière and Fratzscher (2002) work on a new early warning system. The work emphasizes improvement of the previously released early warning system in three ways. First, it tries to eliminate the post-crisis bias of the first system by introducing post-crisis/recovery period into the model. The hypothesis is that the introduction of the third period, that is the distinction of tranquil, pre-crisis and post-crisis/recovery periods all together will increase the forecasting ability of the model. Second, the crises of the 1990's have been contagious in spreading across markets. Thus, inserting contagion indicators is another improvement aimed by the paper. Last, the paper considers the period 1993-2001. The reason is to omit 1980s and early

1990s is that the capital markets were not that integrated, several countries were experiencing hyperinflation and that the capital accounts were closed to foreigners. In addition to all these reasons, the transition to the free market by the Eastern Europe was another major reason why these periods were omitted. The aim of the paper is to forecast whether a currency crisis will occur or not in the following 12 months and not to forecast the timing of the possible currency crisis. Previous early warning models fall into two broad categories. The first one constitutes of models that attempt to extract early signals from a set of variables, as in the case of Kaminsky and Reinhart (1999) and Kaminsky, Lizondo and Reinhart (1998). The second-type of models are based on a logit model as in the case of Eichengreen, Rose and Wyplosz (1995). This model combines the two models. With the new built in concepts of the paper that are mentioned above, the predictive power of the early warning system improves significantly, while the ratio of false alarms decreases. The findings show that the exchange rate overvaluation has a strong impact on crisis possibility. A 10% appreciation of the currency above its appreciation trend increases the risk of crises by almost 18% to 23.36%. The increase in short term debt to reserves ratio to 120% causes a 1% increase in the crisis risk. The slowdown in economic growth to 2% only increases the risk by 0.5%. For the rest of the findings, the paper starts with the government deficit. The first generation crises model is based on a government running a deficit. However, for some cases, the budgets run a surplus, as in the case of Mexico and Asia, thus leading to the rejection of this first generation currency crisis model. The liquidity proxies such as, reserves to exports, to GDP or either to M1 or M2 leads to insignificant coefficients or significant coefficients without any real improvement in the predictive power. Current account items are not very spectacular in predicting the crisis with an interesting finding

exception that says, openness does not mean higher risk for a country. In the investment area, foreign direct investment is preferable to portfolio investment as expected. It seems that an increase in foreign direct investment helps a country to avoid a crisis.

Krugman (2001) aims at explaining a new generation of currency crisis. The paper considers an economy where the output is a function of the investment and the interest rate level is a function of the output level.

In order to turn this model into a crisis yielding one, a balance sheet effect is added into the model. It is supposed that there are many leveraged firms and that a significant amount of their debt consists of foreign currency. However, the firms can only borrow according to the amount of collateral that they can provide. Thus, Krugman (2001) sets the output as a function of investment, where investment affects the output by a multiplier effect; and the monetary authority reacts to the output movements either by increasing the exchange rate when y is too high, or by lowering the interest rates when output is too low. Therefore, an investment-output space is set. As investment approaches to zero, the effect of the decrease in the investment has little effect on output since the investment is already very close to nil and cannot go below zero. As investment increases, the output starts to increase less, since there is a capacity usage constraint.

At the following stage a negative shock to the economy decreases the confidence. As a reaction, the asset prices fall. The fall in asset prices causes a drop in the value of the collateral, which is a requirement for borrowing, and therefore investment falls. The fall in the investment is followed by a decrease in the output. The reaction to the decrease in the output is a rate cut.

However, as an extreme case, if the central bank cannot stop the decrease in the output by cutting down the interest rate until it is equal to zero, then the economy gets stuck in the bad equilibrium. In this case, Krugman (2001) proposes either a price level target or an exchange rate target or both. A sufficiently large expansionary fiscal policy may also work to put the economy back to track but again the keyword is sufficiently large as mentioned by Krugman (2001).

Dornbusch (2001) provides additional support to Krugman (2001)'s new generation of crisis. The new style crises have their roots in the balance sheets of a significant part of an economy and the exchange rate. The crisis can be initiated either by the bad balance sheets or the exchange rate. When one of the two is questioned, the capital flight depletes the reserves and the currency collapses. Since the new style crises involve the balance sheet of an entire economy, the effects are more serious than a current account crisis.

After considering the already known crises, Dornbusch (2001) focuses on the balance sheets of the corporate side. Just like bank balance sheets, the corporate sector may have vulnerabilities in its balance sheet. For example, as the short term debt of the corporate sector increases, the vulnerability of the sector increases. Dornbusch (2001) claims that the more the vulnerability is spread along the corporate sector, the more likely the financing problem will become a currency crisis. Even if only a sector in the corporate side is affected by balance sheet problems, the capital flow affects all sectors, since the investors do not shift their funds from one sector to another. The exit from a sector becomes a capital outflow and the currency collapses.

According to Dornbusch (2001), a bad balance sheet problem can continue indefinitely, contrary to overvaluation problems. As long as the problems are covered

with capital flows, the problems can persist for very long periods of time. However, a seemingly insignificant event can turn things around. If the balance sheets are bad enough, then these small events can ruin this funding scenario and a currency crisis may be initiated.

Finally, Dornbusch (2001) concludes that, even in countries where the balance sheets are not bad, and where there is no vast misalignments in the exchange rate is not overvalued, a crisis is not likely. This does not mean that in those cases the economy does not slow down or interest rates go up; in the contrary economy may slow down, the interest rates may go up and currency may depreciate. However, the possibility of a detrimental crisis is almost zero.

Turkish Experience

Özatay and Sak (2002) try to determine the type of the 2001 Turkish crisis. Basically, after revising each currency crisis generation, the paper points at the details where the 2001 crisis differ from those previous currency crises models. The paper first considers the background for the first and second generation currency crisis models and seeks to associate the 2001 crisis with these types of crises. As discussed earlier, a high public sector borrowing requirement rate points at the first generation currency crisis. However, the deficit was financed through borrowing rather than inflation taxation and some corrective measures were already taken with the start of the program. In addition, fiscal policy was not expansionary in the aftermath of the crisis, contrary to the second-generation currency crisis models require.

As Krugman (1979) points out, before a first generation currency crisis occurs, the fundamentals in the economy start to deteriorate and during this process the international reserves of a central bank depletes gradually. At a given time, the economic agents figure out that the exchange rate regime is not sustainable. This expectation initiates an attack to the currency. Özatay and Sak (2002) show that the advances from the central bank is zero starting from 1997, which is a crucial element in first generation currency crisis. Another point is that the debt maturity, right after the implementation of the program, started to increase. The interest rates are quite

volatile during the whole year and spikes are observed right before the crisis. Basically, it is hard to mention a worsening of the situation, a factor at the core of the first generation currency crisis models.

Another special point to consider is the current account deficit. The paper directs to Calvo and Végh (1997) to prove that the current account deficit did not matter before and after the crisis. Sustainability of the current account deficit requires an average growth rate multiplied by net international debt as a share of GDP. Carlos and Végh (1997) takes 80% of GDP as the maximum level of indebtedness as a rule of thumb, after which the emerging markets are considered to be very risky to attract any capital flow. Considering the average growth rate of Turkey for a period of 20 years as 4.4%, the multiplication gives 3.5% as current account to GDP ratio for 2000. Turkey hits limit once in 2000, that is the deficit is not a permanent one; and most of it, was due to adverse movements in oil prices. Right after the crisis, government shifts to a more flexible exchange rate regime, takes budgetary measures to decrease the current account deficit. Finally, as pointed by Özatay and Sak (2002), research, e.g. Sachs, Tornell and Velasco (1996), show that current account is not a good predictor of currency crises, in most of the cases.

The later attempt is to consider the second-generation currency crisis models and the behavior during the 2001 crisis in Turkey. It was already argued that the public sector borrowing requirement was financed through borrowing. By limiting the increase in money supply, this type of financing hinders the inflation to reach skyrocketing levels. However, high, positive real interest rates and a weak primary surplus are generally associated with unsustainable domestic debt, which makes the economy prone to speculative attacks. The second-generation currency crisis models also show that the post crisis period is not characterized by a decrease in economic

activity. Özatay and Sak (2002) argue that Turkish case did not fit into second-generation crisis models. First, the economy stalled after the crisis. Second, the expansionary fiscal policy in second-generation crisis models was absent in the Turkish case. There was a new IMF agreement and the primary surplus of 6.5% of GDP was set as a benchmark for fiscal discipline.

Finally, the paper analyses the banking sector in order to find the reasons to the crisis. Any of the liquidity ratio definition considered shows that there was no volatility until November 2000, the deterioration was absent until February 2001 and finally the ratio was higher than other emerging markets where there was a currency crisis. For credit quality measurements, credit growth is taken into account and shown that although the credit growth was high in 2000 the figure was not an extreme value when the previous decade is considered. More direct risk measurement variables however, credit risk, foreign exchange risk and interest risk variables, show that the vulnerability in the sector increased during the crisis period. In the foreign exchange rate risk area, open positions of the banks were always a problem to the system. While the open position was increasing, the liquid foreign exchange asset to the liquid foreign exchange liabilities ratio was decreasing. Maturity mismatch was another source of risk. Deposits with maturity longer than 6 months were only 20% of all deposits in the first three months of 2000 however, the maturity for the government debt instruments improved to one year. These portfolios were financed by overnight deposits and repurchase agreements.

All the risk ratios and the ownership dichotomy of the banks, show that the banking system was vulnerable. Banks that were carrying a huge portfolio of government debt instruments found themselves in a very difficult situation when their credit lines were cut. The issue turned into debt rollover problem that pushed

the interest rates up. The increasing interest rates, in return, made of the situation a debt sustainability problem, in an environment where one of the major concerns of the stabilization program was the fiscal discipline.

However, Özatay and Sak (2002) differentiate between the Turkish crisis in 2001 and third-generation currency crisis. In a third-generation currency crisis, the post-crisis period is characterized with expansionary fiscal policy to overcome, high exchange rate and low output. This was not the case in Turkey, a country that was trying to avoid any question of debt sustainability.

Failing to classify the 2001 crisis under any of the existing currency crisis model, Özatay and Sak (2002) list the triggering factors as the delay in structural reforms, slow state deposit insurance fund takeovers, the bankruptcy of Demirbank and the political "crisis" between the government and the president of the republic.

Eichengreen (2002) investigates both Argentinean and Turkish crises in 2001 and provides an outline of the lessons to be drawn from both of these crises. The first important point in both of these crises is the risk of exchange rate based stabilization. In Argentina, the exchange rate regime was a fixed one, whereas in Turkey it was a pegged one. As an initial to a program that is based on credibility, a pegged or a fixed exchange rate regime is ideal. On the other hand, these types of exchange rate regimes are fragile and do not provide easy exit strategies. Although there were numerous examples of exchange rate based stabilization programs, only two of them, Israel and Poland, were successful. In Turkey, the exchange rate regime was a pegged exchange rate regime and the country was supposed to exit from the band in 18 months. During this 18 months period, the banking sector reforms were expected to strengthen the system. However, the reforms were not implemented as planned

and the pegged exchange rate regime was not released when the exchange rate regime came under pressure.

The second point is the maturity structure of the government debt. In the early stages of the stabilization program, both Argentina and Turkey had undertaken serious improvements in their economic conditions. The discipline in the fiscal side helped both countries to achieve primary surplus, the current account had moved to surplus from deficit. However, the maturity for 40% of the domestic currency based bonds of Turkey was between June 2001 and August 2002. This has basically caused a rollover problem after a while, spreading the crisis to new grounds.

Third, debt swap was another problem. Right after the crisis, Turkish Treasury, swapped short-term debt with longer maturity instruments, with higher yields. This was a relief in the short term, but it caused the debt sustainability problems later on.

Fourth, a common problem in both of the countries was the lack of fiscal discipline, which, later on, paved the way to the crisis. During the stabilization program period, starting in 1997, government expenditure in Argentina increased and the public debt increased by 3.5% of the GNP in Turkey, between 1998 and 2000. In 1999, the debt of the public sector as a whole was 23% of the GNP. The first measures to be taken were in the area of primary budget balance, where 6.5% of the GDP as primary surplus became Turkey's target. However, positive primary surplus meant less government expenditure, slower economy, smaller tax base relative to interest rate costs and erosion of political support.

Fifth, it is possible to name the difficulty of rejecting to help. Considering Argentina that had a solvency problem and not a liquidity problem and Turkey that lacked the commitment to the program, those countries did not deserve the support of

the IMF that became more and more conservative after the Asian crisis. IMF was supposed to help the countries with sound economic fundamentals; however the fear of a contagion urged IMF to lend both to Argentina and to Turkey.

Finally, the market participants, opposite to the local authorities and international institutions who back up the reforms and programs, have the initiative for a wait-and-see strategy. These participants are reluctant to invest more unless other investors wait and see that the commitments by a government are fulfilled. If the commitments and the requirements of the program are fulfilled, a new wave of foreign capital starts to flow into the country. Otherwise, the capital inflows stop and problems start to arise.

Alper (2001) clearly shows that by the signing of the letter of intent, the optimism was dominant because of, first, the will for stabilization in Turkey and second, the improvement in Turkey-European Union relationships. The spread between the Turkish Eurobonds and US government bonds tightens as a first reaction. At the first place, the elimination of exchange rate risk by the commitment of the central bank and very low perceived default risk helped to increase the capital inflow. Commercial banks, joining the foreign investors, buy excessive amounts of Turkish government bonds. In addition to the government bonds, the extension of consumer loans at fixed rates by the aggressive local banks caused the interest rates to go lower. Low interest rates and consumption expenditures spurred the economic growth.

On the current account side, the trade deficit grew very fast, not because of the bad export performance but because of the imports. However, the appreciating currency, increased economic growth and increased imports are all associated with stabilization programs.

One of the commitments listed in the stabilization program was the privatization of Turkish Telecom and Turkish Airlines. The delay in the privatization of these state owned firms caused a deviation of USD 4 billion in privatization revenues.

Although a regulatory body had been established, the banking watchdog was far from efficiently supervising the banking system. The open position of the Turkish banking system soared during the stabilization program period, which was borrowing from abroad, exchanging the foreign currency for Turkish Lira and investing in Turkish government bond.

By the end of the year, the foreign investors started to invest in Turkish lira denominated assets. However, Turkish central bank, which has been acting as a "quasi currency board", had his hands tied and was unable to conduct open market operations in order to provide relief to the capital outflow based liquidity squeeze. Local banks with huge government bond portfolios started to sell these bonds for liquidity, which pushed up the interest rates. The foreign banks and investors, in order to limit their risk, cut their credit lines to those banks. In return, the acceleration in the sell-off increased and the interest rates went higher. The central bank, by buying the government bonds and injecting liquidity to the market tried to overcome liquidity problem. However, the liquidity made its way back to the central bank in the form of foreign exchange demand and further capital outflow. The central bank announced the end of the financing of the liquidity short commercial banks. The interest rates spiked to record levels of 7500%. IMF provided a 3-year supplementary reserve facility of USD 7.5 billion, which is used against a speculative attack.

Alper (2001) summarizes the steps to the crisis as follows. First, the disinflation program with an exchange rate anchor and fiscal discipline measures is announced. The capital inflows follow the announcement, due to the fact that the country provides a higher return and similar level of risk since the exchange rate risk is eliminated at the first place and the commitment to the fiscal discipline reduce the default risk. Third, the decrease in the risk premium leads to an increase in the liquidity and decrease in the interest rates in return. The reduction in the interest rates further decreases the risk by lowering the borrowing cost of the government. The capital flow stops until further improvements in the economic conditions. At the same time, reduction in the interest rates spurs the postponed consumption and investment expenditures. The increase in consumption and investment causes a larger current account deficit. Foreign exchange reserves start to decrease. Because of the lack of new reforms, improvements in the economic conditions capital outflows start and liquidity is drained out of the country. The capital outflow depletes the international reserves and the monetary authority abandons the exchange rate anchor.

This paper clearly supports the idea that the 2001 crisis was not a current account crisis but a liquidity and banking crisis. The willingness to improve the economic conditions with new reforms would have helped the country in the form of new capital inflows. Moreover, the hesitating move by IMF in the form of USD 7.5 billion was late. The country's trade deficit was USD 22.3 billion and the capital outflow after the collapse of the illiquid local banks was USD 4 billion. Finally, the lack of sterilization caused an undershooting in the interest rates side and could have been avoided in the first stages of the initial capital inflows.

Kadıoğlu, Kotan and Şahinbeyoğlu (2001) focus on the 2001 crisis in Turkey. Although the paper uses the behavior of numerous statistics, it is a bit far from

detecting the real reason why the crisis occurred; it provides some insights in understanding the pattern of the crisis. The findings of the paper do not differ from those of the rest of the exchange rate stabilization program failure literature. According to the paper and the rest of the literature, the basic pattern that the economic activity in a country follows when an exchange rate based stabilization program is initiated, is real appreciation of the exchange rate, followed by an increase in the economic activity and finally by contraction. This pattern ruins the balance of payment equilibrium. Thus, balance of payment turns out to be a crucial statistic to keep an eye on.

For the Turkish case, one of the major aims of the stabilization program was to bring discipline to the government side of the economy in fighting inflation. The exchange rate regime was set according to the inflation target, attempting to break the backward indexation behavior of the economic agents. Monetary expansion was a function of the capital inflow.

With the start of the program, the interest rates fell drastically and the inflation to the lowest levels of the last 15 years. In return, the investment, thus the production increased and spurred the domestic demand. The increasing domestic demand hindered the inflation level fall to target levels, thus keeping Turkish lira more appreciated than expected and causing a huge current account deficit. Despite the increasing current account deficit, the commitment to the program allowed the country to finance the deficit with capital inflows. However, after August 2000, things started to change. Postponed structural reforms from the government side, the behavior towards the emerging markets, and failure in getting the third part of the IMF loan because of the lack of commitment to the program, started the capital outflows. Capital outflows caused monetary contraction, which in return pushed the

interest rates up. The banking sector that was carrying large interest and exchange rate exposure became more and more fragile.

Just like Alper (2001), the most important finding of the paper is that the crisis is not a balance of payments crisis but the lack of commitment to the program and structural reforms, which shrank the external financing that allowed monetary expansion in the economy.

Akyüz and Boratav (2001), after providing a short Turkish economy performance during 80's, 90's and prior to the crisis, present the two-step crisis. After the start of the program, the important observation to be made was the sticky prices. Although the target for the nominal exchange rate, net domestic assets and primary budget deficits are attained, the CPI figure overshot the target by 15%. The slow pace of stabilization in prices, accompanied with slow nominal exchange rate caused a real appreciation in the domestic currency. The slow adjustment of the price level is mainly attributed to the increase in the price level in public sector products and services. Second, wage increases in the private sector, since they were mostly based on backward indexation, exceeded the inflation. In the public sector side, the collective agreements acquired higher than inflation increases to the labor payments. Finally, the increase in some components of CPI, such as rents, exceeded the inflation target.

Despite the slow adjustment of the prices, there was a slowdown in the inflation, decrease in the interest rates and the domestic currency was appreciating. The inevitable result was an increase in the demand for goods. The GDP growth reached 7%, imports increased by 35%, whereas exports only rose by 5%. The current account deficit to GNP ratio reached an unprecedented 5%. The inflation rate was still higher than the target when the peg was released. In Mexico, the inflation

reached single digit figures when finally Mexican Peso was devalued in 1994. Similarly, in Brazil, after the launch of the stabilization program in 1994, the hyperinflation had come down to 6% in 1999, when there was an attack on the currency. Thus, when the fact that the other programs have stood still against the contagions is considered, the collapse of the Turkish program in such a short period of time was bizarre.

In November, disappointing inflation figures for October, higher than expected trade deficit figures, worsening relations with European Union and the situation in Argentina caused a capital outflow of USD 5.2 billion. Since it was the end of the year, both local and foreign investors started to sell lira for foreign exchange in order to reduce their position in Turkey. Banks relying on foreign funds, like Demirbank, started to bid up the market for liquidity, borrowing at very high interest rate and at the end selling off their T-bill portfolio with huge losses, for liquidity. The rate on benchmark T-bill reached 50% where the overnight interest rates were already three digits. Central bank started to provide liquidity for the troubled banks in order to avoid deepening the financial crisis. Injection of the lira hit back the central back in the form of demand for foreign exchange. Liquidity injection was stopped and the central bank started to defend the peg by selling foreign currency for lira. In a short period of time, a new agreement was reached with IMF and a fresh USD 10.5 billion backed up the program in return of new commitments by the government such as further spending cuts and tax increases, relaxation of agricultural support, privatization and restructuring of the financial sector.

The new agreement seemed to help to stabilize the situation. In January, the capital flows had stopped, the overnight interest rates had come under 60% and the international reserved had been replenished. IMF was backing up the program and

was confident that the program was working. However, the maturity in the treasury auctions started to shorten drastically, the interest rates rose up to 70%. Finally, the conflict between the president of the republic and the government paved the way to the end of the program. The interest rates rose to 5000% and the international reserves started to be depleted. The government decided to abandon the peg.

Akyüz and Boratav (2001) points IMF as the first reason for the crisis, who blames the external factors, policy slippages, and political uncertainty for the failure of the program. However, the program designed by the IMF had not the flexibility to deal with the widening current account balance, weak financial sector, worse than expected fiscal policy performance. In addition, the previous exchange rate based stabilization programs show that the weaknesses that arise during the program are not due to policy slippages but the results of the capital inflows, that appreciate the currency, deteriorate the current account. Regarding the external factors, the strengthening of dollar against euro worked against the success of the program. The weak euro caused problems for the Turkish exports. Nevertheless, the exports increased by 7% that year. In addition, IMF estimated that the TRL was 10% undervalued and the appreciation was in the same magnitude.

The reaction to the speculative attack on Turkish lira was the same as in the case of other speculative attacks with some small differences. The Fund asked a move to a floating regime following the attack, mostly due to the pressure by United States, who criticized the defense of the currency, which is bound to collapse, using the money of American taxpayers. The previous examples provided ample support to the fact that, once the policies failed to restore the confidence, it was impossible to realign in an orderly way.

Furthermore, the Fund's hands-on approach to the program was a drawback. The Fund was criticized to be too intrusive in the East Asian experience. In the Turkish case, this tendency was taken further by the Fund to the point of interfering to the appointments of the public bodies. This proved to wear away the confidence of both the program and the government.

Öniş and Alper (2002) try to clarify the role of IMF in the crisis. IMF, since its establishment, is criticized by its approach and involvement with the developing countries. When a member country experienced a balance of payment crisis, IMF stepped in when approached. However, in most of the cases, IMF's expenditure switching and expenditure reducing packages were very hard to implement since IMF did not provide enough fund to support the program. Developing countries were disapproving of the IMF programs since the strategy followed by IMF to fight the balance of payments problems required budgetary cuts in the short run, which limited the economic growth and the living standards of the poorer class.

Moreover, Öniş and Alper (2002) list 4 types of asymmetries regarding IMF policies. First, the Fund is myopic in the sense that short-term adjustments are preferred over long-term growth. Second, the preferences of the lenders are preferred over those of the borrowers. Third, IMF cannot discipline surplus countries with the same weight of adjustment as deficit countries. Fourth asymmetry is, arising from the third point, the involvement of IMF prior and following to the crisis. IMF can step in, when a crisis occurs, so its involvement is very limited prior to the crisis, however, when the crisis occurs, the influence of the Fund, increase drastically. Consequently, the strategies proposed by the Fund become unpopular by the citizens of the recipient country.

The criticisms against the Fund during 70's and 80's were not critical since they mostly originated from the developing world. Although the criticisms helped the developing world to gain access to a larger pool of funds at favorable terms, their impact was not at a desirable level. In addition, Fund started to cooperate with the World Bank, showing the awareness of the need to combine short-term adjustment with long-term reforms to deal with the balance of payment problems. However, promotion of the Washington Consensus, emphasizing free trade, free capital market, liberalization, raised more concerns. Especially, open capital account regimes made IMF's job more complicated than before. The capital flows were massive and very volatile. Hence, although the fund provided by IMF increased in size, the proportion of those available funds to private funds became gradually smaller and smaller.

With the Asian crisis in 1997, the Fund's focus shifted to financial and banking sector. Fund started to put more weight on good governance and transparency of budgetary process. Furthermore, the stabilization programs based on pegged exchange rates regimes became more and more pronounced. The peg was never the single anti-inflationary instrument, but just a part of a broader program where fiscal discipline was very important.

Although the adaptability of the Fund to new cases and changing types of problems improved, the uniformity of the prescriptions became the major point of criticism. The expenditure reducing policies to bring the balance of payments into balance was at the heart of the prescription. The Korean and Mexican crises that occurred in an environment of fiscal prudence, clearly pointed out the shortcoming of the Fund's program. In both countries, the reason for the crises was the private sector rather than public sector.

The IMF stabilization program was then criticized because of the assumptions of the program. The program assumed that the fiscal policy was strict and regulatory measures were implemented. This assumption required another two assumptions: first, the political resistance could be overcome easily and second, politicians would behave in the long-term economic interest of the country, ignoring the short-term temporary, populist benefits. In most of the cases, measures failed to be implemented successfully and politicians were reluctant to consider the long-term benefits all the time.

After the initial steps of liberalization that took place in the early 1980s, Turkey made the full capital account liberalization in 1989. The macroeconomic structure was not stable; regulatory framework was far from sufficient. So the aim of lower interest rate, higher growth could not be achieved. Mostly, short-term capital flowed into the country, whereas desirability for foreign direct investment suffered when compared to the emerging markets of the same size and same population. Öniş and Alper (2002) consider the critical issue, namely the extent of IMF's role in the premature opening of Turkey's capital account. The decision was the result of the domestic political process. The decision was taken just for the short-term benefits of the portfolio investments. At the same time, there was no confrontation or requirements from the part of IMF. It may be the case that the Fund wanted fast capital account liberalization, assuming that the regulatory infrastructure could be built at a later stage. The lack of crisis would also hinder the Fund to convince Turkey for the establishment of a banking sector regulatory body. The state deposit insurance fund could only be established before the 2001 crisis, in 1999, when IMF had the power to insist on such a regulatory body.

When the period between the two crises is considered, IMF was closely watching the Turkish economy and pointing out to the problems in the fiscal policy. However, Turkish authorities were quite reluctant to cooperate with IMF until the sustainability of the fiscal policy was questioned. For the 1999 stabilization program, it was the first attempt from the Turkish side to cooperate with IMF without a crisis at the site. The problem was that, not all coalition members of the government has wholly backed up the program; but IMF assumed full government commitment and underestimated the financial sector fragility. If the underestimation is not the case then one can say that the banking crisis was purposefully designed, because the program was launched before the establishment of a sound financial sector. Finally, the financial resource provided by the Fund was far from being sufficient. Again, the Fund put much more emphasis on short-term targets, which is elimination of the budget deficit, than longer- term targets, that is, banking sector regulation. On the exchange rate based stabilization program side, the setting was much more flexible and softer in Turkey, when compared to other experiences such as Argentina, where there was a currency board and the convertibility plan was very strict.

Briefly, although a much criticized institution, IMF has the ability to reform itself, especially when 1980s and 1990s are considered. However, it is possible to hold responsible the Fund for rushing the capital liberalization procedure and just assuming a short period of time for the establishment of a decent regulatory infrastructure. In addition, the Fund should take into account both borrowers' and lenders' interests. Any unconditional financial resource will cause more trouble via moral hazard. Moreover, any stabilization program that aims only at short-term targets is insufficient. For cases like Turkey, the Fund must take into account points like, long-term growth and distributional problems. This also requires strong

cooperation by individual countries that must devote further efforts to improve the conditions beyond the Fund's efforts.

Kar and Kara (2003) deal with the crisis from another point of view. The research takes into consideration the capital movements. According to Kar, by relaxing the limitations on capital movements in 1989, Turkey was left vulnerable in the sense that short-term portfolio investments flowed into the country. The process of the 1994 crisis was not an enigma. The financial markets were dominated by short-term speculative foreign investors instead of the central bank. By letting the foreign capital to have access to the Turkish markets, the Turkish lira appreciated, and encouraged the domestic banks to borrow from abroad and invest these funds into lira denominated assets. This caused in worsening foreign exchange exposure of the financial system, where the banks are the biggest players. With cheaper funds, domestic demand is stimulated. Imports increased and appreciated lira caused reduction in the exports. The increased levels of trade balance over GNP ratio increased the demand for foreign short-term capital. The open position of the banks has increased more and more. The attempt to lower the interest rates, by injecting more liquidity into the market and taxes on domestic bonds and bills, caused the agents to form depreciation expectancies. Despite the dirty float, the domestic currency started to depreciate and foreign capital fled the country. The reserves of the central bank were reduced to almost half of its initial levels.

The April 5th 1994 decisions saved the day, but caused greater problems in the future. Just to name a few, keeping the interest rates high stopped the capital outflows but increased the debt burden on the government and thus the taxpayers. Second, by the beginning of the crisis, full deposit insurance is launched, which in

return caused more grave problems in the coming years because of the moral hazard problems, which was in the heart of the crisis in 2001.

The most serious attempt to fight inflation was the exchange rate based stabilization program launched in 1999. On the fiscal side, government made commitment to a primary surplus target and tight fiscal policy, accelerated privatization, an income policy compatible with the target inflation and a structural reform package. On the monetary side, central bank announced the value of a basket that constituted of USD1 and 0.77EUR, for the year 2000. Net domestic assets were fixed and any monetary expansion became possible with an expansion in net foreign assets. It was obvious that the central bank relaxed its power to manipulate short-term interest rates for exchange rate.

By the end of the year, the devaluation in Turkish Lira was 20% and the inflation level 39%. The deviation between the devaluation and the inflation was the perfect sign for an anomaly. Because of an appreciating Turkish lira, the imports expanded by 23% whereas the exports increased only by 2.2%. Another reason for an increase in imports of that size is the expansion in consumer loans that soared by 300%. As a result, current account deficit reached USD 9.8 billion, which was 5% of the GNP. For a sustainable current account deficit, Turkey needed more foreign funds; however the risk perception of the foreign lenders changed as the fundamentals of the country deteriorated.

With the start of the capital outflows, the liquidity in the market became scarce and the overnight interest rates started to rise. The banks that were holding government debt instruments were financing their portfolio via short-term borrowing and this financing method became more and more problematic. The banks started to incur huge losses. State Deposit Insurance Fund started to take over the control of the

troubled banks. This speculative attack was not successful due to very high interest rates, loss in foreign exchange reserves and a loan of USD 7.5 billion, granted by IMF. However, the system was now vulnerable to an attack and did not have the strength to stand another attack. After the conflict between the president of the republic and the prime minister, another speculative attack started and the program could not survive this second one.

The crisis in 2001 put forward the subject of effective capital controls in Turkey. As an emerging market, it is not very wise to put limits on the capital movements, since Turkey is a capital scarce economy. Plus, the saving rate is not as high in the far eastern emerging economies. Thus, to avoid a biased growth, which is based on only agricultural production and simple textile exports, the country needs more foreign exchange generating items. Until that time, the capital movements are unavoidable. Still, there are measures to be taken. First, it is mandatory to acquire a sound macroeconomic structure; and at the same time the financial sector must be under severe control. Second, although it is very well known that the capital inflows and domestic lending are highly correlated, limiting measures must be taken in order to control loan expansion.

Kibritçioğlu, Köse and Uğur (1999) use the leading indicator approach in order to study the 1994 Turkish crisis. The paper uses monthly data for the period 1986-1998, taken from IMF and Turkish Treasury and the Central Bank. The variables used are a series of macroeconomic variables. They define the crisis as an abnormal behavior of the exchange rate market index. The currency crisis index (CCI) was constructed as a weighted average of monthly exchange rate changes, the negative of monthly international reserve changes and the difference between the domestic interest rate and foreign interest rates (domestic bill rates-US treasury bill

rates). The weights are chosen so as the variables of the three variables are equalized. When the value of the index exceeds the threshold value, which is set to equal to 1.5 times to the pooled standard deviation of the calculated index plus the pooled mean, there is an indication of the currency crisis. The paper finds that, terms of trade, market-determined exchange rate over official exchange rate and some central bank survey data are leading indicators. The ratio of budget deficit to GDP and the ratio of current account balance to GSP were found to be insignificant. These were parallel findings with the literature. However, growth of domestic credits of deposit banks, the ratio of M2 to gross international reserves, growth of exports, growth of imports, the ratio of short term capital flows to industrial production and the ratio of current account balance to industrial production were not effective to predict the currency crisis in Turkey.

Özkan (2005) tries to give a fundamental based explanation for the crisis in addition to a financial fragility based explanation. First, the output growth performance is examined as a start for the fundamental based explanation. The post 1996 period exhibits a very volatile pattern for this variable. The program period shows a strong growth performance, which is in line with the stylized facts associated with the exchange rate stabilization programs. This variable provides no evidence for crisis.

Secondly, external balance is examined. Although this variable is considered to be neither necessary nor sufficient to predict a crisis, it is always taken into account. The deterioration in the external balance is very likely, since the fixed exchange rate causes an appreciation of the domestic currency, which distorts the relative prices in favor of import good prices versus export good prices leading to a deficit in the external balance. The paper finds a downward sloping trend in the trade

balance after the liberalization of the trade, starting from 1980s; but this is not a very surprising point. Another expected point is that the case of current account balance is more optimistic. However, both of these variables show a downward trend during the program period.

Thirdly, the author focuses on competitiveness. In high inflation countries, the evolution of the inflation is very important for competitiveness, when an exchange rate based stabilization program is implemented. For Turkey, the program was successful in the sense that it broke the upward trend in the inflation rate; but it was still higher than the expected devaluation rate.

For the external borrowing case, the paper shows that the external debt of the country increases from USD 3 billion (in 1971) to USD 100 billion (in 2000). The last figure was approximately 60% of the GDP. After 1997, short term borrowing starts to rise dramatically. The major borrowers in this market are the local commercial banks. This situation was the major cause for the vulnerability of the financial system in Turkey. For the same period, with the improvement in the economic conditions, the public sector was able to borrow for medium and long-term borrowing. For the ability of debt servicing, the ratios of debt service to GDP and exports show an alarming picture for Turkey. The due interests over exports points out an increasing heavy burden for the country.

In the fiscal side, total domestic debt over GDP ratio increased almost by 50% in 15 years. Public sector borrowing requirement over GDP ratio was always on very high levels as 12%-14%. This, in turn, pushed up the nominal interest rates. The figures show that the problem with the fiscal side is not the expanding credits but the worsening condition of the public finance that contributed to the overall weakness of the economy.

After the fundamental based explanation, Özkan puts forth the financial fragility issues of the crisis period. The banking sector in Turkey, even before the crisis was undercapitalized and poorly supervised. The introduction of the peg led the banks to be riskier than ever. Banks were borrowing in foreign money and were using it to lend it in Turkish Lira. They were carrying both the exchange rate risk and the country risk. The open position of the banking sector skyrocketed during the year. The maturity structures of the syndication loans were short term and this caused a maturity mismatch balance sheet-wise. Toward the end of the year, extended consumer loans started to climb up –but as mentioned before they were not extensive as were the case in the Asian crisis. The policy makers' hands were tied, since the release of the peg would harm the financial sector and would also put the treasury in a much worse situation. The addition of the corporate sector's weakness into the analysis shows that the mentioned sector is also troubled though the problem is not as deep as the Asian case.

To sum up, the paper finds three sets of vulnerabilities that paved the way to the crisis. The first one is the high external debt burden. The inflation rate, which was higher than the devaluation rate caused a loss in competitiveness, and this in turn, caused problems in debt servicing. The second set is the weak fiscal position. This was mainly due to high interest payment made on the domestic bonds. The public sector borrowing rate was always too high for the country and the banking sector was too shallow to satisfy the borrowing requirement of the government. The high borrowing requirement for the government crowded out the investment of the private sector and new areas of taxation could not emerge and the process continued as a vicious cycle. Third and final set is the financial and banking sector weakness. The

lack of supervision and balance sheet problems prepared the ground for the liquidity squeeze in late 2000.

CHAPTER 4

THE CAUSES OF THE CRISIS

The Theoretical Background

It is of crucial necessity to investigate the determinants of real exchange rate and their behavior before the crisis to understand the crisis, which is characterized by the devaluation of the domestic currency. Cerra and Saxena (2002) conduct a similar research, investigating the reasons of the 1991 crisis in India. They focus on the relationship between the fundamentals and the real exchange rate, defined as the relative price of nontraded goods to traded goods, that can be investigated either by an infinite horizon optimization or by a two-period optimization method as is done by Montiel (1997) and Edwards (1989) respectively. These papers basically considers the variables that are found to be significant by the literature, namely the current account, government consumption expenditures, investment, openness of the economy, technological progress, terms of trade, trade controls and budget balance. The inclusion of these variables is explained as follows:

The improvement in the terms of trade can spur the trade surplus, in return appreciates the real exchange rate. The coefficient is expected to be positive.

The expected sign for government consumption is mixed. It can be negative as well as positive. The explanation is based on the direction of the government consumption. If the consumption is directed to traded goods, the trade balance will

deteriorate, which in return depreciates the real exchange rate; leaving the coefficient negative. If the consumption is directed to non-traded goods, to maintain the relative prices stable, the real exchange rate will appreciate, the expected sign will be positive.

As the openness of the economy develops, depending on the proxy utilized, the sign of the coefficient will change. For example, the mostly used proxy (exports + imports) / GDP, as used in Montiel (1997), assumes that as share of the international trade in GDP increases, the openness of the economy improves. As the economy is opened to the international trade, imports cause imbalances that are corrected by a depreciating real exchange rate. Thus the sign is expected to be negative. However, Edwards uses custom tax revenues / imports and the difference between the formal exchange rate and the black market rate for the foreign exchange, in order to evaluate the effects of controls over trade and exchange. In this specific case, it is obvious that the expectation for the signs are positive, since the decrease in the values of both of these variables implies a relaxation in the control mechanism.

One of the mostly debated variables is capital control. The sign will be mostly depending on wealth and substitution effects. In the long run, the relaxation of the capital controls, with the wealth effect, increases the consumption in all periods. Hence an appreciation is necessary and the expected sign becomes positive. However, when substitution effect is considered, the future consumption is lower than present consumption, pushing down the price of non-traded goods. Thus, the expected sign is negative.

Technological progress leads to an expansion in the sector producing traded goods and an increasing trade surplus. To restore the equilibrium, the price of the non-traded goods must rise, appreciating real exchange rate.

Investment is included in the model to capture the effects of the supply-side. However, the sign for this variable may change from country to country due to the production factor intensities of traded good and non-traded goods sectors.

In addition to the long run variables, Edwards adds expansion of domestic credit and budget balance to the framework in order to capture the short run effects of the inconsistent fiscal policy. As long as the fiscal policies are expansionary, the real exchange rate is under pressure and the domestic currency is mostly overvalued.

For current account, which is an exogenous variable for the model just like extension of credit and government budget balance, the sign is expected to be positive.

The Data

The data covers the period 1987:Q1 – 2000:Q4. The source for the data is Central Bank of Turkish Republic (CBTR) and IFS statistics. The list of the variables is given in Table 7.

Table 7 – List of Variables

Variable	Description	Source
REER	Real Exchange Rate	CBTR
GCON	Government Consumption	IFS line 91
XVAL	Unit Value of Exports	IFS line 74, CBTR
MVAL	Unit Value of Imports	IFS line 75, CBTR
TOT	Terms of Trade	
X	Exports	IFS line 70, CBTR
M	Imports	IFS line 71, CBTR
OPEN	Openness	
GDP	Gross Domestic Product	CBTR
CAPFLOW	Capital Inflows	IFS line 78 bjd + 78 cad
IPI	Industrial Production Index	CBTR
TECHPRO	Technological Progress	
INVEST	Gross Fixed Capital Formation	IFS line 93e
CA	Current Account Balance	IFS line 78 aldzf
HPMONEY	High Powered Money	IFS line 14
DOMCREDIT	Domestic Credit	IFS line 32
GBAL	Government Budget Balance	IFS line 80
EXCREDIT	Extension of Credit	

The data frequency is quarterly, 1987:Q1 – 2000:Q4, as mentioned before. Annually released data were interpolated in order to obtain quarterly data. The data construction was as follows:

REER = ln (REER)

GCON = ln(GCON)

$TOT = \ln(TOT)$

$OPEN = \ln [(X+M)/GDP]$

$INVEST = \ln (INVEST/GDP)$

$TECHPRO = \ln(IPI_t/IPI_{t-4})$

$CAPCONTROL = (CAPINFLOW/GDP)_{t-1}$

$GBAL = GBAL/HPMONEY_{t-1}$

$EXCREDIT = \Delta\ln(DOMESTIC\ CREDIT) - \Delta\ln(GDP)_{t-1}$

$CA = \ln(CA/GDP)_t$

Model Selection

The major aim is to detect the long-term relationship between the real exchange rate and its real determinants and then it is safe to see the reason why the crisis happened in Turkey in 2001. The error correction model (ECM) is extremely handy in that sense.

The theoretical part of the paper contains both short-term and long-term determinants for real exchange rate. Therefore, it is possible to focus on the short-term causes and long term causes of the crisis separately and by combining both of the factors, it is possible to obtain a sensitivity check model.

As expected, the first step was to implement the unit roots test. The Augmented Dickey-Fuller test proved that all variables with the exception of real exchange rate and terms of trade are stationary (Table 8). Although the results of analyses conducted with nonstationary series can be spurious, the number observations that are required despite the limitation of data makes it safer to work with nonstationary data. Moreover, most of the macroeconomic data is characterized by a unit root procedure. However, the combination of any two non-stationary variables may be stationary. In this case, these variables are said to be cointegrated. The stationary combination is called a cointegrating equation and is interpreted as a long run equilibrium relationship between the considered variables. Cointegration

and error correction models help to work with nonstationary data. Thus, it is less adventurous to work with non stationary data than not to conduct the analyses.

Table 8 – Unit Root Test Results

Unit Root Test	
Variable	ADF Statistic
CA	-4.27*
CAPCONTROL	-6.92*
EXCREDIT	-6.22*
GOVCONS	-5.20*
INVEST	-12.53*
OPEN	-5.61*
REER	-2.40*
TECHPRO	-3.52*
TOT	-2.30*
GBAL	-5.49*

*denotes a nonstationary series.

The following step is cointegration tests. Nonstationary series are necessary but not sufficient to conduct an error correction model. The Johansen cointegration test basically provides the number of cointegration equations. The initial model is Montiel's theoretical framework for the determinants of real exchange rate, which includes government consumption, terms of trade, openness of the economy, technological production, capital control and investment. Step by step, insignificant variables are omitted or new variables are added according to the requirements of the theory and new analyses are conducted.

Before conducting a vector error correction model, a cointegration test is run, since the test of cointegration means the long-run equilibrium relationship between the variables considered. If the results prove that there are no cointegrating vectors among the variables considered, then there is no long-run stable relationship among these variables. In case where there is cointegrating relationship, then it is possible to talk about at least one way Granger causality, that is, either the variable Granger causes the movement in the real exchange rate or the movement in real exchange rate

causes the movement in the considered variable. However, a Granger causality test is not performed between the real exchange rate and individual variables. The first row for all the cointegration test tables shows the result of the null hypothesis of no cointegrating relation; the second row shows the hypothesis of one cointegrating relation and so on. The critical values provided by Johansen and Juselius (1990) help to determine the existence of cointegrating relationship among the variables comparing the likelihood ratios with the critical values at 5% and 1% significance levels. When the likelihood ratio is higher than the critical values, we reject the hypothesized number of cointegrating equations. Finally, the estimations are computed using EViews. Although, EViews provide eigenvalues for the cointegration test, the critical values for these figures are not provided. Therefore, the eigenvalues are listed in the summary tables but only the likelihood ratios are taken into account while analyzing.

If any cointegrating relation is detected, then a vector error correction (VEC) analysis is conducted. The results for the VEC analysis are presented in Table 10 at the end of Chapter 4.

The vector error correction is a vector autoregressive (VAR) process such that, assuming Y_t, a (nx1) vector of variables. The unrestricted VAR of Y_t up to k lags can be written as:

$$Y_t = \prod_1 Y_{t-1} + ... + \prod_k Y_{t-k} + \Phi D_t + \varepsilon_t \qquad t = 1,\ldots,\mathrm{T}.$$

The error term, ε_t, is distributed with mean 0 and a variance of σ^2. The variable D_t may constitute of a trend term, a constant and seasonal dummy variables. The equation can be written in VEC form as:

$$\Delta Y_t = \prod Y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \Phi D_t + \varepsilon_t \qquad t=1,\ldots,\mathrm{T}$$

where $\prod = \sum_{i=1}^{k} \prod_i - I$ and $\Gamma_i = -\sum_{j=i+1}^{k} \prod_j$. If the polynomial has one or more unit roots, then Y_t is an integrated process. Setting $\Pi = \alpha\beta$, the model is then defined as:

$$\Delta Y_t = \alpha\beta Y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \Phi D_t + \varepsilon_t \qquad t=1,\ldots, T$$

β is the matrix for long term coefficients and α stands for the speed of the adjustment to the equilibrium. In this part of the analysis, the Y_t consists of:

Y_t = {real exchange rate (REER), current account (CA), capital control (CAPCONTROL), extension of credit (EXCREDIT), government budget balance (GBAL), government consumption (GCON), investment (INVEST), openness (OPEN), technological progress (TECHPRO), terms of trade (TOT)}

The first model, Model 1, uses all the variables proposed by Montiel (1997) that is government consumption, terms of trade, openness of the economy, technological production, capital control and investment in investigating the cointegrating relationship among those variables and real exchange rate. The Johansen cointegration test results reveal that there are cointegrating equations (Table 9). The null hypothesis of no cointegration equation is rejected at the 1% significance level since the likelihood ratio, 209.51, exceeds 133.57 and 124.24, which are the critical levels for 5% and 1% significance levels respectively. For at most one cointegration equation, the hypothesis is rejected again at the 1% significance level, with likelihood ratio being equal to 243.97 and the critical value for 1% being 103.18. The hypothesis that there are at most two cointegrating equations is rejected, with the likelihood ratio of 85.23, which is greater than 76.07, the critical level for the 1% significance level. For the rest, the hypothesized number

of cointegrating equations cannot be rejected. Therefore, likelihood ratio test indicates three cointegrating equations at 1% significance level.

Table 9 - Johansen Cointegration Test Results for Model 1

		Critical Values		
Eigenvalue	Likelihood Ratio	5 percent	1 percent	Hypothesized No of CE(s)
0.72	209.51	124.24	133.57	None**
0.68	143.98	94.15	103.18	At most 1**
0.57	85.23	68.52	76.07	At most 2**
0.37	42.26	47.21	54.46	At most 3
0.19	18.29	29.68	35.63	At most 4
0.12	7.03	15.41	20.04	At most 5
0.00	0.01	3.76	6.65	At most 6

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.

After concluding that there are cointegrating equations, VEC analysis is conducted. First, the lag structure is determined using the Akaike Information Criterion (AIC). AIC considers $-2*l/n+k*n$ for model selection, where k is the number of estimated parameters, n is the number of observation and l is the log likelihood function value that uses those k parameters. The model that minimizes the AIC value is selected. AIC is minimized at third lags. Therefore, the analysis is conducted using that lag structure.

All of the possible long term variables suggested by Montiel is used to estimate the first error correction model. These variables are namely government consumption, terms of trade, openness, technological progress, capital control and investment. The second column of the Table 15 shows that only terms of trade and investment are insignificant. Openness and capital control variables are significant at the 1% significance level; whereas government consumption and technological progress are significant at the 5% significance level. Government consumption has a significant negative coefficient, which is in line with the theory anyways, since both positive and negative signs have economic meanings. Openness and relaxed capital

controls depreciate the currency. Technological progress leads to an appreciated real exchange rate, which is in line with the Balassa-Samuleson effect. The R^2 is 0.60 for the first model, indicating that 60% of the long term behavior of the real exchange rate in Turkey can be explained by government consumption, terms of trade, capital controls and technological progress. However, insignificant variables, terms of trade and investment prove that Turkey is not a textbook case to test the long-term determinants of real exchange rate. Therefore, these results confirm that the crisis was not an outcome of solely long-term variables.

Model 2 is the initial step to investigate the combined effect of short-term misalignments. Therefore, the model consists only of extension of credit, current account and government budget balance. An expansionary fiscal policy is expected to be associated with an appreciating currency; therefore the coefficients for government budget deficit and extension of credit are expected to be positive. Just like the other short-term variables, the current account deficit will be accompanied by an appreciating currency; therefore the sign is expected to be positive.

First of all, the cointegration tests are conducted. Table 15 shows that the error correction model can be conducted since the existence of at least one cointegrating equation cannot be rejected. The hypothesis that there is no cointegrating equation is rejected at the 1% level, with a likelihood ratio of 104.12 and at the 1% significance critical value of 54.46. For at most one cointegrating equation, the hypothesis is only rejected at the 5% level where the likelihood ratio is 34.77 and the critical value is 29.68 for the 5% level. The eigenvalues are listed again, but as mentioned before, the statistical package does not provide the critical value, that is why, only likelihood ratios and their critical values are taken into account.

Table 10 - Johansen Cointegration Tests for Model 2

		Critical Values		
Eigenvalue	Likelihood Ratio	5 percent	1 percent	Hypotesized No of CE(s)
0.74	104.12	47.21	54.46	None**
0.39	34.78	29.68	35.65	At most 1*
0.13	8.75	15.41	20.04	At most 2
0.02	53.24	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.

The third column of Table 15 shows the results of the error correction model for Model 2. All the short term variables are significant. As expected the expansionary fiscal policies result in an appreciated currency. The sign for extension of credit and government budget deficit is positive and their coefficients are significant at the 1% significance level. Interestingly, the current account deficit has a negative coefficient, which is again significant at the 1% significance level. The result proves that, the variables that are considered to affect the real exchange rate in the short-term are as important as the long-term determinants. With only those variables, R^2 turns out to be 0.52, that is, it is possible to say that 52% change in the variance of the real exchange rate can be explained by the change in these variables' variances.

The last model combines the significant variables of Model 1, government consumption, openness, technological progress and capital controls; and the variables of Model 2, extension of credit, government budget deficit and current account deficit. The first is again the cointegration test as it was in the previous two models.

The test results show that there are eight cointegrating equations. The hypotheses that zero, at most one, at most two, at most three and at most seven cointegrating relations are rejected at the 1% significance level. The hypotheses that there are at most four, at most five and at most six cointegrating equations are

rejected at the 5% significance level (Table 11). For none, at most one, at most two, at most three and at most seven cointegrating equations hypotheses, the likelihood ratios are 408.95, 246.33, 150.48, 93.68 and 8.09 respectively whereas the corresponding critical values for the 1% significance level are 156, 124.24, 94.15, 68.52 and 3.76. For at most four, at most five and at most six cointegrating equations hypotheses, the likelihood ratios are 50.29, 32,70 and 19.44 that are greater than corresponding 47.21, 29.68 and 15.41, 5% significance level critical values. Therefore, there is no constraint to the vector error correction model analysis.

Table 11 - Johansen Cointegration Tests for Model 3

		Critical Values		
Eigenvalue	Likelihood Ratio	5 percent	1 percent	Hypotesized No of CE(s)
0.95	408.95	156	168.36	None**
0.84	246.33	124.24	133.57	At most 1**
0.67	150.48	94.15	103.18	At most 2**
0.57	93.67	68.52	76.07	At most 3**
0.29	50.29	27.21	54.46	At most 4*
0.22	32.70	29.68	35.65	At most 5*
0.19	19.44	15.41	20.04	At most 6*
0.14	8.09	3.76	6.65	At most 7**

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.

Although the introduction of extension of credit improves the explanatory power of the equation, by increasing the R^2 to 0.33, this variable turns out to be insignificant. Similar to extension of credit, terms of trade and government balance are significant. The government consumption, openness, capital control and investment are significant. Government consumption is significant at the 10% level, whereas capital control and investment are significant at the 5% and openness is significant at the 1% level.

All the variables, government consumption, openness, technological progress, capital control, extension of credit, government budget deficit and current account deficit, are significant at the 1% significance level.

Consistent with the theory, the coefficient of government consumption is positive. The increased level of government consumption of traded goods leads to an appreciated currency. Capital control has a significant and positive coefficient, meaning that a decreasing control over capital attracts more capital inflow, appreciates the currency that is, the income effect dominates the substitution effect. Technological production, with the significant positive sign, is consistent with the Balassa-Samuelson effect. The extension of credit and government budget balance proves that the expansionary fiscal policy appreciated the currency. The openness variable turns out to be positive, which is unexpected by the theory. In the case of openness, it is likely that the pace at which the imports increased is assumed to be higher that that of increase in exports. Therefore, the more open the economy is, the more depreciated the currency is. However, if exports grow faster than imports, then this is not the case. In this case, the currency, instead of depreciating, appreciates and the sign is expected to be positive. In order to overcome the problematic negative sign of the current account balance, its lagged values are used.

The fourth lag of the current account balance solves the problem but again in order to test the existence of cointegrating relations, the cointegration test is run. The cointegration test reveals that there are cointegrating relations (Table 12). The results show that the hypotheses that there are no, at most one and at most two cointegrating relations are rejected at the 1% significance levels. The likelihood ratios for those hypotheses are 409.85, 247.93 and 141.84 respectively; whereas the corresponding critical values for the 1% significance level are 168.36, 133.57 and 103.18. The

hypothesis that there are at most three cointegrating equations are rejected at the 5% level with likelihood ratio 71.97 and 5% critical value of 68.52. Therefore, the vector error correction model is run.

Table 12 - Johansen Cointegration Tests for Model 4

		Critical Values		
Eigen Value	Likelihood Ratio	5 percent	1 percent	Hypotesized No of CE(s)
0.96	409.85	156	168.36	None**
0.89	247.93	124.24	133.57	At most 1**
0.76	141.84	94.15	103.18	At most 2**
0.43	71.97	68.52	76.07	At most 3*
0.36	44.70	27.21	54.46	At most 4
0.24	22.58	29.68	35.65	At most 5
0.10	8.93	15.41	20.04	At most 6
0.07	3.70	3.76	6.65	At most 7

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.

The error correction model analysis proves that all the variables are significant at the 1% significance level. The coefficient for government consumption is negative meaning that the government spending is directed towards traded goods and therefore the currency depreciates. The openness variable is now negative as expected, meaning that the exports grew slower than the imports. Technological production is now negative, meaning that the Balassa-Samuelson effect is not working in Turkey. This may be explained by the profit margin in the domestic market. As technological progress takes place, the major part of the production is directed to the domestic market where the profit margin is higher. Although increased supply of the non-traded goods pushes down the prices, the profit margin is higher than the competitive export market, pushing down the relative price of non-traded goods. The capital control variable is positive meaning that the wealth effect of capital flows dominates the substitution effect of those flows, increasing the consumption in all future periods. The expansionary fiscal policies, the extension of

credit and budget deficit, have the expected positive sign. The coefficient of the current account level is now positive, meaning that as the deficit (surplus) increases the currency depreciates (appreciates). The R^2 for this model is 0.70 which means that 70% of the change in the real exchange rate can be explained by the change in the variables that are selected for the analysis.

Since the current account is included in the model as an exogenous short-term variable, and since the behavior of the current account is closely watched by the economic agents in Turkey, another step is included into the analysis to investigate the causality between the current account balance and the real exchange rate. Using the previous error correction model period of 1987:Q1 – 2000:Q4, four Granger causality tests are conducted, between real exchange rate and two and four lags of current account balance, that is one year and one and a half year, since the data is quarterly (Table 8 and Table 9). For the two lag model, the F-statistics, the F-statistics of Wald test with the null hypothesis of all coefficients are statistically equal to zero, is 0.12027 with a probability of 0.88694. Therefore, we accept the hypothesis that two periods lagged current account balance does not Granger-cause movements in real exchange rate. The way of the causality changed, real exchange rate does not Granger-cause the two periods lagged current account balance. The F-statistics is 0.11928 with the probability of 0.88782 accepting the hypothesis that all coefficients are equal to zero, showing that there is no Granger-causality.

The same test is conducted for four lagged values of current account balance and real exchange rate. First, causality between the four periods lagged current account balance and real exchange rate is investigated. The F-statistics is 0.21519 with probability 0.92857. The Wald test null hypothesis cannot be rejected, so all

coefficients are statistically equal to zero. Therefore, we cannot reject the hypothesis that current account balance does not cause real exchange rate.

To sum up, for the considered period of 1987:Q1 – 2000:Q4, the real value of the Turkish lira is affected by the combined effect of both short term and long-term variables. In the short term, both the expansionary fiscal policies and the current account are important variables that affect the real exchange rate. Figures show that undisciplined fiscal policies were one of the major reasons for an appreciated currency. This may be true due to the fact that the public sector borrowing requirement was high and as long as the deficit was sustainable, the government was reluctant to take the disciplinary measures. Combined with the high inflation rate, the political instability, the terrorism in the southern region pushed, budget deficits therefore pushed up the real interest rates. The second short run variable, current account balance, was especially important. It turns out that the current account is important in the determination of demand of and supply for foreign exchange. However, the Granger causality tests clearly show that current account balance does not cause the movements in real exchange rate but real exchange rate movements cause current account balance changes in one and a half year (Table 13 and Table 14). Edwards (2001) covers more than 120 countries, for a period of 25 years. The paper shows that very few countries run large current account deficits for long periods of time, say five to ten years. The large imbalance is reversed after a while and the balance turns to a surplus. However, the cost to the reversals is slowdown in economic activity. In addition, the paper shows that larger deficits' effect on the probability of crisis depends on the definition of a crisis. The maintained large deficits increase the probability of a crisis but do not cause a crisis necessarily; whereas small crashes are not affected by the current account imbalances. Therefore,

saying that the “large” current account deficit in Turkey did not cause the crisis can be considered in line with the theory.

In the long run, governments spending on the traded and non-traded goods, openness of the economy, technological progress in production, capital flows to the country are important factors that affect the real exchange rate. The interesting point is that the coefficient for the technological progress is negative, due to facts that may be attributed to domestic market structure.

Table 13 - Granger Causality Test Results for Two Lags

H_0	Observation	F-Value	Probability
CA does not Granger cause REER	54	0.12027	0.88694
REER does not Granger cause CA	54	0,11928	0.88782

Table 14 - Granger Causality Test Results for Four Lags

H_0	Observation	F-Value	Probability
CA does not Granger cause REER	52	0.21519	0.92857
REER does not Granger cause CA	52	2.40327	0.06438

Table 15 – Results from the Error Correction Model

Variable	*Model 1*	*Model 2*	*Model 3*	*Model 4*
GCON(-1)	-0.0743 (-2.029)**		0.3937 (8.937)*	-1.0881 (-9.574)*
TOT(-1)	-0.0423 (-0.395)			
OPEN(-1)	-0.0723 (-3.699)*		0.1904 (9.313)*	-0.4485 (-9.521)*
TECHPRO(-1)	0.3877 (2.242)**		0.1198 (3.030)*	-0.9339 (-8.392)*
CAPCONTROL(-1)	-86.1512 (-4.427)*		20.1568 (5.586)*	55.8904 (6.516)*
INVEST(-1)	-0.1013 (-1.109)			
EXCREDIT(-1)		1.0786 (3.6527)*	0.9341 (11.457)*	0.8814 (6.398)*
GBAL(-1)		1.1123 (3.7656)*	1.0689 (12.171)*	0.6458 (5.493)*
CA(-1)		-0.1267 (-2.747)*	-0.3565 (-9.479)*	0.5193 (9.684)*
CONSTANT	-1.2077	2.1993	7.3064	-11.9581
Coint Eq	-0.2782 (-1.157)	-0.2766 (-1.372)***	-0.0308 (-0.113)	0.1576 (-0.948)
D(REER(-1))	-0.4638 (-1.711)**	-0.4629 (-2.095)**	-0.7484 (-2.303)**	-0.6978 (-3.129)*
D(REER(-2))	-0.2618 (-1.079)	-0.4749 (-2.479)*	-0.5097 (-1.939)**	-0.4893 (-2.092)**
D(REER(-3))	-0.0172 (-0.096)	-0.1694 (-1.047)	-0.1039 (-0.495)	-0.0892 (-0.405)
D(GCON(-1))	0.1023 (0.913)		0.1029 (0.711)	-0.0555 (-0.288)
D(GCON(-2))	0.1817 (1.538)***		0.1883 (1.458)***	0.1355 (0.882)
D(GCON(-3))	0.1578 (1.525)***		0.1816 (1.751)**	0.2262 (1.960)**
D(INVEST(-1))	-0.1065 (-0.775)			

Note: Figures in parentheses show the t-values and asterisks, *, **, ***, denote the significance of the coefficients at 1%, 5% and 10% significance levels respectively. The dependent variable is D(REER).

Table 15 - Results from the Error Correction Model (continued)

Variable	*Model 1*	*Model 2*	*Model 3*	*Model 4*
D(INVEST(-2))	-0.2131 (-1.579)			
D(INVEST(-3))	0.0431 (0.323)			
D(CAPCONTROL(-1))	-32.0713 (-1.594)***		-17.9119 (-1.967)**	-1.2913 (-0.076)
D(CAPCONTROL(-2))	-12.349 (-0.809)		0.2545 (1.066)	-4.849 (-0.315)
D(CAPCONTROL(-3))	0.0431 (0.323)		0.1598 (0.943)	-21.885 (-1.445)***
D(OPEN(-1))	0.0510 (0.297)		0.0805 (0.465)	-0.0232 (-0.132)
D(OPEN(-2))	0.3459 (2.079)		0.3790 (1.982)**	0.2679 (1.915)**
D(OPEN(-3))	-0.1625 (-0.905)		-0.0242 (-0.148)	-0.0176 (-0.120)
D(TECHPRO (-1))	0.0354 (0.134)		-0.1787 (-0.685)	-0.4788 (-1.595)***
D(TECHPRO(-2))	-0.3817 (-1.443)		-0.6272 (-2.138)**	-0.7897 (-2.283)**
D(TECHPRO(-3))	0.0759 (0.299)		-0.1049 (-0.404)	-0.1173 (-0.467)
D(TOT(-1))	-0.2136 (-0.647)			
D(TOT(-2))	-0.3464 (-1.120)			
D(TOT(-3))	-0.1395 (-0.453)			
D(GBAL(-1))			0.3827 (1.4597)***	0.3597 (1.858)**
DGBAL(-2))			0.2629 (1.049)	0.1011 (0.452)
DGBAL(-3))			0.1610 (-0.543)	0.0851 (0.388)
D(EXCREDIT(-1))		0.6071 (3.634)*	0.2545 (1.066)	0.2697 (1.543)***

Note: Figures in parentheses show the t-values and asterisks, *, **, ***, denote the significance of the coefficients at 1%, 5% and 10% significance levels respectively.

Table 15 - Results from the Error Correction Model (continued)				
Variable	*Model 1*	*Model 2*	*Model 3*	*Model 4*
D(EXCREDIT(-2))			0.1649 (0.755)	0.0542 (0.285)
D(EXCREDIT(-3))		0.2533 (1.806)**	0.1598 (0.943)	0.0840 (0.492)
D(CA(-1))		-0.0314 (-0.319)	-0.0798 (-0.543)	
D(CA(-2))		-0.0388 (-0.718)	0.0216 (0.1341)	
D(CA(-3))		-0.0694 (-0.717)	0.1699 (1.120)	
CA(-4)				0.519 (9.684)*
D(CA(-5))				-0.1527 (-1.142)
D(CA(-6))				-0.0841 (-0.743)
D(CA(-7))				-0.0071 (-0.067)
R^2	0.61	0.52	0.68	0.70
Sample	88Q2:00Q4	88Q2:00Q4	88Q2:00Q4	89Q1:00Q4

Note: Figures in parentheses show the t-values and asterisks, *, **, ***, denote the significance of the coefficients at 1%, 5% and 10% significance levels respectively. The dependent variable is D(REER).

CHAPTER V

THE PREDICTABILITY OF THE TURKISH 2001 CRISIS

From the late 1990s, financial crises, namely balance of payment crises, banking crises and twin crises, became more and more frequent. As mentioned in the literature survey, prediction of crisis became a subject as important as the currency crises literature itself. The next chapter is an attempt to test the predictability of the crises in 2001.

Considering the damage caused by the crisis, following up macroeconomic data and taking the necessary measures on time, is crucial in minimizing its effects. Therefore, investigating the predictability of the crisis is as important as understanding the reasons.

Kibritçioğlu, Köse and Uğur (1998) use the leading indicators approach to test the predictability of the crisis that occurred in 1994. The methodology used in the paper basically consists of a correlation analysis. An index of foreign exchange pressure is constructed and the values of this index are cross correlated with those of some selected economic variables that are thought to signal a crisis before it might occur. The same methodology is implemented for 2001 crisis. The advantage of the methodology is that it is based on a reasonably practical methodology, basically correlation analysis, although it makes use of numerous variables.

The Data

The span for the analysis is from 1995 till 2002 and monthly data is used. Data sources are Central Bank of Turkey and International Financial Statistics (IFS). The data consists of three types of variables: survey data, monetary data and macroeconomic data (Table 16, Table 17, and Table 18).

Table 16 - List of Variables: Monetary Data

Variable	Source
Growth of M2 (%)	CBTR
M2 / Gross International Reserves	CBTR & IFS
M2Y / Central Bank Foreign Assets (%)	CBTR
M2Y / International Reserves minus Gold (%)	CBTR
M2Y / Foreign Assets of Monetary Authorities (%)	CBTR
FX Deposits / M2Y	CBTR

Table 17 - List of Variables: Macroceconomic Data

Variable	Source
Growth of Domestic Credits of Domestic Banks	CBTR
Growth of Exports (%)	IFS
Growth of Imports	IFS
Exports / Imports	IFS
Short-term Capital Flows / Nominal Industrial Production	CBTR
Current Account Balance / Nominal Industrial Production	CBTR
Net Domestic Assets / Reserve Money (%)	CBTR
Terms of Trade (Export Price Index / Import Price Index)	IFS
Interbank Overnight Interest Rates (%)	IFS
Total Industrial Production Index	CBTR
Growth of Industrial Production Index	CBTR
Domestic Credits of Domestic Banks / Total Credits	CBTR
Budget Balance / Nominal Industrial Production	CBTR
Average Auction Rates (%)	Treasury

Table 17 – List of Variables: Macroeconomic Data (continued)

Public Sector WPI (%)	CBTR
Private Sector WPI (%)	CBTR
Total WPI (%)	CBTR
Growth of Private Sector Manufacturing Industry Price Index	CBTR
Growth of Total Manufacturing Industry Price Index	CBTR
Growth of Equity Price Index (%)	ISE
CPI Inflation (%)	CBTR
Growth of Deposit Money Banks Credits to Private Sector (%)	CBTR

Table 18 - List of Variables: Survey Data

VARIABLE	SOURCE
General course of business compared to previous month	CBTR
Over the next three months, opinion about the export possibilities	CBTR
Total amount of orders received that month	CBTR
Amount of monthly exports orders received	CBTR
Total amount of employment (trend of last 3 months)	CBTR
Total amount of employment (trend of next 3 months)	CBTR
Amount of new orders received (trend of last 3 months)-domestic market	CBTR
Amount of new orders received (trend of next months)-domestic market	CBTR
Amount of new orders received (trend of last 3 months)-export market	CBTR
Amount of new orders received (trend of next months)-export market	CBTR
The volume of output (trend of last 3 months)	CBTR
The volume of output (trend of next 3 months)	CBTR
The volume of raw material stocks (trend of last 3 months)	CBTR
The volume of raw material stocks (trend of next 3 months)	CBTR
The volume of finished goods (trend of last 3 months)	CBTR
The volume of finished goods (trend of next 3 months)	CBTR
Average unit cost (trend of last 3 months)	CBTR
Average unit cost (trend of next months)	CBTR
Average price for the new orders received from the domestic market (trend of last 3 months)	CBTR
Average price for the new orders received from the domestic market (trend of next 3 months)	CBTR
Average price for the new orders received from the export market (trend of last 3 months)	CBTR
Average price for the new orders received from the export market (trend of next 3 months)	CBTR

To detect the crisis, an index constituting of exchange rate, the negative of the change in international reserves and interest rate differential between Turkish treasury rates and US treasury rates, is built. In order to eliminate the domination of the index by any of these three variables, they are all converted into standard normally distributed variables with mean 0 and variance 1 and the average is calculated (Fig. 12). By subtracting and adding 1.5 times the standard deviation from and to the index mean, which is 0, the threshold values are set as -1.5 and 1.5. Intuitively, when the threshold is breached, a crisis is expected and the exchange rate depreciates, international reserves fall and the interest rate differential widens. For the period considered, there is only one point where the currency crisis index breaches the critical level of 1.5. For the rest of the period considered, there are always fluctuations where the index almost reaches 1.5 in absolute terms, but it never happens. The spike in late 1998 is the Russian crisis and the East Asian crisis combined, an emerging market contagion, despite which, the index cannot reach 1.5; and the movement in late 2000 is the reaction to the failure of Demirbank.

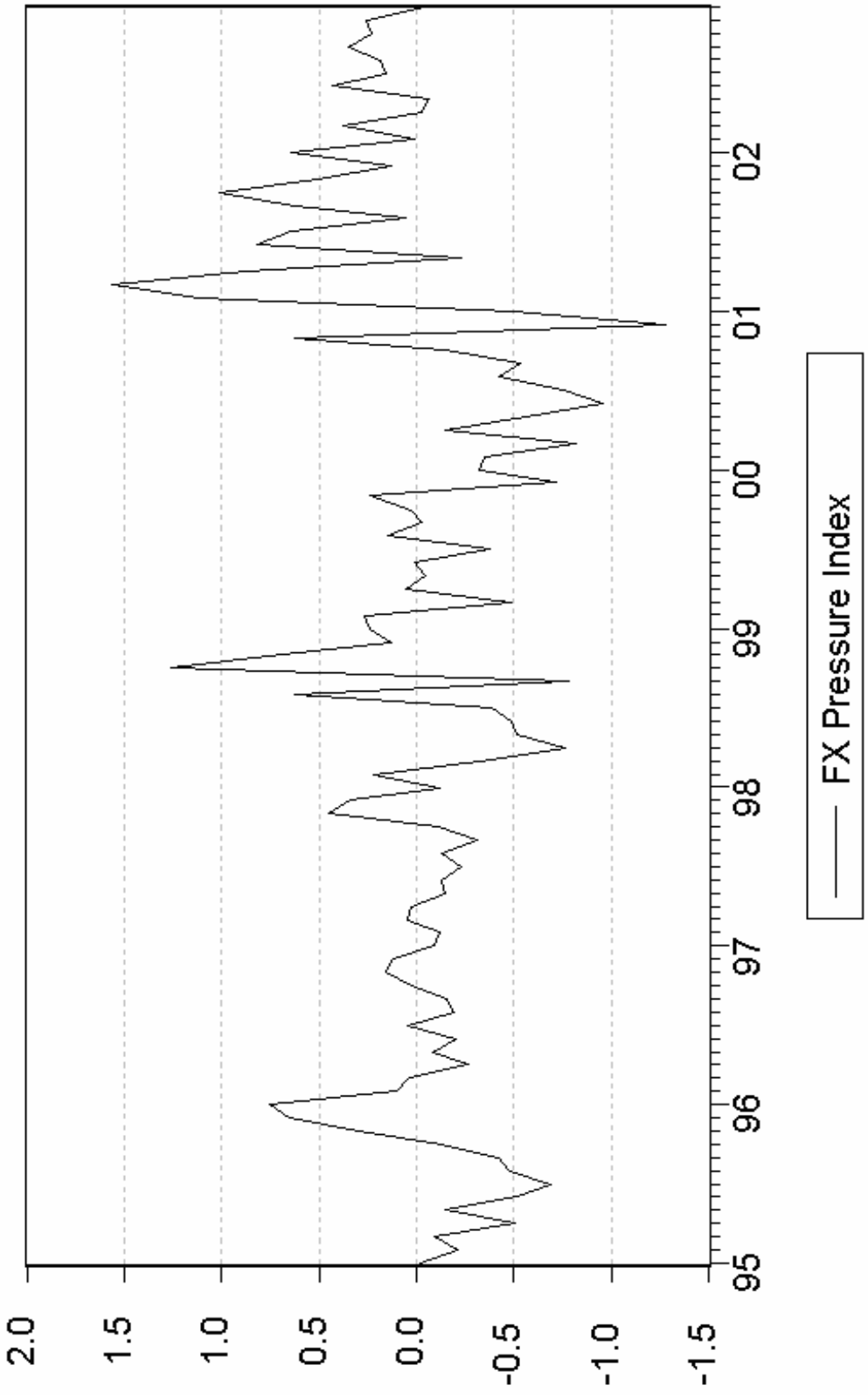

Fig. 12 – Foreign Exchange Pressure Index

The Methodology

The predictability of the crisis is tested by using cross correlation. Theoretically an economic variable consists of four types of components, namely cyclical, trend, seasonal and irregular components. By filtering the trend and seasonal components for the data, it is possible to obtain the cyclical component. Considering that the cyclical behavior of some variables may predate that of another, based on theoretical facts, it would be safe to claim that the behavior of a given variable may signal the behavior of another.

Keeping this fact in mind, the potential leading indicator variables are first deseasonalized and then detrended. Using the additive-difference from moving average the seasonality effect is eliminated. The calculation process by EViews is as follows:

First centered moving average of a variable y_t is calculated as

$x_t=(0,5y_{t+6}+...+y_t+...+y_{t-6})/12$ for the monthly data. Then the difference $d_t = y_t - x_t$ is taken. The next step is the computation of the seasonal indices. For monthly series, the seasonal index si_m for month m is the average of d_t using observations only for m^{th} months. Setting *sf,* scaling factor as $sf_k = i_k - \bar{i}$ where $\bar{i}$ is the average of all the seasonal indices, and where k=1,2…12 for monthly data. The final step is to subtract sf_k from y_t. It is obvious that the major pitfall for this methodology is that it assumes constant seasonal factors.

For trend component's elimination, the Hodrick-Prescott filter is used with λ=14400, which is the built-in parameter for EViews for monthly data, since the variables are monthly. Basically, Hodrick-Prescott Filter calculates the smoothed series of a random variable y_t by minimizing the variance of y_t around the newly generated smoothed series.

The rest of the procedure is checking the cross correlation between the individual variables and the foreign exchange rate pressure index. Cross correlograms considers both the turning points and the behavior of the variables during the period considered, since the variables are detrended and deseasonlized and they only capture the cyclical and irregular components. Therefore, if a variable is a leading indicator, then the cyclical movement of the specific variable precedes that of the foreign exchange pressure index. If there is any correlation between this variable's movement and that of the foreign exchange pressure index, then every time the variable starts a movement, a fresh move from the index is expected, the direction depending on the correlation. Therefore, any change in the behavior of a given leading variable is considered to emit a signal, informing a change in the direction of the index. Cross correlation analysis performs a correlation analysis between the lagged and leading values of a potential leading indicator and the foreign exchange pressure index. The analysis considers the highest correlation between the considered two variables and provides the outcome accordingly. For example, if the correlation between the two variables is maximized between X_t and a variable $A(n)_{t-2}$ then the behavior of A(n) leads that of X with two months. Therefore, any change in this leading variable may be followed by a change in the movement of X in two months, since the data is monthly in this analysis.

Cross correlations are calculated as follows:

$$r_{xy}(l) = \frac{c_{xy}(l)}{\sqrt{c_{xx}(0)}\sqrt{c_{yy}(0)}} \qquad \text{where } l = 0,\pm1,\pm2,.....$$

and $$c_{xy} = \begin{Bmatrix} \sum_{t=1}^{T-l}(x_t - \bar{x})(y_{t+l} - \bar{y})/T \\ \sum_{t=1}^{T+l}(y_t - \bar{y})(x_{t-l} - \bar{x})/T \end{Bmatrix} \qquad \text{where } \begin{Bmatrix} l = 0,1,2..... \\ l = 0,-1,-2,.... \end{Bmatrix}.$$

The cross correlation results show that M2Y and foreign exchange reserves are important signal emitting variables (Table 19). Their ratios to different national reserves figures signal the problem three months before the crisis. This could be explained by the active short-term money market of the pre-crisis period. The interest rates were determined in the money market and the rates were high when compared to inflation target. Besides, the maturity composition was revolving around short-term deposits since this provided flexibility in case of an event that could jeopardize the program.

The point to keep in mind is that three months before the crisis basically coincides with the bankruptcy period of Demirbank. During this period, the bank's demand for liquidity in both foreign exchange and Turkish Lira was very high. This, in return, pushed up the interest rates. Therefore, one should be careful in labeling those variables as signals of the crisis.

Table 19 – Cross Correlations: Monetary Data

Variable	Signal	No of months	Cross correlation
Growth of M2	lag	1	-0.2569
M2 / Gross International Reserves	no relation		

Table 19 – Cross Correlations: Monetary Data (continued)

M2Y / Central Bank Foreign Assets	lead	3	0.2183
M2Y / International Reserves minus Gold	lead	3	-0.1261
M2Y / Foreign Assets of Monetary Authorities	lead	3	0.2269
FX Deposits / M2Y	lag	1	0.3149

The survey data front shows that the first leading variable is the total amount of orders received that month (Table 20). This variable signals the crisis one month prior to the crisis. The correlation sign is negative as expected. As pressure builds up on the foreign exchange price, the possibility of a crisis increases and the economic activity slows down prior to a crisis. Parallel to this finding, the amount of new orders received from the domestic for the last three months and the expectation for the following three months are both signaling the crisis, three months before it happens. The same pattern of correlation applies to the volume of output for the last three months and the next three months. In all these last four cases, the correlation coefficients are negative. It is easy to understand the reason for these variables. As pressure builds up, the orders are cut significantly and the output in the economy dropped significantly. Moreover, the expectations for the future pace of the economy are questioned, since the produces are not optimistic about the next three months' orders and output levels three months prior to the crisis. Finally, the average price of the orders received from both the domestic and export market signal the crisis one month prior to the crisis. This is valid for both the last three months and next three months cases. The correlation coefficients are negative. As the pressure on the exchange rate built up, the demand for the goods in the domestic market and the export market decreases. In addition, the exported items are less attractive due to the

overvalued currency. As a result, the average price of the newly ordered goods falls both in the domestic and the export market.

Table 20 – Cross Correlations: Survey Data

Variable	Signal	No of Months	Cross Correlation
General Course Of Business	no relation		
Over The Next Three Months, Opinion About The Export Possibilities	no relation		
Total Amount of Orders Received That Month	lead	1	-0.1141
Amount of Monthly Exports Orders Received	lag	1	0.2160
Total Amount of Employment (Trend of Last 3 Months)	no relation		
Total Amount of Employment (Trend of Next 3 Months)	no relation		
Amount of New Orders Received (Trend of Last 3 Months)-Domestic Market	lead	3	-0.1076
Amount of New Orders Received (Trend of Next Months)-Domestic Market	lead	3	-0.1131
Amount of New Orders Received (Trend of Last 3 Months)-Export Market	no relation		
Amount of New Orders Received (Trend of Next 3 Months)-Export Market	no relation		
The Volume of Output (Trend of Last 3 Months)	lead	3	-0.1136
The Volume of Output (Trend of Next 3 Months)	lead	3	-0.1404
The Volume of Raw Material Stocks (Trend of Last 3 Months)	lag	11	-0.1360
The Volume of Raw Material Stocks (Trend of Next 3 Months)	lag	11	-0.1250
The Volume Of Finished Goods (Trend Of Last 3 Months)	lag	11	-0.1700
The Volume Of Finished Goods (Trend Of Next 3 Months)	lag	11	0.1429
Average Unit Cost (Trend of Last 3 Months)	coincident		-0.2303
Average Unit Cost (Trend of Next 3 Months)	lag	1	-0.2208
Average Price For The New Orders Received From The Domestic Market (Trend of Last 3 Months)	lead	1	-0.2136
Average Price For The New Orders Received From The Domestic Market (Trend of Next 3 Months)	lead	1	-0.1843

Table 20 – Cross Correlations: Survey Data (continued)

Average Price For The New Orders Received From The Export Market (Trend of Last 3 Months)	lead	1	-0.1769
Average Price For The New Orders Received From The Export Market (Trend of Next 3 Months)	lead	1	-0.1744

Finally, the macroeconomic ratios are investigated (Table 21). Unsurprisingly, considering the survey data, the first leading indicator turns out to be growth of exports that leads the crisis by one month, although the expected sign is negative. Short-term capital flows over nominal industrial production shows that four months prior to the crisis, fund outflow starts to influence the country. The sign is negative as expected. Average auction rates, after the bankruptcy of the major borrower and the worsening situation on the political side, although the inflation rates were at their lowest levels since the beginning of the program's implementation started to increase. This variable leads the crisis by one month. The stock exchange is another leading indicator and the worsening in the stock exchange leads the crisis by five months. This is consistent with the short-term outflow finding, which leads the crisis by four months. The net domestic assets over reserve money ratio, is another leading variable. The interbank overnight rate is another leading variable and it leads the crisis by two months. However, the effect of Demirbank's failure must be taken into account for this variable. The final variable that provides a signal is the terms of trade. This variable starts to emit signals nine months before the crisis, almost coincident with the start of the program.

Table 21 - List of Variables: Macroeconomic Data

Variable	Signal	No of months	Cross correlation
Growth of Domestic Credits of Deposit Banks	lag	1	-0.2439
Growth of Exports (%)	lead	1	0.2307
Growth of Imports	coincident		-0.1506
Exports / Imports	lag	1	-0.2849
Short-term Capital Flows / Nominal Industrial Production	lead	4	-0.3745
Current Account Balance / Nominal Industrial Production	lag	3	0.3766
Budget Balance / Nominal Industrial Production	lag	1	-0.1915
Average Auction Rates (%)	lead	1	-0.1950
Public Sector WPI (%)	coincident		-0.1066
Private Sector WPI (%)	lag	1	-0.1774
Growth of Private Sector Manufacturing Industry Price Index	lag	1	-0.1443
Growth of Total Manufacturing Industry Price Index	lag	1	-0.1759
Growth of Equity Price Index (%)	lead	5	-0.2867
CPI Inflation	coincident		-0.1744
Growth of Deposit Money Banks Credits to Private Sector (%)	lag	1	-0.2388
Net Domestic Assets / Reserve Money (%)	lag	5	0.2251
Terms of Trade (Export Price Index / Import Price Index)	lead	9	-0.2311
Interbank Overnight Interest Rates (%)	lead	3	0.1921
Growth of Industrial Production Index	lead	5	-0.1155
Domestic Credits of Domestic Banks / Total Credits	no relation		

The next step is to estimate equations where the independent variable is the foreign exchange pressure index and the dependent variables are the group of leading variables that are obtained from the cross correlation analysis. This equation, in return can be helpful in estimating a value for the pressure index. The dependent variables have the lagged values of the cross correlation analysis outcome. The results for the monetary variables show that all variables are significant (Table 22).

The R^2 is 0.17. The overall regression equation is significant since the F-statistics is 6.15.

Table 22 – OLS Regression Results for Monetary Data

Variable	Coefficient	Std. Error	t-value	Prob
c	16.57	5.15	3.22	0.0018
M2Y/Central Bank Assets(-3)	-22.42	6.43	-3.48	0.0008
M2Y/(International Reserves-Gold)(-3)	5.14	1.46	3.52	0.0007
M2Y/Foreign Assets of Mon. Auth (-3)	9.14	2.62	3.49	0.0008
F-statistics	6.14			
R^2	0.17			

The model for the macroeconomic data cannot be estimated, since the model gives a near singular matrix when run. For the survey data, all variables turn out to be insignificant. Another model that includes all the leading indicators obtained from the cross correlation analysis is run and again all variables are again insignificant. Therefore, a model that only includes monetary data can be used; but because of the low R^2, a healthy estimate for foreign exchange pressure index. The solid line in Fig. 13 is the original index and the dotted line is the estimate of the index. The estimated index is not even close to 1.5 when the crisis occurs. The problem is that the estimated equation for the pressure index does not include all the leading indicators obtained from the cross correlation analysis since they were insignificant and that the correlations were small.

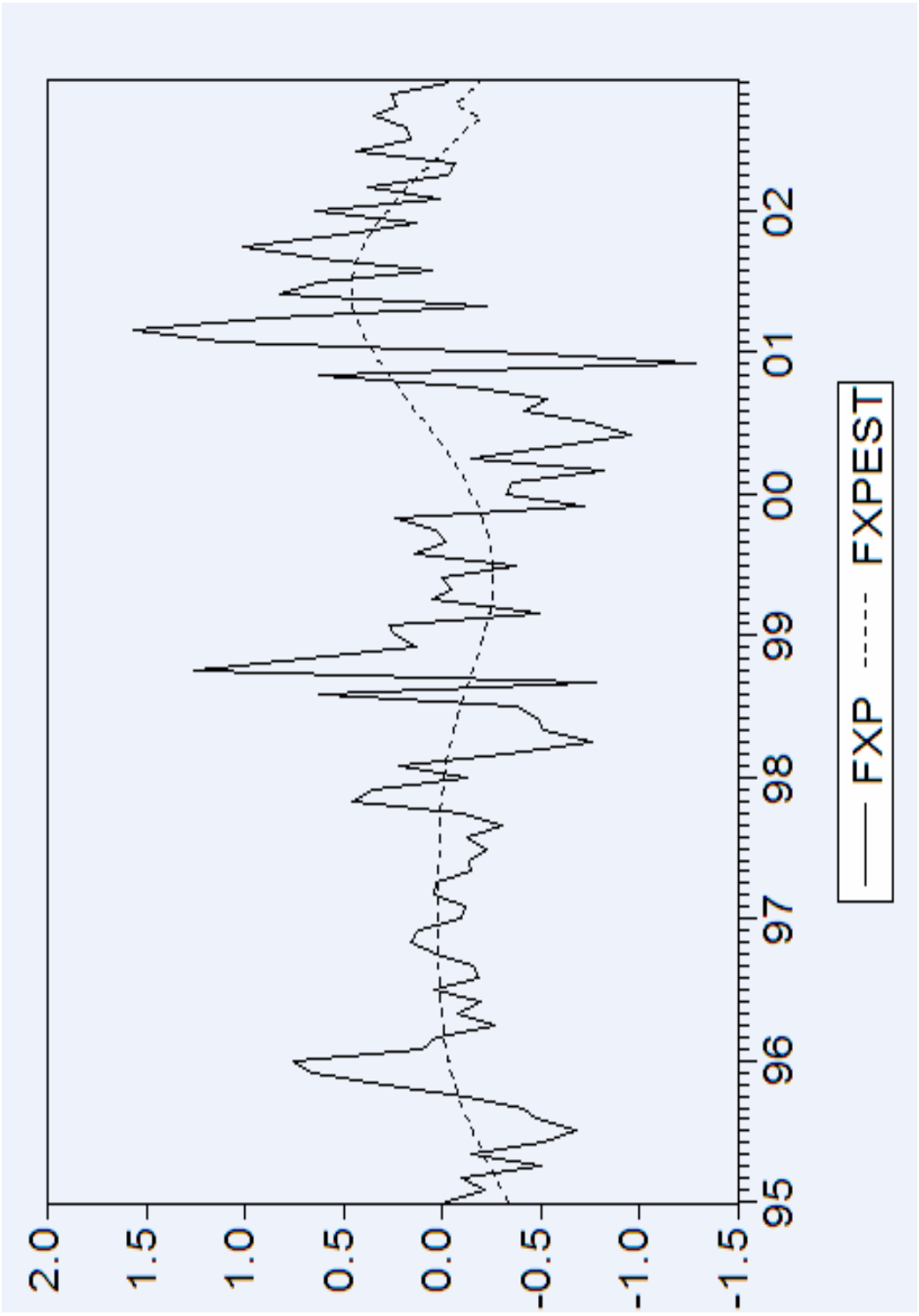

Fig. 13 – FXP and FXP estimate obtained from monetary data

To summarize, the cross correlation analysis provides a number of indicators that signal the crisis. However, the correlations between the individual variables and the pressure index are low. Therefore, the estimated index out of these predictors does not provide adequate support about the severity of the situation in the country. The only information that can be drawn is that pressure was building at that time but foreseeing the crisis was not possible using these correlation results.

CHAPTER 6

CONCLUSION

The crisis in 2001 was the most severe in Turkish history. The Turkish lira was devalued, a jump from 685,000 to 960,000, leading to 65% inflation. Real GNP shrank by 9.5% and the unemployment rate reached 8.5% in 2001 and 10.4% in 2002 according to Central bank numbers.

First, the IMF was blamed, for its standardized stabilization programs. The assumption that the needs for every country were uniform was criticized heavily before and after the crisis. However, IMF was not the only one to blame. The thesis investigated the reasons for the crisis and attempted to prove that the crisis was predictable. The literature survey shows that the Fund is not the only one to be blamed. Although the assumptions made by this institution are to be criticized, the government of the time is to be criticized as well, because of the slow or lack of reforms in the public finance side, the lack of support for the program and the incompatibility of the coalition partners.

The crisis was not the result of events that took place in just one year, but mostly the result of fundamental problems in the Turkish economy. In order to investigate the reasons for this crisis, the long-term behavior of economic figures were analyzed. The methodology was deduced from a literature survey. The analysis involved related the behavior of real exchange rate with macro economic variables

during the period 1987Q4:2000Q4. Government budget balance, terms of trade, openness of the economy, technological production, capital controls and investment were detected as the major causes for real exchange movements. Government consumption expenditures and current account balance were barely significant. Although it was not surprising, the result for the current account balance was a point worthy of note.

An additional analysis was conducted to see the direction of the causality between the movement in the real exchange rate and current account balance. This analysis is important since it helped to correct the erroneous belief that the crisis occurred because of the current account deficit. Most of the economic agents still believe that the crisis was initiated by the large current account deficit, which was unsustainable. The results show that this was not the case. The movements in the real exchange rate helped to predict the current account balance, for the period considered; however the hypothesis that the current account balance caused the movement in real exchange rate was rejected for two and four quarter lags. This finding is very important since the debates about the current account deficit are still being made an issue and is considered as a cause of crisis. The current account has never been a source of crisis in Turkey including the crisis in 1994. However, this figure should be watched carefully as well as its methods of financing.

A shortcoming of this part is that, no political variable could have been added to the models, whereas the original model suggests the use of a political risk variable. Politics risk was and is still one of the major sources of risk in Turkey. In addition to the political risk, introduction of banking sector statistics would improve the explanation of the reasons for crisis. The fragility of the banking sector, the foreign

exchange rate exposure and the moral hazard problem raised by deposit insurance, all contributed to the crisis.

The second part of the paper assessed the predictability of the crisis. For the practicality, a simple method was used for the analysis: cross correlation. First, an exchange rate pressure index was calculated and the behavior of this index was correlated with selected variables. Cross correlation gives a measure of the extent to which two variables correlate with each other as a function of the time displacement between them. In the second part of the paper, the foreign exchange pressure index was correlated with lagged and leading values of the selected macroeconomic variables. The results clearly show that there were warnings before the crisis that occurred in February. For example, the terms of trade emitted signal nine months prior to the crisis. This figure is five months and four months for growth of equity prices and for short-term capital flows. However, it was not possible to make a clear cut forecast whether a crisis was coming or if it was just a temporary distress.

This part of the thesis is still very useful. Apart from the estimated index result, the cross correlation analysis shows that no single variable alone has the power to predict a currency crisis. Only an overall consideration of theses variables' behavior together with the foreign exchange pressure index provides an idea about how close a currency is to a collapse.

Currency crises are experienced both in the developing countries and developed countries. Thus, understanding the reasons for a crisis and developing methods to predict it are crucial. This thesis, by considering the currency crisis literature, working on the reasons for the crisis in Turkey in 2001 and providing the predictors, offers a new perspective on the currency crises in Turkey.

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