FINANCIAL DOLLARIZATION AND CURRENCY SUBSTITUTION IN TURKEY

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ABSTRACT

FINANCIAL DOLLARIZATION AND CURRENCY SUBSTITUTION IN TURKEY

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This study aims to investigate currency substitution and financial dollarization in Turkey. The extend of dollarization in Turkey appears to be very high according to both the conventional currency substitution and the recently developed financial dollarization measures. This has serious policy implications as a source of financial fragility through currency/maturity mismatches and balance sheet effects. The empirical part of this study contained an investigation of the long run relationships between the variables in a system containing currency substitution ratio, expected exchange rate change and rates of return on domestic and foreign currency denominated assets. The results of the Johansen cointegration analysis based on quarterly data for the 1987-2004 period appeared not to be strongly supporting the General Portfolio Balance Model (GPBM). The theoretical part of this study suggests that the GPBM can be reduced to the Sequential Portfolio Balance Model (SPBM) under the uncovered interest parity (UIP) hypothesis. Consequently, the GPBM may be misleading under UIP. The Johansen cointegration results suggested the validity of the UIP for the Turkish data. The estimation of the SPBM suggested that there is a long-run relationship between currency substitution and expected exchange rate change in Turkey. The elasticity of currency substitution appeared to be high but consistent with those estimated for other high inflation developing countries. The results further supported the presence of a ratchet/hysteresis effect proxied by a trend variable. All these results are consistent with the argument that currency substitution and financial dollarization are important especially in high inflation countries.

Keywords: Financial Dollarization, Currency Substitution, Elasticity of Currency Substitution, Turkey, Uncovered interest parity, Portfolio Balance Model.

ÖZ

TÜRKİYE'DE FİNANSAL DOLARİZASYON VE PARA İKAMESİ

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Bu çalışma, Türkiye'de para ikamesi ve finansal dolarizasyonu araştırmayı amaçlamaktadır. Türkiye'deki dolarizasyonun gerek geleneksel para ikamesi ölçütleri, gerekse son dönemde geliştirilen finansal dolarizasyon ölçütleri çerçevesinde oldukça yüksek olduğu gözlenmektedir. Bu durum, kur/vade uyumsuzluğu ve bilanço etkileri aracılığıyla finansal kırılganlık kaynağı oluşturulması açısından ciddi politika çıkarsamalarına neden olmaktadır. Bu çalışmanın ampirik kısmında, para ikamesi oranı, beklenen döviz kuru ve ulusal para ve yabancı para cinsinden varlıkların getiri oranlarını içeren bir sistemde yer alan değişkenler arasındaki uzun dönem ilişkiler incelenmiştir. 1987-2004 dönemi için 3 aylık verilere göre yapılan Johansen eşbütünleme analizi sonuçları Genel Portföy Dengesi Modelini güçlü bir şekilde desteklememektedir. Diğer taraftan, bu çalışmanın teorik kısmında Genel Portföy Dengesi Modeli Kapsanmamış Faiz Haddi Paritesi hipotezi çerçevesinde Aşamalı Portföy Tercih Modeline indirgenmiştir. Bu bakımdan, Genel Portföy Dengesi Modeli kapsanmamış faiz haddi paritesi altında yanıltıcı olabilmektedir. Johansen eşbütünleme sonuçları, Türkiye verileri için kapsanmamış faiz haddi paritesinin geçerliliğini ileri sürmektedir. Aşamalı Portföy Tercih Modelinin tahmini Türkiye'de para ikamesi ile beklenen kur düzeyi arasında uzun dönem ilişkisi bulunduğunu önermektedir. Para ikamesinin esnekliği yüksek olmakla birlikte yüksek enflasyon yaşayan diğer gelişmekte olan ülkeler için tahmin edilen para ikamesi esnekliği ile tutarlı olduğu görülmektedir. Ayrıca, sonuçlar eğilim değişkeni ile gösterilen histerezis(ratchet) etkisinin varlığını desteklemektedir. Elde edilen tüm sonuçlar para ikamesi ve finansal dolarizasyonun özellikle yüksek enflasyon yaşayan ülkeler için çok önemli olduğu yönündeki tezi desteklemektedir.

Anahtar Kelimeler: Finansal Dolarizasyon , Para İkamesi, Para İkamesi Esnekliği , Türkiye, Kapsanmamış Faiz Haddi Paritesi, Genel Portföy Denge Modeli.

To My Parents

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CHAPTER I

INTRODUCTION

Currency substitution and financial dollarization have been at the core of not only the theoretical international macroeconomics literature but also of the macroeconomic policy debates especially after the recent financial crises. The early literature focusing solely on currency substitution and thus investigating the causes of the use of foreign currencies as any of the main functions of domestic currency (means of exchange, unit of account and store of value) appears to be inadequate to explain the substantial presence of foreign currencies in both assets and liabilities of all the sectors of an economy (financial dollarization). Consequently, the costs of dolarization appears to contain not only the loss of seigniorage and limiting monetary policy effectiveness which are related to currency substitution but also currency and maturity mismatches caused by financial dollarization.

The literature on dollarization is large and growing. However, until very recently, the bulk of the literature concerned mainly with the causes and consequences of currency substitution. The currency substitution literature focuses on the negative relationship between inflation and domestic money along with nominal instability and choice of unit of account. However, an analysis of currency substitution as a result of inflation alone may not be sufficient to explain the persistence of the dollarization phenomenon in spite of declining inflation rates in many developing countries. The recent evidence by Reinhart, Rogoff and Savastano (2003) and Levy-Yeyati (2004) strongly suggest that many developing countries are indeed “addicted to dollars” by increasing the use of foreign sound currencies (Dollar and Euro, etc) even under the substantially world wide declining inflation rates of the recent decade. The main sectors (firms, banks, households and governments) of many developing countries still hold a significant share of their assets and liabilities in the form of sound foreign currencies. This suggests that an analysis of dollarization as an asset substitution may be needed. Recently a new phenomenon, financial dollarization, is suggested in the literature referring the foreign currency replacement of domestic currency as a store of value and it is mostly observed in the circumstance of dollarized assets and liabilities in the financial system. The

explanations of financial dollarization as an asset substitution phenomenon contain portfolio choice, time inconsistency, moral hazard and lack of monetary policy credibility, incomplete markets and market imperfections, exchange rate pass through, hysteresis, trade openness, type of shocks.

Financial dollarization has crucially important policy implications. As Levy-Yeyati (2004) convincingly argues financial dollarization can be a source of financial fragility through creating currency and/or maturity balance sheet mismatches and can lead to a limited ability to implement an independent monetary policy and "fear of floating". Levy-Yeyati (2004) finds also "evidence that financially dollarized economies tend to display higher inflation rates, higher propensity to suffer banking crises and slower and more volatile output growth, without significant gains in terms of domestic financial depth".

The process of financial dollarization is often reflected in varying patterns of dollarization of bank deposits and loans, which in turn influence the extent of currency mismatches in financial intermediation. In most of the developing countries, credits and deposits mostly constitute a significant part of total bank assets and liabilities. Thus currency imbalance of financial intermediation, which is the mismatch of assets and liabilities of the banking system, can be very effective in forming the foreign currency exposure of a dollarized banking system. However there hasn't been much study on the determinants of currency composition of bank assets and liabilities and its determinants. Dollarization of financial intermediation is neglected whereas dollarization of currency transactions are extensively studied in the literature. In turn, this draws up the purpose of this paper which aims at shedding some light on financial dollarization since a widespread financial dollarization may inevitably introduces currency mismatches as well as bank balance sheet fragility. Also it influences the pricing strategy of the firms as firms reflect the exchange rate changes to prices, that is to say, monetary authorities has to take into account the exchange rate fluctuations as well because of the high exchange rate pass through.

The literature on empirical modeling of financial dollarization is not very large. Most of the earlier literature has focused on currency substitution as reflected by dynamics of money demand equations and consequently the link between inflation and dollarization has been the most important empirical issue. However, contrary to the predictions of this line of research, the recent experience often

showed that dollarization ratios have been relatively persistent even after reaching sustained price stability. Consequently, the recent studies appear to focus on a broader measure, financial dollarization, rather than limiting themselves only with currency substitution. The list of the recent primary studies on financial dollarization includes Arteta (2002, 2003), Reinhart, Rogoff and Savastano (2003), Levy-Yeyati (2003, 2004) and Ize and Parrado (2002).

This study aims to investigate currency substitution and financial dollarization in Turkey for the period 1987-2004. The basic limitation of a study on currency substitution and financial dollarization especially for a developing country is the availability of the data. For currency substitution, the lack of foreign currencies in circulation makes the available dollarization measures to show only the lower limit of dollarization. The lack of a reasonably long-span data for the foreign currency credits by the banking system needed to construct a better measure of financial dollarization leads us to focus on the deposit dollarization ratios in our empirical analysis. This may be a plausible choice, as deposit and credit dollarization often mirror each other due to prudential regulations in many countries including Turkey (Levy-Yeyati, 2004). The presence of the company sector foreign currency debts data, however, allows us to discuss the manufacturing firms liability dollarization in Turkey during the last decade.

The rest of this study is organized as follows. Chapter II presents a brief review of the literature on currency substitution and financial dollarization. In this chapter we basically discuss the definition and measurement of financial dollarization and currency substitution along with their causes and policy implications. Chapter II discusses the roles of inflation volatility and real exchange rate depreciation in dollarization as suggested by the portfolio choice models along with alternative explanations including time inconsistency, moral hazard and lack of monetary policy credibility, incomplete markets and market imperfections, exchange rate pass through, hysteresis, trade openness, type of shocks offered by the literature. Financial dollarization can lead to financial fragility through creating currency/maturity balance sheet mismatches, limit the effectiveness of monetary policy and affect the choice of the exchange rate regime. Therefore, after briefly presenting the policy consequences of financial dollarization, we consider also the recent discussions on dedollarization strategies which is based on a “carrot and stick” approach in the chapter.

Chapter III focuses on some stylized facts of the Turkish economy and historical background of dollarization in Turkey. This chapter presents also some descriptive measures of financial dollarization in Turkey. In this chapter we evaluate the extent of financial dollarization in Turkey considering a composite dollarization index and foreign exchange denominated liabilities of the aggregated manufacturing sector firm accounts.

Chapter IV is devoted to the theoretical models of currency substitution and empirical results for the Turkish quarterly data for the 1987-2004 period. For the theoretical models, we consider the two main approaches, namely the Sequential Portfolio Balance Models or Liquidity Service Approach and the Portfolio Balance Model. The results of the Johansen cointegration analyses for the variable spaces postulated by these approaches are presented and discussed in this chapter. Finally, Chapter V concludes this thesis.

CHAPTER II

CURRENCY SUBSTITUTION AND FINANCIAL DOLLARIZATION

Many developing countries and transition economies have realized financial liberalization and economic reforms in order to integrate with the world economy and to have a better operating and more stable economic system during the last decades. During this period, capital accounts are liberalized, restrictions on capital are removed and domestic financial intermediation is allowed to be conducted in both domestic and foreign currencies. Those developments caused a competition between domestic and foreign monies since residents get the oppurtunity to have domestic contracts and transactions in both currencies. Consequently, most of the developing countries experienced a significant increase in the shares of foreign currency denominated assets and liabilities in their financial systems.

II.1. DEFINITIONS OF CURRENCY SUBSTITUTION AND FINANCIAL DOLLARIZATION

There are two basic motives for the demand for foreign currency assets: 'currency substitution' and 'asset substitution'. Financial dollarization is generally referred as asset substitution in the literature.

In currency substitution, foreign assets are used as money, essentially as means of exchange and unit of account. Currency substitution typically arises under conditions of high inflation since economic agents search for available hedging alternatives due to the high opportunity cost of holding domestic currency for transactions. Once the use of foreign currency in transactions becomes accepted, it may not be rapidly abandoned due to financial learning and adaptation. Asset substitution, on the other hand, arises basically as a result of risk and return considerations of economic agents about domestic and foreign assets. Since foreign currency-denominated assets serve as an insurance against macroeconomic risks, such as price instability and prolonged depressions, economic agents prefer to hold foreign assets in many developing countries. In some cases although currency

stability has been sustained, foreign currency-denominated assets may still serve this purpose.

Since we basically deal with financial dollarization in this paper, we should make clear the definition of it. Furthermore, it is important to highlight the difference between currency substitution and financial dollarization. Although the definitions above have given a general view, a detailed literature survey on definitions of currency substitution and financial dollarization is presented below in order to highlight the difference between these two concepts.

Currency Substitution

There are some alternative definitions of currency substitution in the literature. Some authors define currency substitution as partially or totally replacement of foreign currency with domestic currency in any or all the three basic functions of money, whereas others provide different definitions according to the functions of money by which it is replaced. Generally in most of the studies, currency substitution is used to refer to the use of foreign money only as means of exchange but in some studies both means of exchange and unit of account properties of money is referred as well.

Giovannini and Turtelboom (1994) mention the difference between the meanings of the terms “substitution” and “substitutability”. According to their definition, currency substitution is the complete replacement of one currency with another and currency substitutability is the process that one currency becomes a substitute for another. Since currency substitution is a result of substitutability between currencies, it may take place at both domestic and international levels.

Domestic currency substitution refers to ‘dollarization’ according to Savastano (1996). Dollarization and currency substitution concepts, however, have some alternative meanings in the literature. For example Calvo and Vegh (1992) define ‘currency substitution’ as transfer of medium of exchange property of domestic currency, whereas ‘dollarization’ is the transfer of the other two functions of money, which are store of value and unit of account. On the other hand, Mueller (1994) suggests a contrasting definition. According to Mueller (1994) ‘currency substitution’ and ‘dollarization’ refer to the case where demand for foreign currency is reversible and non-reversible, respectively.

Ize and Parrado (2002) provide a distinctive classification of dollarization. According to their classification, there are three types of dollarization in the economy: 'payments' dollarization, 'financial' dollarization and 'real' dollarization. Payments dollarization is also used as currency substitution in the literature. As already defined, it is the use of foreign currency as a mean of payment. Financial dollarization is also referred as asset substitution in the literature (Nicolo, Honohan and Ize (2003)). It is the use of foreign currency to index deposits, credits (loans) and any other financial intermediates. Real dollarization, on the other hand, is the use of foreign currency to index wages, prices and real contracts in the economy. This appears to be the most distinctive and clear classification of dollarization in the literature.

Financial Dollarization

Financial dollarization mostly refers foreign currency replacement of domestic currency as a store of value and it is mostly observed in the circumstance of dollarized assets and liabilities in the financial system.

Levy-Yeyati (2003), Ize and Levy-Yeyati (2003) and Nicolo, Honohan and Ize (2003) define financial dollarization as residents holding of foreign currency denominated assets and liabilities including non-bank assets such as commercial papers or sovereign debt. This definition implies that currency composition of residents and non-residents should be different from each other and residents will be more prone to invest in domestic currency assets than non-residents. Levy-Yeyati (2003) argues that financial dollarization is associated with the inability of certain countries to develop deep and stable local currency markets.

Arteta (2003) defines financial dollarization as 'extensive presence of dollar assets and deposits' in the domestic banking system. It is the process of financial intermediation dollarization. Luis (2004) has made a similar definition of financial dollarization concluding that the term refers the extensive use of foreign currency to value assets and liabilities in the domestic financial system. Ize and Parrado (2002), on the other hand, define financial dollarization as the use of foreign currency to index deposits, loans and other financial contracts as already mentioned.

Broda and Levy-Yeyati (2003) note that there are often two or more currencies in the financial systems of the emerging economies and since the dollar is generally the main foreign currency choice, this phenomenon has been named

financial dollarization in the literature. (Broda and Levy-Yeyati (2003)). Financial dollarization can be either in the form of foreign borrowing or deposit dollarization. In the case of foreign borrowing, domestic banks or local firms in the country borrow directly from abroad, whereas in the case of deposit dollarization, domestic asset holders have foreign currency denominated deposits locally. Turkey and Argentina are amongst the countries experiencing this type of financial dollarization (deposit dollarization) in the 1990s.

According to Reinhart, Rogoff and Savastano (2003), until the late 1990s, dollarization was defined as residents holding of foreign currency or foreign currency denominated financial assets as part of their asset portfolios, But after the late 1990s, the concept of 'liability dollarization'[1] started to attract attention which focuses on external foreign currency liabilities of households, firms and the government. These two concepts of dollarization focus on different sides of balance sheets of the sectors in an economy. Thus Reinhart *et al*. (2003) defines a financial dollarized economy where households and firms have foreign currency denominated assets as a share of their portfolios and where some fraction of public and private sector debts are foreign currency denominated. As a result, that type of a definition covers most of the developing and transition economies rather than developed or industrialized countries.

Most of the earlier literature has focused on currency substitution as reflected by dynamics of money demand equations and consequently the link between inflation and dollarization has been the most important empirical issue. However, contrary to the predictions of this line of research, the recent experience often showed that dollarization ratios have been relatively persistent even after reaching a sustained price stability. Consequently, the recent studies appear to focus on a broader measure, financial dollarization, rather than limiting themselves only with currency substitution.

Measurement Problems

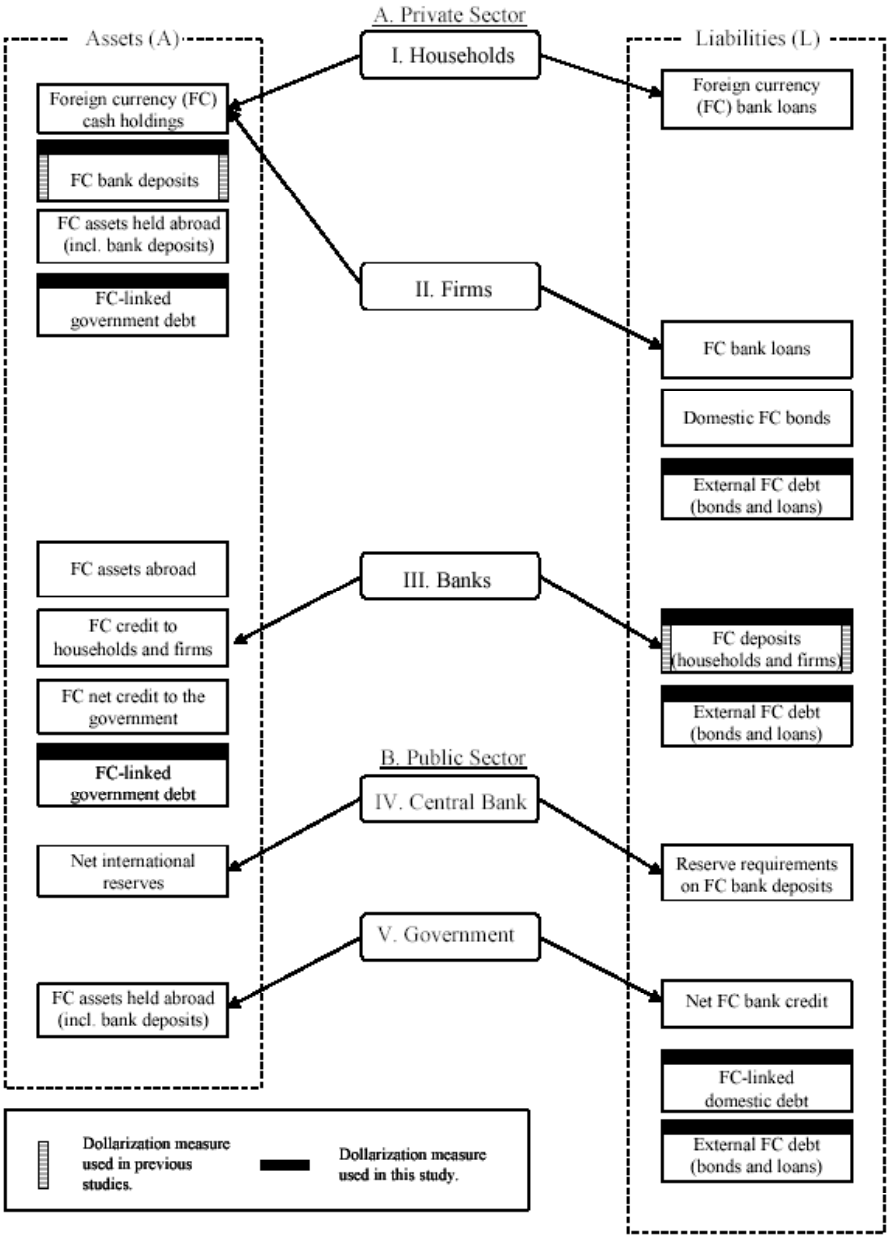
In the empirical literature, there are alternative measures of the degree of financial dollarization. The most common way of measuring financial dollarization is

[1] A key point that has emerged in the recent literature of currency and banking crises in emerging markets is that either the domestic banking system, firms, households and/ or government can have relatively large foreign currency debt obligations. This case is often referred to liability dollarization in the literature.

the deposit dollarization ratio such as the ratio of foreign currency (FX) deposits to the broad money supply. Some alternative measures including the ratio of FX deposits to domestic currency deposits or to a domestic broad monetary aggregate are also considered by this conventional approach. Alternative approaches consider not only the banking system asset dollarization but also the debts of public and private sectors denominated in foreign currencies (liability dollarization).

There are some obstacles in the measurement of financial dollarization. One of them is the choice of the relevant measure. Definition or the 'type' of financial dollarization considered often varies from one study to another depending on the main variable or subject of interest. For example; in order to measure the impact of financial dollarization on monetary stability, a measure of dollar share of resident's savings is needed, which is deposit dollarization ratio. However, in order to see impact of financial dollarization on financial fragility and crisis, liability dollarization ratio of the financial intermediation is required. Moreover, in order to show the impact of financial dollarization on growth and output volatility, overall dollar indebtedness measures are needed. That is to say; to distinguish the different types of dollarization is not straightforward. Consequently, the different concepts of dollarization focus on different sides of the balance sheet.

Figure II.1 shows the extent of dollarization in different sectors of an economy. As argued by Reinhart *et. al.* (2003), a financial dollarization measure should consider all the available dollarized balance sheet items in an economy. The figure summarizes foreign currency assets and liabilities of the public and private sectors in a partially dollarized economy. Foreign currency assets of households and firms are the commonly used measures in the conventional dollarization analysis. Liability dollarization measures are related with the right side entries, more preciously about external foreign currency liabilities of households, firms and the government.

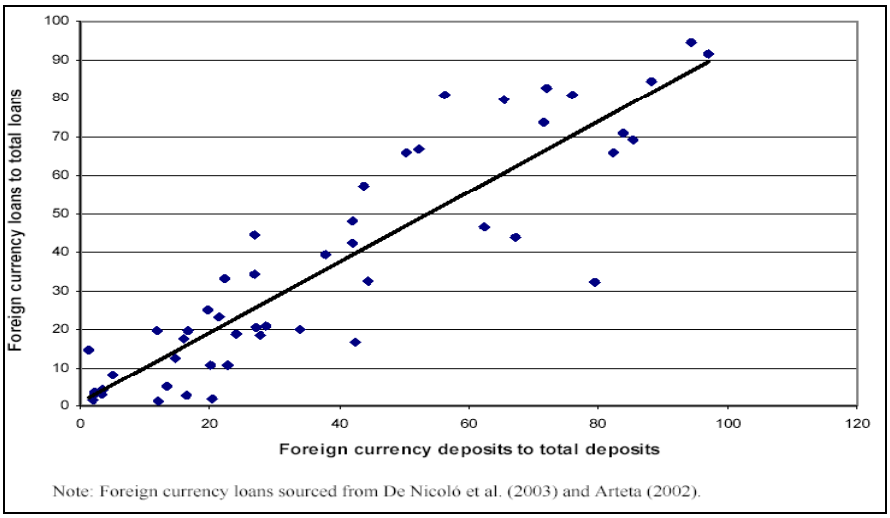


Source: Reinhart, Rogoff and Savastano (2003).

Figure II.1: The Extent of Dollarization in Different Sectors of an Economy

The other important obstacle in the measurement of financial dollarization is the data availability. Measuring banking system deposit dollarization appears to be relatively easy as the data for the FX deposits are often available for many countries for a plausible time period. However, as the foreign currency in circulation is generally not available, the conventional measures can underestimate the extent of dollarization in an economy. Furthermore, liability and credit dollarization data are not available for the bulk of countries. Also, the data for domestic money bank's foreign currency credits to the private sector are extremely limited for most of the countries. Sectoral data on foreign currency liabilities of different economic agents and on the linkages across the balance sheets of those agents can be found only for a very limited number of developing countries. Figure II.1 also stresses the fact that, due to lack of reliable data on various foreign currency assets and liabilities, the measures of dollarization used in empirical studies are constrained. Consequently, in many studies, foreign currency assets of domestic residents which are indicated in the two boxes with striped borders (FX Deposits) are used as a standard indicator of dollarization.

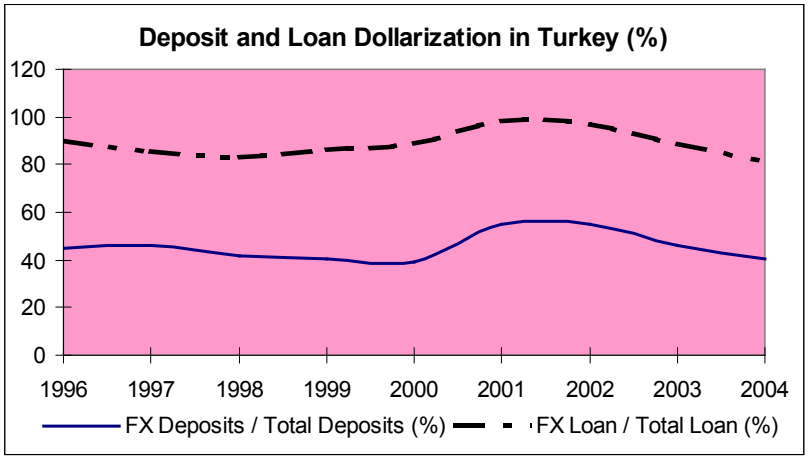
As a solution to these measurement problems, Levy-Yeyati (2004) suggests to use deposit dollarization to proxy loan and/or financial dollarization as these two measures often mirror each other due to prudential limits on banks foreign exchange position as shown in Figure II. 2 for a large sample of developing and developed countries.



Source: Levy-Yeyati (2004)

Figure II.2 : Deposit and Loan Dollarization

A similar case can be argued to be valid also for Turkey. Figures II.3a and II.3b plot loan dollarization (foreign currency loans as a share of total loans, %) and deposit dollarization ratios (foreign currency deposits as a share of total deposits, %) for the period 1996 to 2004. The figures suggest that these two ratios move together during the period. Consequently, following Levy-Yeyati (2004), deposit dollarization can be used as a proxy to loan dollarization for Turkey.



FigureII.3a: Deposit and Loan Dollarization in Turkey

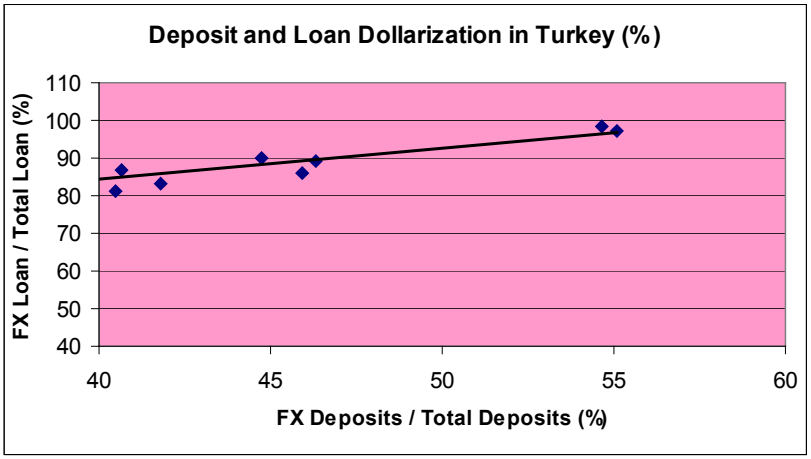


Figure II.3b: Deposit and Loan Dollarization in Turkey

II.2. DETERMINANTS OF FINANCIAL DOLLARIZATION

Causes of financial dollarization can be explained by the properties of the economic environment of the country and the policy responses of the monetary authorities. The determinants of dollarization can be grouped whether it is evaluated in the context of currency susbtitution or asset substitution. This section briefly summarizes the basic causes and determinants of financial dollarization.

Inflation

As argued by Savastano (1996) and Levy-Yeyati (2003), sustained high and variable inflation rates are among the basic cause of dollarization. As Levy-Yeyati (2003, p.5) notes 'long lasting inflationary memories in economies with a track record of monetary mismanagement' fosters financial dollarization. In the case of an increase in the volatility of domestic inflation, which increases the volatility of local currency real wages and local currency real financial returns, financial dollarization deepens. The increase in the real exchange rate volatility, on the other hand, can increase the volatility of dollar indexed real wages or financial returns, and thus can lead a lower degree of financial dollarization. Persistent inflation and nominal instability can lead foreign currencies to be used also as a unit of account (Guidotti and Rodriguez (1992) and Levy-Yeyati (2003)).

The currency substitution literature focuses on the negative relationship between inflation and domestic money along with nominal instability and choice of unit of account. However, an analysis of currency substitution as a result of inflation alone may not be sufficient to explain the dollarization phenomenon in most of the developing countries. Alternatively, an analysis of dollarization as an asset substitution may be needed.

The explanations of financial dollarization as an asset substitution phenomenon contain portfolio choice, time inconsistency, moral hazard and lack of monetary policy credibility, incomplete markets and market imperfections, exchange rate pass through, hysteresis effect, trade openness and type of shocks.

Portfolio Models

Ize and Levy-Yeyati (1998) present a portfolio model, which provides an important point of reference relating financial dollarization to macroeconomic policies. The portfolio model is a function of volatility of inflation and real depreciation. Ize and Levy-Yeyati (1998, p.8) state that ‘‘for a given variance of inflation, an increase in the variance of the rate of depreciation reduces dollarization as it limits the hedging benefits of the dollar assets. Hence, stabilization may fail to reduce dollarization if accompanied by policies that target the real exchange rate’’. Their conclusion prefers a floating exchange rate regime for dedollarization. Accordingly, stable inflation and a fluctuating exchange rate should be associated with low dollarization. In particular, the combination of inflation targeting (to the extent it reduces inflation volatility) with a floating exchange rate (to the extent it increases real exchange rate volatility) should foster the use of local currency and discourage the use of foreign currency, since it reduces the risk related with the former and increases the risk related with the latter. Instead a stabilization policy that reduces inflation volatility, through lowering inflation, may not succeed in reducing dollarization if it is accompanied by a fixed exchange rate regime. This would be the case in particular, if authorities target the real exchange rate (for example, a crawling peg policy) rather than the inflation rate. Ize and Levy-Yeyati (1998) also find that the stochastic properties of assets and liabilities are crucial determinants of dollarization.

Time Inconsistency, Moral Hazard and Lack of Monetary Policy Credibility

The time inconsistency argument arises from the argument that governments tend to inflate the real burden of debt denominated in domestic currency. In the absence of a credible government commitment to low inflation, agents rationally anticipate an inflation bias and decrease their demand for domestic currency instruments. If the government cares about inflation, a high inflation bias would dissuade a government from issuing local currency debt. Consequently, public debt dollarization could be interpreted as a deliberate decision by the issuer to avert the inflation bias (Calvo and Guidotti, 1989) or to mitigate the time inconsistency problem by increasing the associated costs of inflation (De la Torre *et al.* (2003)), rather than as the consequence of lack of a missing market for local currency debt, as the original sin view suggests. (Levy-Yeyati, 2003).

Time inconsistency problem of the monetary policy is an important factor that contributes to dollarization especially in developing countries. The use of monetary surprise as a means of motivating economic activity and reducing the real value of the public debt reduces the credibility of the monetary policy. Inflation reduces the credibility of the monetary policy and as a result of this, the cost of the public debt increases sharply. According to Calvo and Guidotti (1990), indexation and dollarization of the debt are used in order to gain credibility. Because these methods help to convince the public about the commitment of the policy makers to inflation stabilization.

Nicolo, Honohan and Ize (2003) argue that lack of monetary credibility can raise the cost of domestic currency debt to the point where it becomes optimal for the government to effectively default on the debt. In such cases, domestic currency is not an effective means of financial transactions any more. Instead, indexed debt (including dollar debt) becomes the medium of choice. For instance, when the exchange rate is fixed, an expectation of a devaluation causes a shift to the dollar because the probability of default on local currency loans and the cost of insurance against devaluations increase. Nicolo, Honohan and Ize (2003) give the example of a driver who, faced with an increase in his insurance premium, decides to drive without insurance. For borrowers, contracting in local currency is preferable in order to be protected against a large potential increase in the cost of debt , However, this insurance benefit disappears when the high cost of insurance can itself cause a

default. As a result, borrowers prefer to borrow in dollars because defaulting on dollar loans have a lower probability than defaulting on local currency loans. Due to the mistreatment of the fixed exchange rate regime, the credibility of the fixed exchange rate policies is lost. With the depreciation of the domestic currency with respect to foreign currency, dollar denominated assets become reasonable to hold instead of domestic currency.

Ize and Levy-Yeyati (1998) focus also on the role of monetary policy on financial dollarization. Monetary policy affects dollarization through the debt wedge. In case of a shift in the currency composition of the central bank's liability in the favor of domestic currency, monetary condition will not be affected. They suggest that this can be obtained by issuing domestic currency denominated central bank securities and using the income to withdraw an equal amount of foreign currency denominated securities from circulation. Thus it can be concluded that dollarization is a rational reaction to a weak monetary policy.

Ize and Parado (2002) indicate that sustainability of the monetary regimes is also effective in determining the dollarization. In fact dollarization may reproduce a lack of confidence in the sustainability of the monetary policy regime and current regime changes in the aim of encouraging the domestic currency may not help to explain the inertial dollarization. Moreover if the current regime is an exchange rate peg which possesses a low exchange rate volatility and if the confidence of the current regime is high, the expected response of a monetary policy in the case of a currency crisis has become dominant in determining the degree of dollarization. This can explain both the high degree of dollarization and its extreme variability in countries with nearly or fully pegged exchange rates as illustrated by the recent Argentinean experience.

When the debt defaults are considered in the context of moral hazard, the possibility of a default increases. Nicolo, Honohan and Ize (2003) indicates that according to McKinnon and Pill (1999), Dooley (2000), Schneider and Tornell (2000) and Burnside, Eichenbaum and Rebelo (2001), the source of moral hazard is the government intervention that provides free insurance against currency risk. When the government promises to bail out the borrowers and lenders in the case of a devaluation and when they borrow in foreign currency, they do not fully internalize the risks they bear. Instead, they take the advantage of low and stable dollar rates

on condition that the exchange rate holds and expect the government to insure them against potential losses in case of a large depreciation.

Incomplete Markets and Market Imperfections

This argument is related with the presence of externalities and poor regulations. Due to absence of alternative financial instruments like inflation-indexed assets in chronic inflation countries, savings are forced out of domestic currency into dollar denominated assets. Also, as Caballero and Krishnamurthy (2000) state, financial restrictions cause domestic agents to underestimate the risk of borrowing in dollars in order to insure their own financing, generating a negative externality for the economy as a whole.

Broda and Levy-Yeyati (2003) explain the reasons of financial dollarization by the issue of insurance. The insurance types include i) *Deposit insurance* and ii) *Bank insurance* (as a lender of last resort and as an exchange rate defense).

First of all, in the case of bank liquidation, if domestic and foreign currency deposits are treated equally, this can cause to the dollarization of the banking system. When the exchange rate is low, for banks, cost of dollar deposits relative to domestic currency deposits is higher. However, when the exchange rate is low, banks are more likely to default and as a result, they do not internalize the cost differentials between deposits. Broda and Levy-Yeyati (2003, p.3) state this argument as ‘‘the peso-dollar spread priced by risk neutral depositors will exceed the effective relative cost of dollar liabilities for the bank, inducing a preference for dollar funding. This mispricing of exchange rate risk by banks leads to an excessive level of dollarization.’’

With the deposit insurance, dollar deposits become attractive as a hedge against large devaluations. Consequently, the share of dollar deposits that are protected against exchange rate risk increases as a result of their insurance properties. Broda and Levy-Yeyati (2003) name the full deposit insurance case as ‘currency blind ‘ deposit insurance. Moreover, the deposit insurance scheme maintained by the government makes dollar denominated deposits and loans cheaper for banks and depositors since the insurance is unlimited and free. Levy-Yeyati (2003) suggests that in order to solve the problem of insurance, the larger value of currency blind deposit insurance for dollar depositors should be factored in

the insurance premium. Also coverage of dollar and domestic currency deposits should be equal for a given currency-blind premium.

In the absence of deposit insurance, bank insurance as a lender of last resort type, has the same effect as deposit insurance inasmuch as it enlarges the range of end-of-period exchange rates over which dollar deposits are insulated from exchange rate risk. (Broda and Levy-Yeyati (2003)). However, contrary to deposit insurance, the dollarization will be further encouraged well above than that of deposit insurance since it preserves the claim of shareholders on the bank charter. In case the lender of last resort ensures insurance for banks regardless of their dollarization level, this will reduce the cost of risk taking which will accordingly lead to an increase in dollar deposits. In other words, where banks can transfer part of the risk to the provider of insurance, they will tend to increase funding in dollar.

In case of bank insurance as the type of exchange rate commitment, Central Bank precommits to defend the price of the domestic currency. When the government intervenes in the exchange rate market to limit the exchange rate fluctuations and reduce volatility, the risks exposed by banks will decline and this will result in financial dollarization as in the case of deposit insurance as well as bank insurance in the form of Lender of Last Resort.

Burnside, Eichembaum and Rebelo (2001) also focus on the insurance argument. They show that presence of warranties in the financial system incentives the risk taking behavior of the private sector and results in excessive exchange rate position. When the government covers the risks, it is not priced in the interest rate and as a result, foreign currency credit becomes cheaper. In a broader sense, fixed exchange rate regime can be considered as a warranty. The private sector internalizes the future exchange rate path and this results in further credit dollarization.

The findings of Broda and Levy-Yeyati (2003) differ from the related literature in the way that the incentive to dollarize is present even in the absence of government or private exchange rate guarantees. They show that any bank liquidation policy that recognizes the currency of denomination of outstanding liabilities induces financial dollarization that is unwarranted which means dollarization that would not arise in the model if dollar-funded banks are forced to separate from peso funded banks. The second difference they find is that a currency-blind deposit insurance leads to dollarization for a different rather than from

moral hazard consequences of insurance. It creates dollarization due to the effects of insurance on the price of deposits. Moral hazard is a key source of dollarization where banks can transfer part of the risk to the provider of insurance that lead banks to increase the level of deposit dollarization in the context of bank insurance as a lender of last resort.

Exchange Rate Pass Through and Hysteresis (Ratchet) Effect

Honohan and Shi (2002) focus on the role of exchange rate pass-through and hysteresis or the ratchet effect on the degree of dollarization. Dollar deposits protect depositors from devaluation of the domestic currency but nominal devaluation is not the only risk. For a depositor who consumes both domestic and imported goods, holding dollar deposits does not mean that the risk is eliminated. Honohan and Shi (2002, p.4) suggest that ''in order to minimize the variance of a portfolio's real value, the mix of foreign and local currency assets must be chosen with reference both to the variance of inflation and to the variance of the real exchange rate''. When the variance of domestic inflation rises, share of dollar deposit rises whereas when the variance of real exchange rate rises, the share of dollar deposits falls. In the case of a rapid exchange rate pass-through on domestic prices, real exchange rate will be stabilized and this will result in dollarization due to the reason mentioned above. However Honohan and Shi (2002) indicate that although the determinants of pass-through and dollarization certainly have common characteristics, models differ as to how closely they are related. The degree of correlation between the two is thus an empirical question.

It is generally agreed that primary cause of dollarization is the instable financial markets. However, country experiences have shown that although financial conditions are settled down, the share of dollar denominated instruments has not declined. The persistence of dollarization can be explained by the hysteresis or the ratchet effect. When depositor get used to hold dollar denominated deposits, they do not change their behavior immediately although the conditions are reversed. Set-up costs of establishing a dollar deposit and financial adaptation can explain the source of hysteresis effect. Once the set-up costs are paid, depositor may prefer to go on benefiting from the risk-reduction that can be gained from holding a mixed portfolio of currencies.

Trade Openness and Type of Shocks

Panel and/or cross country studies consider also trade openness and type of shocks as potential determinants of financial dollarization. In the case of output and productivity shocks, financial dollarization may become significant. The reasons behind this argument are that an optimal (countercyclical) monetary policy should result in some inflation volatility and financial dollarization reflects the trade structure of the economy. Thus, trade openness is one of the factors that affect financial dollarization Moreover by increasing inflation volatility a shift towards an optimal monetary policy can increase rather than reduce financial dollarization. Thus considerable financial dollarization will exist if the economy is open, home monetary policy is responsive to real shocks, and these shocks are mainly idiosyncratic (proper to each country). In other words, more open economies are likely to experience higher inflation volatility and be financially more dollarized

The effect of real shocks on financial dollarization is seen indirectly. Real shocks affect real dollarization, which is the use of dollar to index wages, prices of goods, and other real contracts. Monetary responses to these shocks will then change the stochastic properties of inflation and the real exchange rate. Thus the effects of real shocks are conveyed through real dollarization to financial dollarization. If the real sector is extremely dollarized, real financial returns on domestic currency instruments are likely to become relatively more volatile than those of dollar indexed instruments.

Ize and Levy-Yeyati (1998) assert that change in the external wedge induced by a reduction in the cost of borrowing may explain the reason of loan and deposit dollarization. When the world interest rate or the country risk premium declines, loan demand will increase and this will stimulate the capital flows and will result in a rise in the supply of loanable funds. Thus financial intermediation will expand and it will tilt the interest rate differential in favor of the domestic currency, in that way raising the dollarization of loans and reducing that of deposits.

II.3. CONSEQUENCES AND POLICY IMPLICATIONS OF FINANCIAL DOLLARIZATION

Financial dollarization has crucially important policy consequences and implications. As Levy-Yeyati (2004) convincingly argues financial dollarization can be a source of financial fragility through creating currency/maturity balance sheet mismatches and can lead to a limited ability to implement an independent monetary policy and "fear of floating". The process of financial dollarization is often reflected in varying patterns of dollarization of bank deposits and loans, which in turn influence the extent of currency mismatches in financial intermediation. In most of the developing countries, credits and deposits mostly constitute a significant part of total bank assets and liabilities. Thus currency imbalance of financial intermediation, which is the mismatch of assets and liabilities of the banking system, can be very effective in forming the foreign currency exposure of a dollarized banking system.

Levy-Yeyati (2004, p.1) points out that ''while some dollarization may be required by producers of tradable as a hedge against exchange rate risk, widespread financial dollarization inevitably introduces a currency mismatch for the economy as a whole". This currency mismatch occurs either at the domestic banks' balance sheets through local currency on-lending of foreign currency funds, or through real exchange rate exposure of dollar borrowers with income largely denominated in non-tradable as in the case of most local producers or the public sector. Currency mismatch and the resulting real exchange rate exposure, amplifies the impact of real shocks through its negative effect on debtors' balance sheets, possibly leading to financial fragility and currency and financial crises.

Financial Dollarization and Monetary Policy

Financial dollarization can cause monetary policy to become more complex and less effective. This conventional view rests on the theoretical results obtained from the currency substitution literature. The main rationale of such view is that under currency substitution, the demand for domestic money becomes more unstable and the ability of central banks to set interest rates for aggregate demand management substantially decreases. Although a significant volume of literature suggest that dollarization causes to monetary policy ineffectiveness, recently

Reinhart *et al.* (2003) do not find significant differences between the ability of monetary policy to reduce inflation or to stabilize output across countries with different degrees of dollarization. Reinhart *et al.* (2003) also show that inflation rates are higher and more volatile in the countries where there is a high degree of financial dollarization compared with the countries where the degree of dollarization is low. However, their empirical evidence does not support the view that dollarization prevents inflation to bring down or it makes monetary transmission more complex. Consequently, it may be argued that the ability to carry out an effective monetary policy does not seem to be a major cause of concern about dollarization.

These results have clear implications for the conduct of monetary policy. However these models do not claim that monetary policy is completely ineffective to control inflation in a dollarized economy. This is consistent with the fact that dollarization has been persistent in spite of the substantially declining inflation rates in the bulk of countries during the last decades. Consequently, it may be argued that dollarization can coexist with low inflation without providing a significant obstacle to monetary policy effectiveness

Financial dollarization, however, can severely affect the choice of the exchange rate regime as suggested by the recent theoretical and empirical literature. The main reason is the “fear of floating” (Calvo and Reinhart (2002)) under liability dollarization. As Calvo and Reinhart (2002) and Haussman, Panizza and Stein (2001) point out, dollarization limits the ability of central banks to increase interest rates to defend the currency due to fear of floating. In the presence of liability dollarization when the private sector debts are denominated in foreign currency, countries become less tolerant to exchange rate fluctuations since fluctuations in the exchange rate effects sectoral balance sheets and ultimately aggregate output.

The increase in dollar denominated assets in the financial system increases the substitutability of assets leading to exchange rate become more sensitive to portfolio reallocations. Thus dollarization can result in a more volatile exchange rate and increase the need for a flexible regime. On the other hand, currency mismatches in the financial system determines the foreign currency exposures of the banking system. The empirical results by Arteta (2002) suggest that flexible exchange rate regimes may worsen such exposures in developing countries. Moreover, since exchange rate is a policy decision, it is partly based on the level of

financial dollarization. Therefore, the direction of causality may run in the opposite direction: for example, countries with high dollarization and high mismatches may choose to fix their exchange rate. This is also reported by Poirson (2001) that countries with higher deposit dollarization are more likely to adopt a fixed exchange rate regime.

According to IMF World economic Outlook (1997), financial dollarization as an asset substitution has implications for the choice of an exchange rate regime. With the availability of foreign currency deposits in domestic banks, capital mobility increases. The public can potentially shift between foreign currency deposits held with domestic banks and abroad, as well as between foreign currency and domestic currency denominated deposits held in domestic banks. These various assets are likely to be close substitutes for economic agents, which build up the link between interest rates on dollar deposits at home, international dollar interest rates and domestic currency interest rates. This would limit the control that the central bank can exert on monetary conditions, such as the level of interest rates on domestic currency. Thus, financial dollarization in the context of asset substitution may increase the usefulness of a flexible exchange rate arrangement in enhancing monetary autonomy.

There are some obstacles in the process of monetary policy implementation under financial dollarization. Recently, the failure of the pegged exchange rate regimes, loss of relationship between monetary aggregates and inflation has made inflation targeting (IT) regimes preferable. However, dollarization of the economy prevents the successful implementation of the inflation-targeting regime since the prerequisites of the IT regime is the absence of fiscal and external dominance. As Jonas and Mishkin (2003) convincingly argue, the absence of external dominance contains the lack of a significant financial dollarization. Dollarization in the economy affects the independence of the monetary policy. Under a fully-fledged IT with flexible exchange rates, exchange rate fluctuations may increase domestic currency value of foreign exchange denominated and foreign exchange linked debt. This may encourage currency and asset substitution and may damage the balance sheets of firms, households and banks in the case of high degree of financial dollarization. Due to an external shock, debt burden of the government can increase and it may also affect financial and real sectors' balance sheet if there is high degree of financial dollarization in the system. Significant depreciations of domestic currency

may affect financial solvency of firms and financial institutions. Thus, inflation targeting regime may not be successful when there is significant financial dollarization in the economy.

Financial dollarization causes currency mismatches in the financial system and this causes financial fragility in the real and financial sectors through dollarization of public debt and dollarization of balance sheets of firms and financial intermediations. For example, sharp depreciations can cause unsustainable fiscal balances and collapse of the firms and banks. In the context of 'original sin'[2] hypotheses, it is observed that financial dollarization has an increasing exposure on the economy as a whole.

Financial dollarization also influences the pricing strategy of the firms as they reflect exchange rate changes to prices. In such a case, monetary authorities have to take into account also the exchange rate fluctuations. As Chang and Velasco (2000) point out, '' any scheme to control the rate of inflation at short horizon must control, to some extent, the nominal exchange rate''. Thus we can say that financial dollarization has important consequences on the economy and monetary policies as well. The main concerns about financial dollarization are that it can reduce the effectiveness of monetary policy and poses risks for macroeconomic and financial stability.

Another impact of financial dollarization is on the real seignoirage revenue. Reinhart *et al* (2003) also explore that dollarization leads to significant differences in the seigniorage revenue. In the case of financial dollarization, domestic central banks are not able to capture the full seignoirage revenue. It is shared by foreign currency issuer central bank and domestic central bank. Another reason of the loss in the real seignoirage revenue under financial dollarization is the decrease in domestic money demand. Since seignoirage revenue equals to inflation rate times money demand, a decrease in the domestic money demand will cause to a decrease in seignoirage revenue.

Financial Dollarization, Crisis and Vulnerabilities

Arteta (2003) discusses whether financial dollarization heightens the probability of crisis and its output cost. The case where deposit dollarization is high

[2] Original sin refers to the case where countries can not borrow in their own currencies from international capital markets

and dollar liquidity is low is dangerous since banks may not be able to deal with a run on dollar deposits. Moreover, high deposit dollarization increases the substitutability of dollar denominated and domestic currency denominated instruments and makes the exchange rate more sensitive to portfolio reallocations. Thus deposit dollarization can increase the possibility of banking and currency crisis. Liability dollarization can make crises more costly as a currency crash, a large depreciation of the exchange rate, can lead to a decrease in the net worth of the banking system. In this case, credit dollarization may not serve as an effective tool for hedging their existing dollar liabilities. After a currency crash, dollar loan default rates may rise since it will become more difficult for borrowers to repay. Greater default in turn leads to a further deterioration of bank asset quality. As a result of increasing banking instability, banks supply of credit may be declined and this may lead to decrease in investment activities and make financial distress even more costly. In short, currency crashes in highly dollarized economies deteriorate both sides of banks balance sheets and thus can be particularly contractionary.

Dollarization can also increase the vulnerability of the country to adverse external shocks. There are two significant vulnerabilities one arising from liability dollarization of the private sector and the other arising due to public debt dynamics. The recent experiences of financial crises have emphasized the importance of such vulnerabilities raised by dollarization. These experiences show that, in the case of foreign currency denominated debt, the expansionary impact of exchange rate depreciations are reversed. Krugman (1999a), Aghion, Bachetta and Banerjee (2001) and Cespedes, Chang and Velasco (2000) are the primary studies that show the contractionary effects of currency depreciations in presence of foreign currency debt. Cespedes, Chang and Velasco (2000), for instance, show that depreciations can be contractionary in the presence of large levels of foreign currency debt and imperfections in the international capital markets. From an empirical standpoint, the recent study (Galindo, Panizza, and Schiantarelli, 2003) uses macroeconomic data to investigate whether the presence of dollar debt affects the relationship between economic activity and exchange rate depreciation. Galindo, Panizza and Schiantarelli (2003) find that the presence of dollar debt reduces (up to the point of possibly making it negative) the expansionary effect of currency depreciations. Moreover some studies suggest that dollarization itself can cause self-fulfilling crises. Calvo, Izquierdo and Mejia (2003) for example, show that for a sample of

emerging market countries, liability dollarization is an important predictor of sudden stops in capital flows, which may cause severe crisis.

Balance sheet effects at the firm level can have adverse effects on investment and growth directly by increasing the fragility of the overall financial sector. Several concerns regarding the vulnerability of the financial system emerge with dollarization. Although empirical evidence presented by De Nicolo, Honahan and Ize (2003) suggest that dollarization can reduce the adverse effect of high inflation on financial intermediation[3], there are important arguments, which focus on the impact of dollarization on financial fragility. Dollarized financial systems are particularly subject to solvency and liquidity risks. The main source of fragility occurs in the case of currency mismatches due to the large exchange rate depreciations. Although the currency mismatch of the banks has been limited significantly with the help of some regulations, the indirect effects of portfolio deterioration remain present. Galindo and Leiderman (2005) indicate that by this way, the currency mismatch is transferred to borrowers, but the financial institution still bears the currency mismatch risk especially if the borrower is unhedged. Also De Nicolo *et al.* (2003) note that such form of credit risk may be associated to an increased risk of deposit withdrawals that can lead to bank runs in response or in anticipation of a devaluation.

Policy Implications and Dedollarization

Since financial dollarization creates obstacles in policymaking process and causes vulnerabilities in the financial system, coping with the risks of dollarization become an area of concern and primary policy objective. While some countries such as Brazil, Colombia, Mexico and Venezuela have tried to avoid domestic financial dollarization by banning or highly restricting the possibility of issuing deposits in foreign currency, most countries have allowed for currency diversification within the domestic financial sector.

According to Levy-Yeyati (2003, p.3)

> The centre of the financial dollarization debate appears to have shifted from a generally passive stance (a ‘’learning-to-live-with-it’’ type of approach,

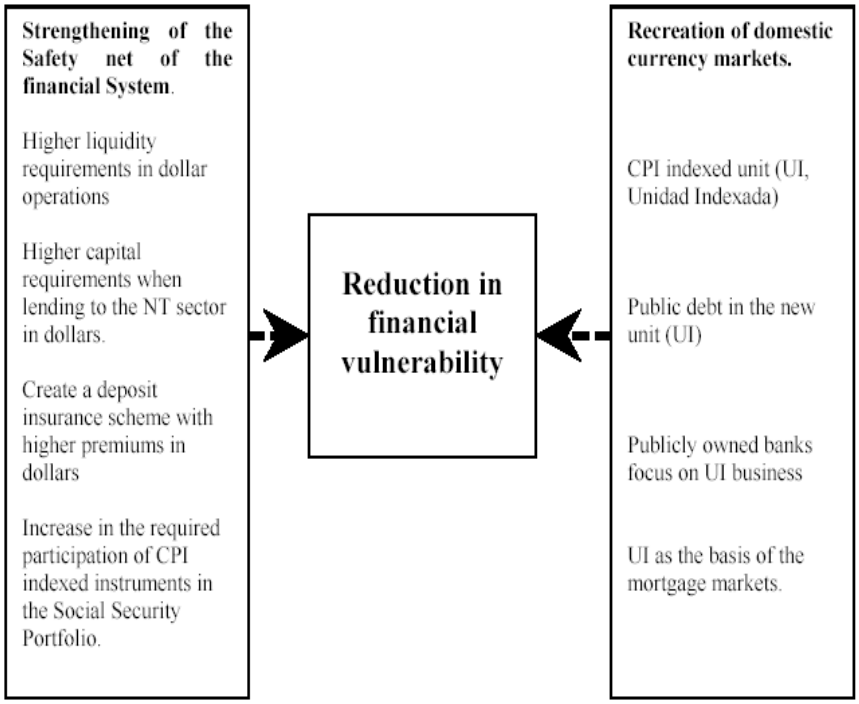
[3] De Nicola *et. al*. (2003) find that financial dollarization is indeed associated with deeper financial markets but only in economies with a history of high inflation.

> focused on the conduct of monetary policy in a bi-currency environment and strengthening of prudential norms to cope with the associated risks) to a more proactive one, oriented to limit the incentives that favor dollarization in the first place and foster the development of local currency instruments.

As a result, dedollarizing the economy has become an important issue in both heavily dollarized countries and international financial institutions. It may be argued that heavily dollarized countries should completely dollarize their economies in order to solve the problem of financial vulnerability. However, as Licandro and Licandro (2003) states, even in a fully dollarized economy a non-tradable sector would exist and the risk of a large adjustment in relative prices would remain. Thus, full dollarization may not be the ultimate solution to financial vulnerability of the economy.

As a result, it can be concluded that neither full dollarization nor full dedollarization are the ultimate solution for reducing the financial fragility. The dedollarization solution suggested by Licandro and Licandro (2003) is to develop a strategy based on two pillars: *i)* strengthening of the safety net of the financial system, and *ii)* recreation of domestic currency asset markets. Licandro and Licandro (2003) state that since financial regulation in several countries does not fully incorporate the risks involved in the dollarization of their business, it is necessary to reconsider this situation which has definitely fostered dollarization. As a solution, prudential requirements have to be stricter in the case of lending to an agent that receives income in domestic currency. Also liquidity requirements have to be higher in dollar denominated businesses since Central bank cannot perform its lender of last resort function in foreign currency. This will lead to a healthier financial system. Licandro and Licandro (2003) also assert that it is necessary to have a domestic unit of account that can be the basis of a future credit system and with nominal domestic currency markets long lost to past misconduct, a new alternative may be needed. In order to obtain a viable alternative to the dollar, a new unit of account will not be enough so government should be active in the system and should develop CPI indexed markets. Figure II.4 presents the steps of the dedollarization strategy for the case of Uruguay suggested by Licandro and Licandro (2003).

Levy-Yeyati (2003) suggests a “carrot and stick” approach to dedollarization. According to Levy-Yeyati (2003, p.14), foreign exchange market in the domestic country necessitates ‘’the revision and adaptation of existing prudential regulation in a way that eliminates distortions that hamper the use of local currency for financial transactions minimizing the costs in terms of financial disintermediation or distortions elsewhere’’. This is the main pillar of the stick approach. The stick approach is related with prudential regulation. With the presence of unremunerated reserve requirements and deposit insurance, foreign exchange deposits are supported by the existing prudential norms. Assigning the same reserve requirement and liquidity ratios to both domestic and foreign currency deposits is not rational since domestic currency banks are not eventually vulnerable to sudden changes in devaluation expectation whereas bi-currency banks are. Thus, by assigning higher reserve requirements and liquidity requirements ratio, costs of foreign currency intermediation can be raised. In this sense, regulations are aimed at letting banks bear the full risk and cost of having dollar denominated liabilities. Also, removal of deposit insurance for foreign currency deposits, putting compulsory minimum holding period for foreign currency deposits and imposing strict quantitative restrictions such as maximum loan dollarization ratios or limits on the application of dollar funds are among the other safety measures that can be taken in order to increase the opportunity cost of intermediation and usage of foreign currency and deposits.



Source: Licandro and Licandro (2003)

Figure II.4: A Dedollarization Strategy

According to Levy-Yeyati (2003), while stick approach aims to diminish the incentives for dollar *vis a vis* the domestic currency, it needs to be complemented also with the introduction of domestic currency instruments. This is because, discouraging the usage of foreign currency instruments should be supported through introducing alternative domestic instruments to switch savings within the domestic markets. The “carrot approach” refers to the usage and creation of domestic instruments instead of foreign currency instruments and development of local currency markets. In order to provide this, CPI indexed assets are presented as an alternative to foreign currency deposits. Since indexation creates inflation inertia, these instruments should be designed in a forward-looking manner. Indexation is not the single alternative to favor the domestic currency instruments. In economies with

a low inflation track record, domestic currency deposits can steadily become an alternative to the dollar. The only way to create liquid domestic currency markets is not presenting indexed or non-indexed domestic currency deposits and loans. Levy-Yeyati (2003) mentions that alternative non-bank sources of local currency financing are likely to become increasingly important especially in the aftermath of a systematic banking crisis. Moreover, although these assets can be attractive for small savers, they may not create enough demand on borrower side. Thus consistent and sound monetary policies are needed to match these instruments.

To sum up, in the way to dedollarization, developing domestic currency markets and indexed instruments coupled with rational monetary and fiscal policies are vital. In that respect, CPI indexed instruments may provide an attractive alternative. However, the effectiveness of this instrument necessitates stable inflation and healthy and well operating derivative markets. Derivative markets have an important role in highly dollarized economies. Aguiar (2004) asserts that firms that are not fully hedged their dollarized liabilities can loose their significant portion of net wealth during a financial crisis leading to a decline in investment and economic activity. In such a case, balance sheets effects at the firm level can have negative effects on investment, growth and financial sector even in countries in which domestic financial sector loans are not dollarized. Therefore, the derivatives markets should be constructed and promoted in highly dollarized countries.

Reinhart *et al* (2003) state that when the country experiences are analyzed only Israel, Mexico, Poland and Pakistan have successfully dedollarized their economies and also Mexico is a noteworthy experience since it has achieved public debt dedollarization. Another important point to note is that the dedollarization efforts can have negative consequences at least in the short run. It may increase capital flight and it can cause a decrease in bank credits and as a result, it may affect inflation and growth in the economy. Levy-Yeyati (2003, p. 26) notes that

> The dedollarization strategy is likely to face a serious liquidity problem at the start up stage, as markets for local currency securities, at least in the short run, will not be able to profit from fully developed international markets for foreign currency emerging market paper. For this reason, the government has a decisive role to play. In particular, it will have to incur the cost of a liquidity premium to be paid by early borrowers. In this regard, regulations governing the financial choices of institutional investors may contribute to reduce this early cost to the extent that it does not detract from their capacity of these investors to fulfill its role.

CHAPTER III

FINANCIAL DOLLARIZATION: THE TURKISH EVIDENCE

III.1. A BRIEF HISTORICAL BACKGROUND

The discussion of currency substitution in the Turkish economy started after the financial liberalization process of the early 1980s and since then the switch to foreign currency deposits from Turkish lira deposits has played an important role in the portfolio allocation decisions of the residents. Consequently, in order to explain the dollarization phenomenon, a brief discussion of the main developments of the Turkish economy during the last three decades may be helpful.

Prior to 1980s, the Turkish economy was characterized by import substitution growth strategy and fixed exchange rate regime policy. The level of the exchange rate was set by the government and the use of foreign currency was restricted. This inward oriented strategy caused to foreign exchange shortages and disruption of the economy. Following a severe economic crisis, a stabilization program was launched in 1980. The program contained conventional IMF stabilization measures along with exchange rate regime flexibility, trade and financial liberalization attempts. The program aimed to decrease budget and current account deficits and inflation and included the removal of government subsidies and price controls, loosening of administrative controls in exports, reducing tariffs and quotas, increasing the incentives to hold savings in financial instruments. Floating exchange rate scheme was adopted with the stabilization program made in January 1980. The development strategy changed from an inward oriented to outward oriented one and this new strategy gave an escalating role to the market forces.

In order to support the new development strategy, some reforms were launched for the development of the financial system. The financial system prior to 1980s was characterized as repressed with negative real interest rates, credit rationing, inadequate capital markets, restrictions on foreign exchange operations, substantial taxation of financial income and transactions, and the central bank financing of budget deficits. The banking system deposit and loan interest rates were basically determined by the government. During the financial liberalization

period of the 1980s, the deposit and loan interest rates were allowed to be determined by the banking system. Also Turkish lira has become convertible, export promotions and import liberalization was sustained in order to improve the balance of payments. Domestic financial markets were integrated with the rest of the world. Capital account restrictions were removed and capital account was fully liberalized by 1989. With the liberalization of the capital account, transaction costs have become lower. Restrictions on foreign travel and investment from abroad have been engaged with substantial liberalization of regulations.

The stabilization program, however, was not successful in decreasing inflation rates. During the 1980s, inflation rate was about 60 percent per annum. Although inflation rate was reduced to 30 percent per annum by the stabilization program in 1980, due to the macroeconomic instabilities and deterioration of the economy, inflation showed an upward trend and increased to 75 percent in 1988 and after reaching a peak of 120 percent in 1994, it has dropped to 88 percent in 1995. Thus chronic inflation was the major problem of the period until the early 2000s.

With the liberalization of foreign exchange regime in December 1983, commercial banks started to engage in foreign exchange operations and transactions in proportion to their foreign exchange liabilities. Afterwards, banks were allowed to open foreign currency deposit accounts to residents. Thus, foreign residents were allowed to purchase or sale any type of Turkish securities and likewise, domestic residents were allowed to invest in abroad to some extent and in line with these progresses, domestic financial transactions were allowed to be conducted in both domestic and foreign currencies.

The aim of the financial liberalization was to present alternative financial assets to residents. Over the 1980s and 1990s, new financial instruments like mutual fund shares, corporate finance bills, Treasury bills, asset backed securities were introduced as alternative domestic assets, however, enlarging opportunities for obtaining foreign balances led to a significant increase in currency substitution since residence tried to protect their wealth against high inflation. After these arrangements, foreign currency share of assets and liabilities in the banking system has increased sharply. Foreign currency denominated deposits started to become a major component of the broad money.

Because of the serious currency substitution in the economy, the government had taken some preventive measures in order to make Turkish Lira more favorable against the foreign currency. Interest rates on all types of deposits (other than public deposits) were freed and reserve requirement ratio on foreign currency denominated deposits was raised from 20 percent to 25 percent. Civcir (2003c), proposes that emergence of these new domestic instruments and markets may have helped to control the route of dollarization to the extent that these new domestic assets could compete with foreign assets in ensuring the liquidity and maintaining the value of financial wealth.

As a result of all these developments, currency substitution process in the Turkish economy deepened and followed an increasing trend despite the precautions taken by the monetary authorities. In other words, although the interest rates on Turkish lira deposits were higher than those on the foreign currency deposits. In addition to this although the reserve requirement ratios on foreign currency deposits were increased, currency substitution ratio was increasing .The Figure III.1 shows this upward trend.

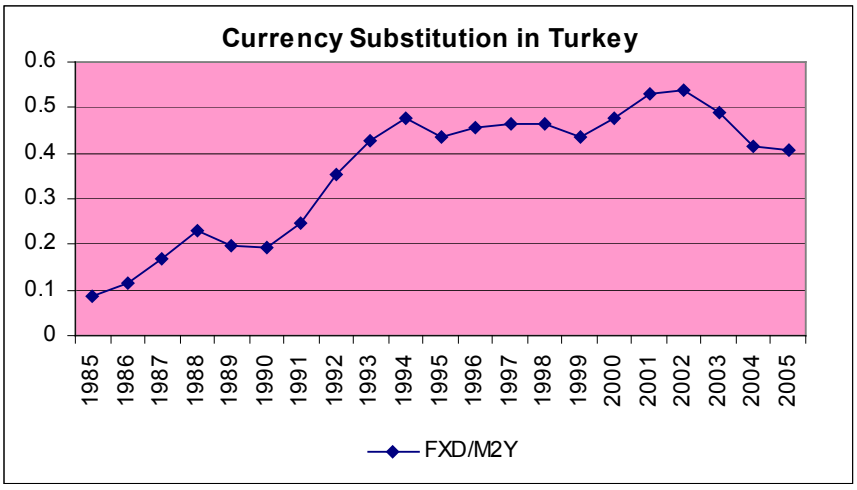


Figure III.1: Currency Substitution in Turkey

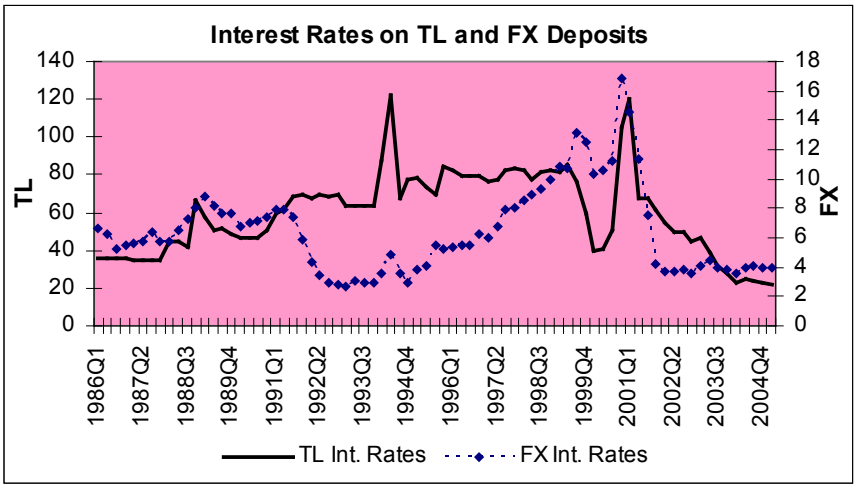


Figure III.2 : Interest Rates on TL and FX Deposits

As it's seen from the figures, a policy of a higher reserve requirement ratio on foreign currency deposits relative to Turkish lira, (TL) deposits and offering higher yields on TL deposits relative to foreign currency deposits was not effective in controlling the currency substitution level. It was hoped that when interest rates on TL deposits were raised, TL deposits would become more attractive than foreign deposits and as a result, demand for foreign currency deposits would decline.

Before the capital account liberalization in 1989, the increase in foreign currency deposits can potentially be explained by residents' desire to hedge against inflation and depreciation of the exchange rate. As Figure III.4 suggests, currency substitution ratio and real exchange rate moved generally together until 1989. Depreciation of the reel exchange rate led to an increase in currency substitution ratio. Also between 1988 and 1991 there was a decline in inflation rate and currency substitution ratio accompanied to the decline in inflation. However after 1990, although the real rates of returns on TL deposits were higher than that of foreign currency deposits, currency substitution have continued to increase due to mainly the exchange rate risk, political uncertainty and macroeconomic vulnerability. The appreciation of the domestic currency and the downward trend in inflation was

reversed in 1991 due to the uncertainty caused by the Gulf War and the policies of the period. Consequently, demand for foreign currency deposits increased.

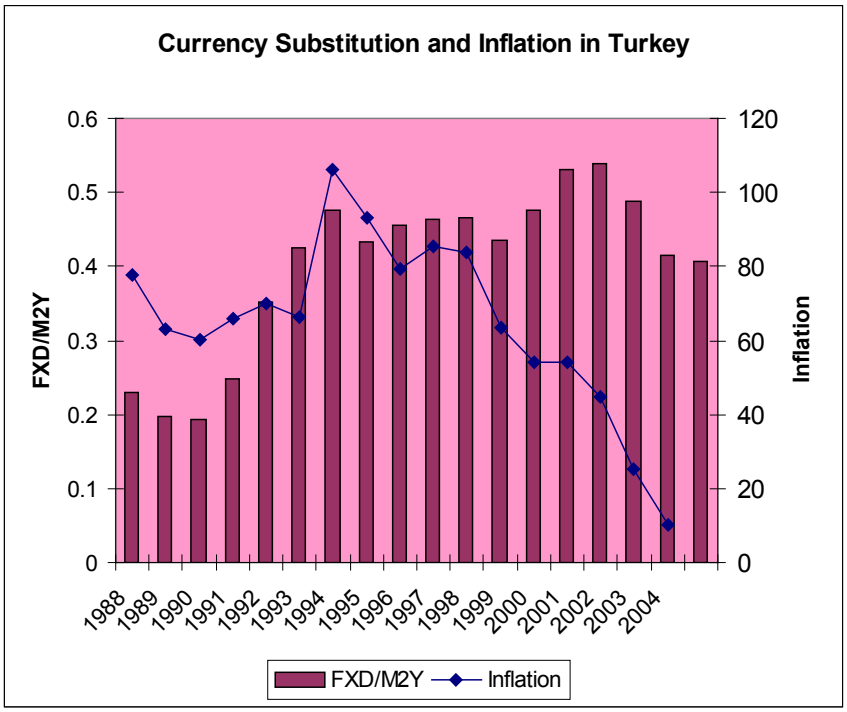
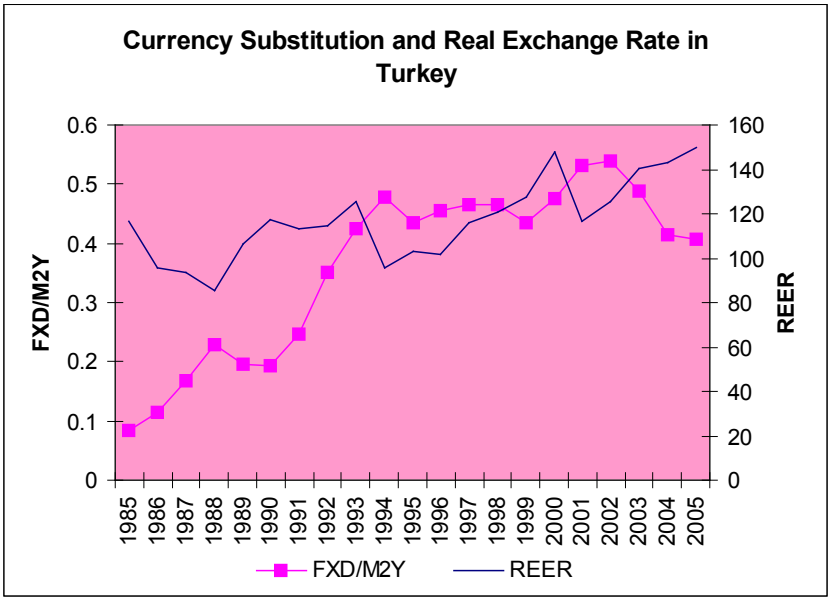


Figure III.3: Currency Substitution and Inflation in Turkey



Note: An increase in reer indicates appreciation.

Figure III.4: Currency Substitution and Real Exchange Rate in Turkey

After 1980, the attempts to minimize the share of public sector in the economy and expansionary policies caused serious public deficits which was financed through domestic borrowing strategy was chosen to finance these deficits. The domestic debt finance strategy with high real interest rates caused public sector deficits to potentially unsustainable levels towards the end of 1990s (Özatay, 1997). Given the limits on domestic borrowing and the idea of creating a downward pressure on interest rates, foreign borrowing was also used to finance both public and current account deficits. During the period, the Turkish economy witnessed a first generation type of crisis in 1994 due to monetary financing of budget deficits under an implicit real exchange rate targeting policy framework (Özatay, 2000). The Turkish economy recessed by about 6 percent and inflation jumped to the three digit numbers in 1994. After the crisis, in order to maintain the monetary discipline, some regulations were done for constraining the CB financing and the government turned back to domestic borrowing. In order to make lending to public attractive, the interest rates on public securities was raised. Due to the severe depreciation of the Turkish lira and unexpected inflation levels, the degree of currency substitution reached to

47 percent, residents preferred to increase their foreign currency share of their portfolios further in response to the failure of the stabilization program and to hedge themselves against any further unexpected increase inflation and depreciation of the Turkish lira. Thus it can be concluded that as a result of political uncertainty and economic instability, currency substitution has deepened after the currency crisis of 1994. With the implementation of a stabilization program after the 1994 crisis, an economic recovery, decreasing inflation and exchange rate depreciation, increasing confidence in the market resulted in a shift back to Turkish Lira instruments. Civcir (2003a) argues that besides these effects, also high returns offered on Turkish Lira instruments contributed to the decline in currency substitution.

With the stand by agreement with the IMF at the end of 1999, an exchange rate based disinflation program was implemented starting from 2000 with an aim to reduce inflation to 7 percent by the end of 2002. The exchange rate basket was composed of 1 US dollar plus 0,77 euro and it was announced by CBRT on a daily basis for a one-year period. In the context of monetary policy, in order to maintain monetary control, some constraints were put on net domestic assets and net foreign assets. The CBRT set net domestic assets and the growth of the balance sheet was determined by the increase in net foreign assets. Together with this quasi currency board process, sterilization was ruled out and the flexibility of the CBRT on interest rate was restricted (Civcir (2003a)).

The exchange rate based stabilization program ended with a financial crisis in February 2001. Although the inflation targets were not achieved, some progress has been maintained such that inflation reached to its lowest level since 1988 as seen from the Figure III.3. In addition to this, exchange rate risk was reduced and interest rates also declined sharply in 2000 as it is seen in the Figure III.2. However, this stabilization program was also ended with the crises of November 2000 and February 2001 (see, Özatay and Sak (2002) and Uygur (2001) for a comprehensive study on the causes of the 2000-2001 financial crises in Turkey). As a result of these unpleasant developments in the economy, currency substitution ratio has increased sharply. The foreign currency share has reached to 53 percent in the period 2000-2001.

After the 2001 crisis, ‘Transition to the Strong Economy Program’ was announced in April 2001. The program contained also some important regulations including Central Bank Law, revision in the Banking Act, Expropriation Act and

regulation of the closing of Extrabudgetary Funds. In the context of monetary policy, an implicit inflation targeting policy framework with the short-term interest rates being the main policy tool was started to be implemented. Exchange rate regime was announced as a floating regime allowing for central bank interventions only if there is an excess volatility on both sides. The implicit inflation targeting policy can be interpreted as successful since historically lower rates of inflation is achieved by mid 2005s as in line with the program targets. With the success of the stabilization program, currency substitution has declined to around 40 percents by 2004 supporting the "reverse currency substitution" interpretation of the recent CBRT policy evaluation papers. However, as will be discussed later, the degree of currency substitution is still high and it may be argued that there are some other regulations needed for an effective dedollarization. As already discussed in Part II-3, firstly incentives to hold foreign currency instruments should be prevented and at the same time local currency instruments should be expanded and alternative domestic currency instruments should be presented.

III.2. SOME DESCRIPTIVE MEASURES OF FINANCIAL DOLLARIZATION IN TURKEY

i) The Share of FX Loans

There are alternative measures of financial dollarization in the literature. For instance, Arteta (2002) defines dollarization in two alternative ways. The first definition deals with the deeds of credit and deposit dollarization by scaling dollar credit and deposits by total credit and deposits, respectively. On the other hand, in the second definition, extent of credit and deposit dollarization is presented by scaling dollar credit and deposits by total assets and liabilities, respectively. The first definition shows the portfolio allocation decisions whereas the second definition focuses on the relative importance of financial dollarization process. The dollarization ratios constructed by Arteta (2002) are as the following:

- **Credit Dollarization Ratio**

a) dollar credit to the private sector / total credit to the private sector
b) dollar credit to the private sector/ total assets

- **Deposit Dollarization Ratio**

a) dollar deposits/ total deposits
b) dollar deposits/ total liabilities

Due to lack of reliable data on dollar credit to the private sector for most of the emerging market countries, generally deposit dollarization ratios are used as a proxy to financial dollarization. As already discussed, a better measure of financial dollarization requires both deposit and credit dollarization ratios. As mentioned in Part II, as a solution to these measurement problems, Levy-Yeyati (2004) suggests to use deposit dollarization to proxy loan dollarization since deposit and loan dollarizations often mirror each other due to prudential limits on banks foreign exchange position.

These measurement problems are also valid for the Turkish case. Dollar credit to the private sector data is not available. Alternatively, the foreign currency credits of the domestic banking system can be considered as a proxy measure to credit dollarization ratio,. However, the data for the foreign currency credits of the banks are very limited for an empirical analysis as the sample starts from 1996. Figure III.5 demostrates the TL and foreign currency (FX) loans of Domestic Money Banks (DMB) staring from 1996. It shows that the share of foreign currency loans in total loans is significantly high reaching a peak in the financial crisis year of 2001. The share of the Turkish Lira denominated loans appears to be increasing after the 2001 financial crisis potentially due to the better macroeconomic stance and substantially lower inflation rates.

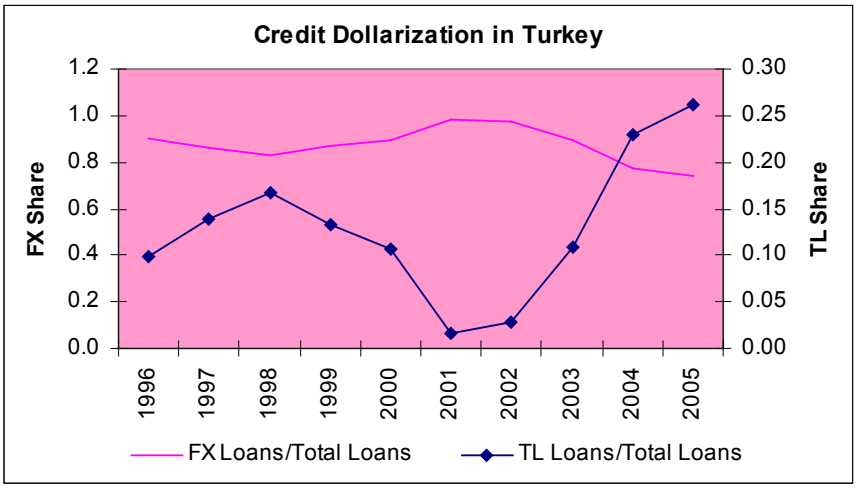


Figure III.5: Credit Dollarization in Turkey

ii) A Composite Dollarization Index for Turkey

Reinhart *et al.* (2003) construct a composite dollarization index for a large sample of countries. They consider not only the conventional dollarization measures but also the available dollarized liabilities of the main sectors in an economy. They defined the composite index of dollarization as the sum of bank deposits in foreign currency as a share of broad money, total external debt as a share of GNP and domestic government debt denominated in foreign currency as a share of total domestic government debt. To construct the composite index, each of the three ratios was previously transformed into an index that can take a value from 0 to 10. Then those three ratios are summed in order to construct the index. In the end, the composite index takes values from 0 to 30.

Reinhart *et al.* (2003) classify the countries into four categories according to the 'type' of dollarization they exhibit. The type of dollarization in each country is determined according to two criteria. One is the degree of domestic dollarization and the other is the amount of foreign borrowing from private sector. Reinhart *et al* (2003) measure domestic dollarization by the ratios of foreign currency deposits over broad money and domestic government debt in foreign currency to total government debt. Then countries are divided into two groups: those where both

ratios are below 10 percent and those where at least one of the ratios exceeds 10 percent. In order to measure the amount of private foreign borrowing, they take the ratio of private sector debt over total external debt and again divide countries into two categories: those where private sector debt accounts for at least 10 percent of total external debt, and those where the ratio is below 10 percent.

By putting the two criteria together, they classified the countries into four categories or 'types'. Type I refers to the countries with domestic and external liability dollarization. Type II refers to the countries where dollarization is of a domestic nature, type III refers to the countries where dollarization is of an external nature and lastly, type IV refers to the countries where most of the external debt belongs to the government. The types of dollarization defined above are shown in Table III.1.

Table III.1: Types of Dollarization

	Private sector debt accounts for **Ten percent** or **more** of total external debt	Private sector debt accounts for **Less than ten percent** of total external debt
At least ten percent of broad money or of domestic public debt are denominated in or linked to a foreign currency	**TYPE I**	**TYPE II**
Less than ten percent of broad money and of domestic public debt are denominated in or linked to a foreign currency	**TYPE III**	**TYPE IV**

Source: Reinhart, Rogoff and Savastano (2003).

Following Reinhart *et al.* (2003), Yılmaz (2004) has constructed a composite index of dollarization for Turkey. Table III.2 presents the composite index, its determinants and their index value for Turkey. Reinhart *et al.* (2003) defines the level of dollarization as 'low' for the range of 0-3, 'moderate' for the range 4-8, 'high' for the range 9-13 and 'very high' for the range 14-30. In this context, the level of

financial dollarization in Turkey as plotted by Figure III.6 can be interpreted as high during most of the period reaching to very high levels after the financial crisis of 2001.

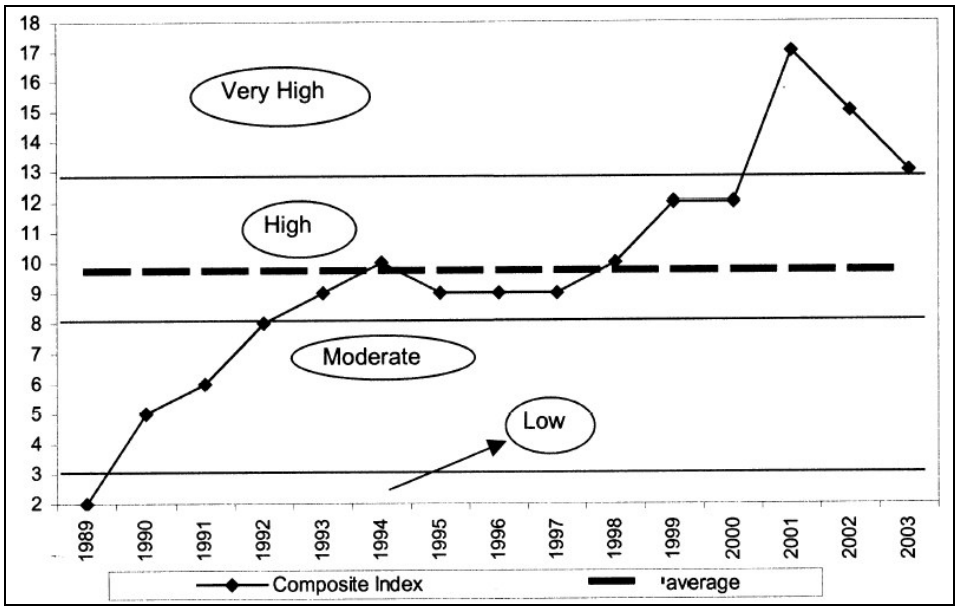
When the type of dollarization in Turkey is considered in the context of Reinhart *et al*. (2003), Turkey belongs to the first category (Type I) as presented by TableIII.3. As already mentioned, Type I countries have domestic and external liability dollarization with private sector debt accounts for ten percent or more of total external debt and at least ten percent of broad money or of domestic public debt are denominated in or linked to a foreign currency. Figure III.7 plots the determinants of the composite index for Turkey for the period 1989-2003. Accordingly, FXD and external debt are the main determinants of the composite index during the period.

Table III.2: The Dollarization Composite Index, and Its Determinants

	FXD/M2Y*	FXD/M2Y Index Value (A)	External Debt / GNP**	External Debt / GNP Index Value (B)	FX denominated or linked domestic debt/Total domestic government debt	FX denominated or linked domestic debt/total domestic government debt Index Value	Composite Index (A+B+C)
1989	0,19	2	-	-	-	-	2
1990	0,20	2	0,33	3	-	-	5
1991	0,31	3	0,34	3	-	-	6
1992	0,38	4	0,35	4	-	-	8
1993	0,53	5	0,38	4	-	-	9
1994	0,47	5	0,51	5	-	-	10
1995	0,46	5	0,43	4	-	-	9
1996	0,46	5	0,44	4	-	-	9
1997	0,49	5	0,44	4	-	-	9
1998	0,42	4	0,48	5	0,07	1	10
1999	0,47	5	0,56	6	0,05	1	12
2000	0,46	5	0,60	6	0,08	1	12
2001	0,53	5	0,80	8	0,36	4	17
2002	0,53	5	0,73	7	0,32	3	15
2003	0,47	5	0,64	6	0,22	2	13

Source: Yılmaz (2004)

Notes: * in terms of TL, ** The annual GNP in terms of USD is calculated by dividing quarterly GNP to CBRT's average bid rate for USD for the relevant quarter. In addition to that quarter data is used for the year 2003.



Source: Yılmaz (2004)

Figure III.6: The Degree of Dollarization in Turkey

Table III.3: The Types of Dollarization in Turkey

Year	FXD/M2Y*	FX Denominated or Linked Domestic Debt / Total Domestic Government Debt	The Share of Private Debt in Total External Debt**	Dollarization Category
1989	0.19	0	0	1
1990	0.20	0	0	1
1991	0.31	0	0	1
1992	0.38	0	0	1
1993	0.53	0	0	1
1994	0.47	0	0	1
1995	0.46	0	0	1
1996	0.46	0	0.33	1
1997	0.49	0	0.39	1
1998	0.42	0.07	0.45	1
1999	0.47	0.05	0.48	1
2000	0.46	0.08	0.47	1
2001	0.53	0.36	0.37	1
2002	0.53	0.32	0.34	1
2003	0.47	0.22	0.35	1

Source: Yılmaz (2004

Notes: * in terms of TL and ** in terms of USD, third quarter data is used for the year 2003

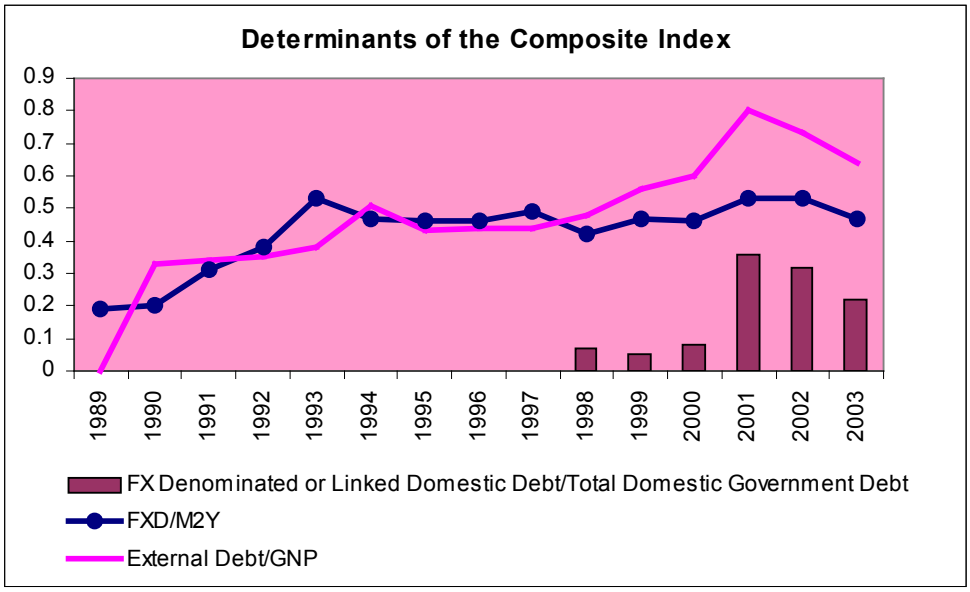


Figure III.7: The Determinants of the Composite Index

iii) Financial Dollarization and Company Accounts

Analyzing the balance sheets of the firms in the economy can be another way of measuring the financial dollarization in the system. As pointed out by Levy-Yeyati (2004) although some degree of dollarization may be required by the producers of the tradable goods in order to hedge themselves against exchange rate risk, extensive financial dollarization causes to currency mismatches in the economy as a whole. This mismatch can be seen both at the domestic banks' balance sheet through local currency on-lending of foreign currency funds or it can also be seen in the balance sheets of local producers or the public sector through real exchange rate exposure of dollar borrowers which have income denominated in non-tradable. Thus, as a result of the currency mismatch and the real exchange rate exposure, the negative impact of real shocks on debtors' balance sheet increases and leads to financial fragility. So, the extent of dollarization in the economy can be viewed also by analyzing the corporate company accounts.

The Central Bank of Turkey has been compiling the annual financial accounts of the corporates since 1992, and producing the aggregated financial

accounts data by the economic sectors, classified according to NACE (*Nomenclature Generale des Activites Economique dans les Communautes Europeennes*). The most recent aggregated financial accounts of the sectors over three-year periods have been issued in the annual publications of the Bank. Data over the period of 2001-2003 relates to 14 main and 34 sub-sectors and is prepared by utilizing the financial accounts of 7,507 companies. In 1992, there were 3000 companies with 10 main and 5 sub-sectors. With the increase in number of firms by years, more detailed analysis of sub-sectors became available. The data for each sector comprises the general information about that sector such as aggregate financial credits and breakdown by size according to employment and net sales criteria, the composition of the assets and liabilities, and the sources and uses of the funds in addition to the balance sheet and the income statement of the sector. The breakdown of the sectors' data by private and public companies and size classes according to net sales criterion is also presented.

Tables III.4 and III.5 present the extent of liability dollarization of the manufacturing firms[4] in Turkey during 1992-2003. The tables show the foreign currency and domestic currency cash credits both in short term and long term and as a total as well between the years 1992 to 2003. The tables also indicate that the liability dollarization of the manufacturing firms has been generally increasing especially after the 1994 currency crisis reaching a peak of around 80% after the financial crisis of 2001.

[4] Manufacturing sector covers the following sub sectors: Food Products and Beverages, Tobacco Products, Textile Industry, Wearing Apparel, Dressing of Leather, Wood Products Including Furniture, Manufacture of Paper and Paper Products, Publishing and Printing, Manufacturing of Coke, Refined Petroleum, Chemical and Products Industry, Rubber and Plastics Product, manufacture of Non-metallic, Basic Metals Industry, Metal Product, Except Machinery, Machinery and Equipment n.e.c, Radio, TV, Communication Equipment, Medical Precision, Optical Instrum, Manufacture of Motor, Vehicles, Trailers, Other transport Equipment Manufacture of Furniture n.e.c.

Table III.4: Manufacturing Sector FX and TL Cash Credits

YEAR	CASH CREDIT (TL)		CASH CREDIT (FX)	
	SHORT-TERM	LONG-TERM	SHORT-TERM	LONG-TERM
1992	64,090.51	9,622.64	31,129.41	2,727.41
1993	112,816.55	7,629.91	63,358.50	5,677.88
1994	91,236.90	8,469.50	77,753.00	15,503.60
1995	162,822.10	12,982.50	195,456.90	33,014.80
1996	361,796.40	29,982.90	975,551.90	305,839.20
1997	441,501.50	42,022.00	1,901,776.60	728,357.40
1998	1,231,090.40	63,405.40	2,988,023.80	1,383,891.00
1999	2,245,954.80	160,895.50	5,056,339.00	2,585,959.80
2000	2,056,298.10	1,172,296.60	6,483,256.30	4,962,253.20
2001	3,245,570.30	975,176.30	9,838,665.60	11,391,379.90
2002	3,874,952.70	989,848.60	11,126,471.40	13,364,277.60
2003	5,256,678.21	2,050,336.73	11,384,982.84	13,220,433.90
TOTAL	19,144,808.47	5,522,668.57	50,122,765.26	47,999,315.69

Table III.5: Manufacturing Sector FX and TL Cash Credits (% Shares)

YEAR	TOTAL TL CASH CREDIT (SHORT+LONG)	TOTAL CASH CREDIT	TOTAL TL CASH CRE./TOTAL CASH CREDIT	TOTAL FX CASH CREDIT (SHORT+LONG)	TOTAL FX CASH CRE./TOTAL CASH CREDIT
1992	73,713.15	107,569.97	0.69	33,856.82	0.31
1993	120,446.46	189,482.84	0.64	69,036.38	0.36
1994	99,706.40	192,963.00	0.52	93,256.60	0.48
1995	175,804.60	404,276.30	0.43	228,471.70	0.57
1996	391,779.30	1,673,170.40	0.23	1,281,391.10	0.77
1997	483,523.50	3,113,657.50	0.16	2,630,134.00	0.84
1998	1,294,495.80	5,666,410.60	0.23	4,371,914.80	0.77
1999	2,406,850.30	10,049,149.10	0.24	7,642,298.80	0.76
2000	3,228,594.70	14,674,104.20	0.22	11,445,509.50	0.78
2001	4,220,746.60	25,450,792.10	0.17	21,230,045.50	0.83
2002	4,864,801.30	29,355,550.30	0.17	24,490,749.00	0.83
2003	7,307,014.94	31,912,431.68	0.23	24,605,416.75	0.77

The Table III.6 shows the share of total TL and FX cash credits in the total credit limit. Total credit limit covers cash credit, non cash credit, loans under follow-up, financing bond and government bond. It is observed from the Table III.6 that total TL cash credit as a share of total credit limit has declined until 1997 then it increased between the period 1997-2000 and with the 2000-2001 crisis, the ratio declined again and it slightly increased in 2003 again. On the other hand, the opposite has been observed for the share of total FX cash credit in the total credit limit. It has increased until 1997 and after 1997 there were small changes in the ratio in order words the share of FX cash credit in total credit limit was stable, it has not fluctuated much during the 1997-2003 period.

Table III.6: The Shares of TL and FX Cash Credits in the Total Credit Limit

YEAR	TOTAL TL CASH CREDIT	TOTAL FX CASH CREDIT	TOTAL CREDIT LIMIT	TOTAL TL CASH CREDIT/TOTAL CREDIT LIMIT (%)	TOTAL FX CASH CREDIT/TOTAL CREDIT LIMIT (%)
1992	73,713.15	33856.82	208633.704	35	16
1993	120,446.46	69036.38	374897.562	32	18
1994	99,706.40	93256.60	372579.3	27	25
1995	175,804.60	228471.70	763752.5	23	30
1996	391,779.30	1281391.10	2890114.4	14	44
1997	483,523.50	2630134.00	5823290.9	8	45
1998	1,294,495.80	4371914.80	9670015.8	13	45
1999	2,406,850.30	7642298.80	17909167.6	13	43
2000	3,228,594.70	11445509.50	25520315.5	13	45
2001	4,220,746.60	21230045.50	47293144	9	45
2002	4,864,801.30	24490749.00	53718025.3	9	46
2003	7,307,014.9	24605416.75	54996949.2	13	45

To summarize, although there are data limitation problems for the measurement of financial dollarization in Turkey, both the composite index of dollarization and company accounts give a general view about the nature of the

economy whether it is financially dollarized or not. The figures strongly suggest that Turkey is a country where the financial system is highly dollarized.

CHAPTER IV

THEORETICAL MODELS AND EMPIRICAL RESULTS

IV. 1. THEORETICAL MODELS OF CURRENCY SUBSTITUTION

In this section, before proceeding to the econometric analysis, we first briefly present the basic theoretical models of currency substitution in the literature. In the empirical literature there are basically two approaches to model currency substitution, namely, i) Sequential Portfolio Balance Models or Liquidity Service Approach and ii) Portfolio Balance Model.

The *Sequential Portfolio Balance Models or Liquidity Service Approach (LSM)* proposed by Miles (1978) investigates currency substitution in two steps: at first, agents choose the optimal mix of monetary and non-monetary assets and then decide how to allocate the monetary assets between the different currencies in their portfolio. The approach focuses on the use of money by means of payment role. According to this literature, since bonds dominate money, it should not be held for the risk diversification reason which is the basis of the portfolio model. As an alternative, money is demanded due to its role in transactions. Individuals choose the optimal level of their holding of domestic and foreign assets taking into account the interest foregone when the money is hold.

In LSM, domestic and foreign monies (M and M* respectively) are both inputs in a CES function that produces money services (MS):

$$MS = \left[\theta_1 \left(\frac{M}{P} \right)^{-p} + \theta_2 \left(\frac{M*}{P*} \right)^{-p} \right]^{-(1/p)}$$

where MS is the production of Money Service, P and P* are the domestic and foreign price level respectively and p is the elasticity of the substitution. This money service function is maximized subject to the following constraint:

$$M_0 = (1+r)\frac{M}{P} + (1+r^*)\frac{M^*}{P^*}$$

where M_o is the desired level of Money Service, which is fixed at the first stage of the portfolio allocation process, r and r* are the domestic and foreign interest rates respectively. The Money Services between the two monies are allocated according to their relative opportunity costs as expressed in the asset constraint and their relative efficiency in providing money services as expressed in the money services production function. The resulting first order conditions express the relative demand for both currencies as a function of interest rate differential, assuming that PPP (purchasing power parity) holds:

$$\log\left(\frac{M}{M^* E}\right) = \eta_0 + \eta_1 \log\left(\frac{1+r^*}{1+r}\right)$$

In this set up, η_0 is the ratio of the weight of domestic real money over the weight of foreign real money in the Money Services (MS) function, $(\theta_1/\theta_2)^*\eta_1 = \rho/(1+\rho)$ and it shows the degree of currency substutitability.

Models of the second type are based on the static two-period ***Portfolio Balance Model*** *(PM).* In this model an agent allocates his wealth among domestic money (M), foreign money (M*), domestic bonds (B) and foreign bonds (B*). That is to say, in the Portfolio Models, all assets are available to the portfolio holders and agents maximize the return of the portfolio. The PM emphasizes the store of value role of money. According to this model, money is viewed as a simple asset and it is a gross substitute of both monetary and non-monetary assets. In these models, there are four types of assets. The demand functions of these assets are as the following:

$$\frac{M}{P} = M\ (PY, r, r^* + e^e, e^e) \tag{1}$$

$$\frac{B}{P} = B\ (PY, r, r^* + e^e, e^e) \tag{2}$$

$$\frac{eM^*}{P^*} = M^*(PY, r, r^* + e^e, e^e) \tag{3}$$

$$\frac{eB^*}{P^*} = B^*(PY, r, r^* + e^e, e^e) \quad (4)$$

Y refers the real income, r and r* are the domestic and foreign interest rates, respectively; e^e is the expected change in the exchange rate and $r^* + e^e$ is the rate of return on foreign bonds. The models are transformed by taking the logarithms as following:

$$\log\left(\frac{M}{P}\right)_t = \alpha_0 + \alpha_1 \log Y_t + \alpha_2 r_t + \alpha_3 (r^* + e^e)_t + \alpha_4 e^e{}_t + u_t \quad (1')$$

$$\log\left(\frac{eM^*}{P^*}\right)_t = \beta_0 + \beta_1 \log Y_t + \beta_2 r_t^* + \beta_3 (r^* + e^e)_t + \beta_4 e^e{}_t + v_t \quad (2')$$

$$\log\left(\frac{B}{P}\right)_t = \gamma_0 + \gamma_1 \log Y_t + \gamma_2 r_t + \gamma_3 (r^* + e^e)_t + \gamma_4 e^e{}_t + z_t \quad (3')$$

$$\log\left(\frac{eB^*}{P}\right)_t = \vartheta_0 + \vartheta_1 \log Y_t + \vartheta_2 r_t + \vartheta_3 (r^* + e^e)_t + \vartheta_4 e^e{}_t + c_t \quad (4')$$

The real demand for each currency will be positively related to its own real return and negatively related to the real return of each alternative asset. Thus an increase in r raises the demand for domestic bonds however; it lowers the demand for the substitutes in the portfolio.

The measurement of currency substitution differs according to the alternative asset functions presented above. For instance, the degree of currency substitution is measured by the parameter α_4 in (1'). Substitution between bonds, which is called 'indirect currency substitution' by McKinnon (1985), is measured by the parameters γ_3 in the (3') and by the parameter ϑ_2 in (4'). According to McKinnon (1985), when estimating this set of equations, the inclusion of both $r^* + e^e$ and e^e allows to distinguish the effects of currency substitution and capital mobility and α_3 in (1') shows the capital mobility or the asset substitution effect.

However; it is difficult in practice to differentiate the effects of currency substitution and capital mobility, thus most empirical applications of the Portfolio Model have estimated individual money demand functions like 1 and 2. This can be

illustrated by the equation for domestic real money balances (M/P*)* derived by Branson and Henderson (1985):

$$\log\left(\frac{M}{P}\right)_t = \alpha_0 + \alpha_1 \log Y_t + \alpha_2 r_t + \alpha_3 (r^* + e^e)_t + \alpha_4 e^e{}_t + u_t \qquad (5)$$

In the presence of currency substitution, α_4 should be significantly negative. Thus, in portfolio models a statistically significant negative coefficient for the rate of depreciation (in the estimated domestic money equation) was taken as evidence of currency substitution. However Cuddington (1983) shows that in a portfolio model with highly developed capital markets, the demand for real domestic money balances depends negatively on the expected rate of depreciation, independently of whether domestic residents hold foreign currency or not. That is, currency substitution and asset substitution were empirically indistinguishable. Optimization models are better from this point of view since the arguments of the money demand function are not chosen arbitrarily. One of the classical models of this type is developed by Thomas (1985). This model predicts that the ratio of domestic (M) to foreign money (eM*) should depend negatively on the domestic nominal interest rate (r) and positively on the foreign nominal interest rate (r*):

$$\frac{M}{eM^*} = \text{f (r ,r*)} \qquad (6)$$

Some econometric specifications that include both nominal interest rates and the rate of depreciation as explanatory variables of the ratio of domestic to foreign money do not follow from this standard optimizing model of currency substitution. In empirical studies, equation (6) is sometimes modified to deal with cases of controlled interest rates. In this case, the expected rate of depreciation (e) is taken as a proxy for the opportunity costs of holding money:

$$\frac{M}{eM^*} = \text{g (e)} \qquad (7)$$

Different variations of equations (6) and (7) were tested by Ramirez-Rojas (1985) for Argentina, Mexico and Uruguay, and by Rojas-Suarez (1992) for Peru.

In some of the Portfolio Models, the dependent variable is defined as the dollarization ratio to proxy currency substitution. In such a case, the estimated equations can be defined as:

$$\log\left(\frac{eM^*}{M}\right) = \beta_0 + \beta_1 r_t^* + \beta_2 r_t + \beta_3 e^e + \beta_4 \pi_t + \nu_t \quad (8)$$

or

$$\log\left(\frac{eM^*}{M}\right) = \alpha_0 + \alpha_1 r_t + \alpha_2 r_t^* + \alpha_3 \Delta e^e{}_t + \alpha_4 \pi_t + \upsilon_t \quad (9)$$

or

$$m - p = \phi_0 + \phi_1 r_t + \phi_2 r_t^* + \phi_3 \Delta e^e{}_t + \phi_4 \pi_t + \upsilon_t \quad (10)$$

However, the empirical implementation of (8) and (9) may be problematic, because under uncovered interest rate parity (UIP), the domestic interest rate and the foreign interest rate denominated in domestic currency (foreign interest rate plus expected depreciation) move together in the long run. To overcome this problem, different models are postulated such as dropping the foreign interest rate or the domestic interest rate or the expected exchange rate from the equations. These models can be defined as:

$$\log(eM^*/M) = \theta_0 + \theta_1 r_t + \theta_2 \Delta e^e{}_t + \theta_3 \pi_t + \upsilon_t \quad (11)$$

$$\log(eM^*/M) = \gamma_0 + \gamma_1 r^*{}_t + \gamma_2 \Delta e^e{}_t + \gamma_3 \pi_t + \upsilon_t \quad (12)$$

$$\log(eM^*/M) = \psi_0 + \psi_1 r_t + \psi_2 r^*{}_t + \psi_3 \pi_t + \upsilon_t \quad (13)$$

Furthermore, in order to consider the persistence of currency substitution, Kamin and Ericson (2000) propose to use a 'ratchet variable'. Kamin and Ericson (2000) estimate the following model to measure the degree of hysterisis effect for Argentina:

$$m - p = \alpha_0 + \alpha_1 r_t + \alpha_2 r_t^* + \alpha_3 \Delta e^e{}_t + \alpha_4 \pi_t + \alpha_5 \Delta p^{\max} + \upsilon_t \quad (14)$$

where $\Delta p^{\max}$ is the ratchet variable obtained from past peak values of inflation.

The recent empirical studies on the currency substitution in Turkey include Selçuk (1994) and Civcir (2003a,2003b). Selçuk (1994) investigates the dynamic responses of currency substitution to the shocks in major policy variables in the Turkish economy employing a VAR modeling approach. According to his results; exchange rate depreciations and nominal interest rates on domestic assets are the main determinants of currency substitution in Turkey. Currency substitution is positively related with depreciation of Turkish lira and negatively related with interest rates that is when the TL depreciates, currency substituiton increases whereas when the interest rate on domestic assets decreases, currency substituiton increases since domestic assets becomes less attractive.

Civcir (2003c) investigates the dollarization process of Turkey from 1980s onwards by an extended portfolio model. Considering the fact that dollarization remained persistently high even under the condition that the real rates of return on domestic currency assets are substantially higher than the returns on foreign currency assets, Civcir (2003c) suggests to consider alternative variables to explain dollarization and currency substituiton. According to Civcir (2003c), dollarization in Turkey can be explained by relative rates of returns of domestic currency and foreign currency denominated assets, expected change in the exchange rate, exchange rate risk and credibility of current economic policies. Accordingly, dollarization in the long run is negatively affected by real interest rates differentials and economic policy credibility. Dollarization appears to increase with expected exchange rates, exchange rate risk and interest differentials in the long-run. Civcir (2003c) also finds that expected exchange rate is the most dominant variable in determining dollarization in Turkey

IV. 2. EMPIRICAL RESULTS

In the empirical part of this study, we aim to investigate the long run relationships between the variables in a system containing currency substitution ratio, expected exchange rate change, rates of return on domestic currency and rates of return in foreign currency. To this end, we employ the multivariate cointegration technique of Johansen and Juselius (1992) and Johansen (1995). In this approach, the relationships between the variables in a Vector Auto-Regression (VAR) system are estimated by maximum likelihood procedure without imposing any

a priori conditioning restriction on the variable space. The result that non-stationary variables can lead to spurious regressions makes testing for the lack of cointegration among I(1) variables an essential step for a time series analysis.

We consider a four variable system z_t = (cs_t, $\Delta e^e{}_t$, r_t, r_t*) postulated to explain currency substitution cs_t proxied by the difference of the (log of) broad money M2Y (M2+FXD) to (log of) M2. In the system, Δe^e is the expected exchange rate, r is the rates of return on domestic currency and r* is the rates of return on foreign currency. In this part we first present the data. As assessing the degree of integration of variables in a VAR system is an essential initial step for a cointegration analysis we proceed with unit root tests for the variables. The final subsection investigates for the long-run relationships between the variables.

The Data

The data used in this study are obtained from the Central Bank of the Republic of Turkey (CBRT) database. All the series are quarterly and the sample extends from 1987:1 to 2004:2. Unless stated otherwise, all the series are in their natural logarithm forms. The definitions of the series are as following:

- cs: m2y-m2 is used as a proxy for the currency substitution.
- m2 is the logarithm of the broad money (currency in circulation + TL denominated demand and time deposits), TL billion.
- m2y is the logarithm of broad money containing also foreign exchange deposits, FXD (M2Y = M2 + FXD), TL billion.
- Δe is the first difference of the nominal exchange rate to proxy for the expected exchange rate change.
- R is the interest rate on 3 Months Turkish Lira Deposits, r = log(1+R/100).
- R* is the interest rate on 3 month US Dollar Denominated Deposits, r*=log(1+R*/100).

In the absence of a readily available data for the expected exchange rate changes, we need to use proxies for them in empirical modeling. For instance, Ortiz (1983) used the difference between the official and real exchange rate, Cuddington (1983) used the difference between spot and forward exchange rate to spot rate,

and Ramirez-Rojaz (1985) used the interest rate and inflation rate differentials between the home country and foreign country to proxy the expected exchange rates. In this study, we consider nominal spot exchange rates which proxy expected exchange rates under a maintained uncovered interest parity (UIP) condition. The UIP condition states that the rates of return on domestic and foreign assets expressed in the same currency are equal in the long run. That is the uncovered interest parity condition (UIP):

$$r_t = r_t^* + \Delta e^e$$

Under the assumption that expectations are formed rationally:

$$\Delta e_t^e = \Delta e_t + v_t$$

where v_t is a stationary I(0) white-noise error term. The stationarity of v_t implies Δe_t^e and Δe_t are cointegrated with a unitary coefficient supporting to use of Δe_t as a proxy for Δe_t^e in a cointegration analysis under rational expectations[5].

Figures IV.1–IV.4 plot the time series of the levels and first differences of the variables considered. The currency substitution ratio appears to have an upward trend reaching a peak at the currency crisis year of 1994 (Figure IV.1). After that, currency substitution remains very high at around 0.6 until another peak at the financial crisis year of 2001. The overall time series evolution of the currency substitution variable appears to be non-stationary. The growth rate of currency substitution, on the other hand, appears to be stationarily fluctuating. The levels of interest rates on 3 months TL deposits and US deposits can be interpreted as non-stationary as depicted by Figures IV.2 and IV.3. A visual inspection of the time series plot of their first differences, however, may lead us to interpret them as stationary. The level of the exchange rate shows an upward trending pattern as plotted by Figure IV.4. The plot of the exchange rate growth may not be very informative as it may suggest that it can be either stationary or non-stationary. The acceleration of the exchange rate ($\Delta^2 e_t$), however, shows a stationary pattern. The following subsection empirically tests for the integration order of the series.

[5] See Özmen and Gökcan (2004) for a similar use of spot exchange rate change as a proxy variable for the expected rates under rational expectations.

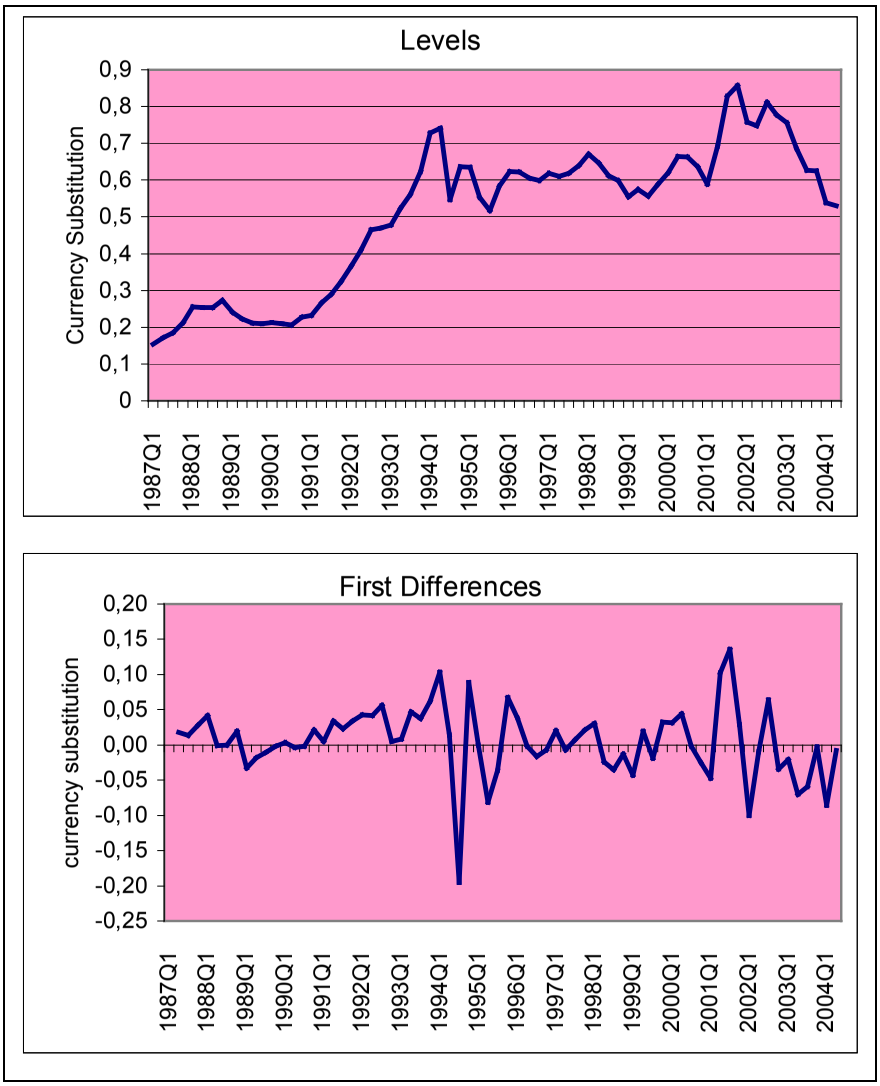


Figure IV.1: Time Series of Currency Substitution

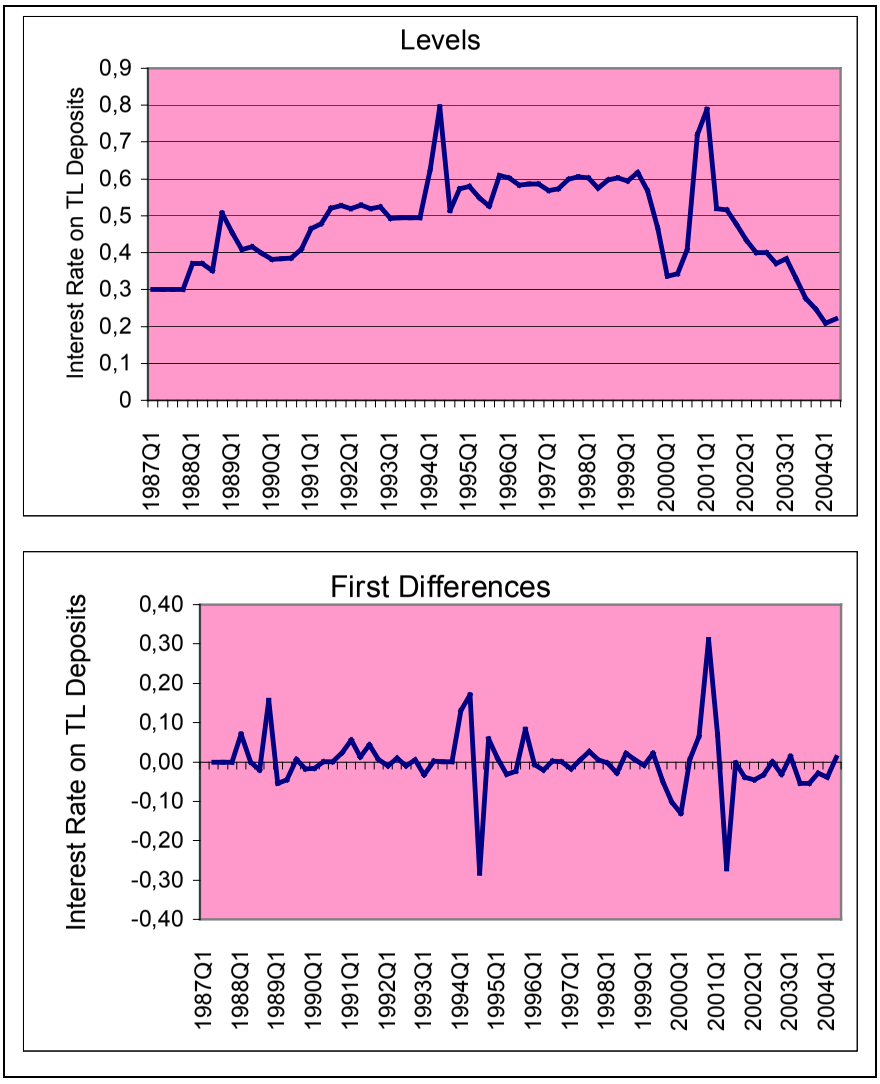


Figure IV.2: Time Series of Interest Rate on TL Deposits

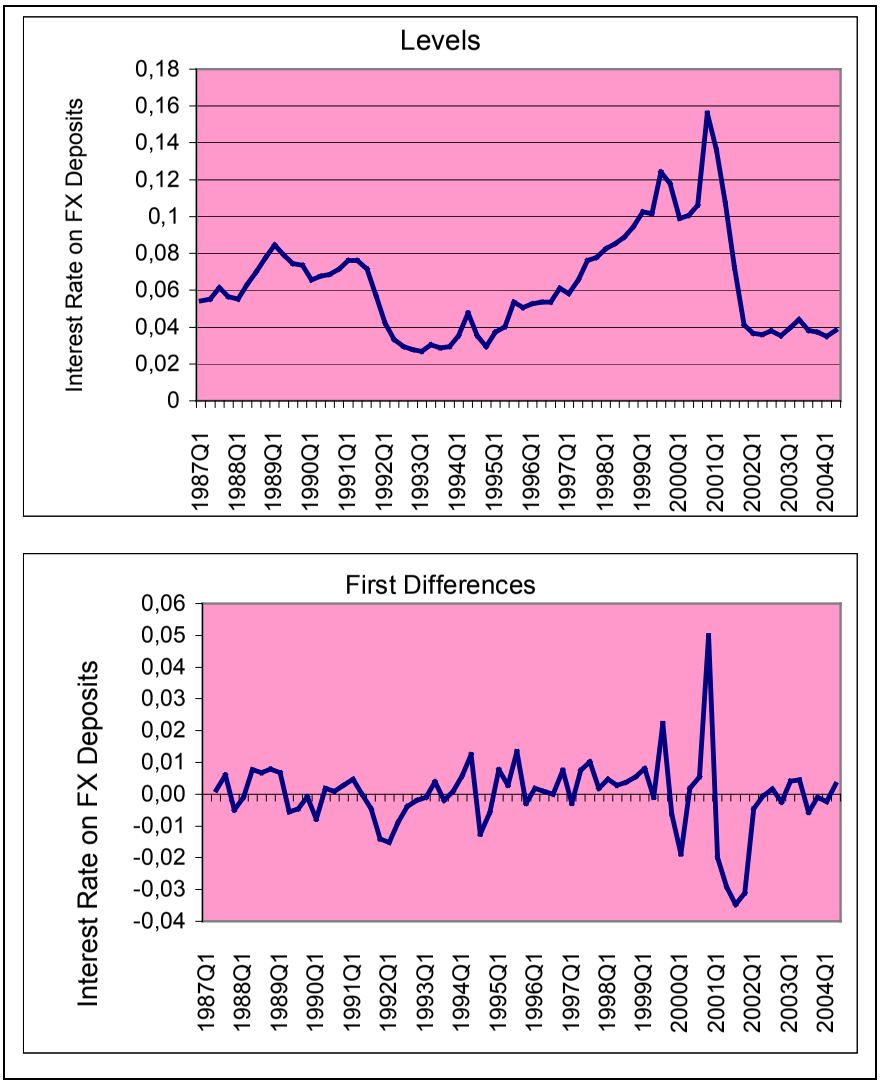


Figure IV.3: Time Series of Interest Rates on FX Deposits

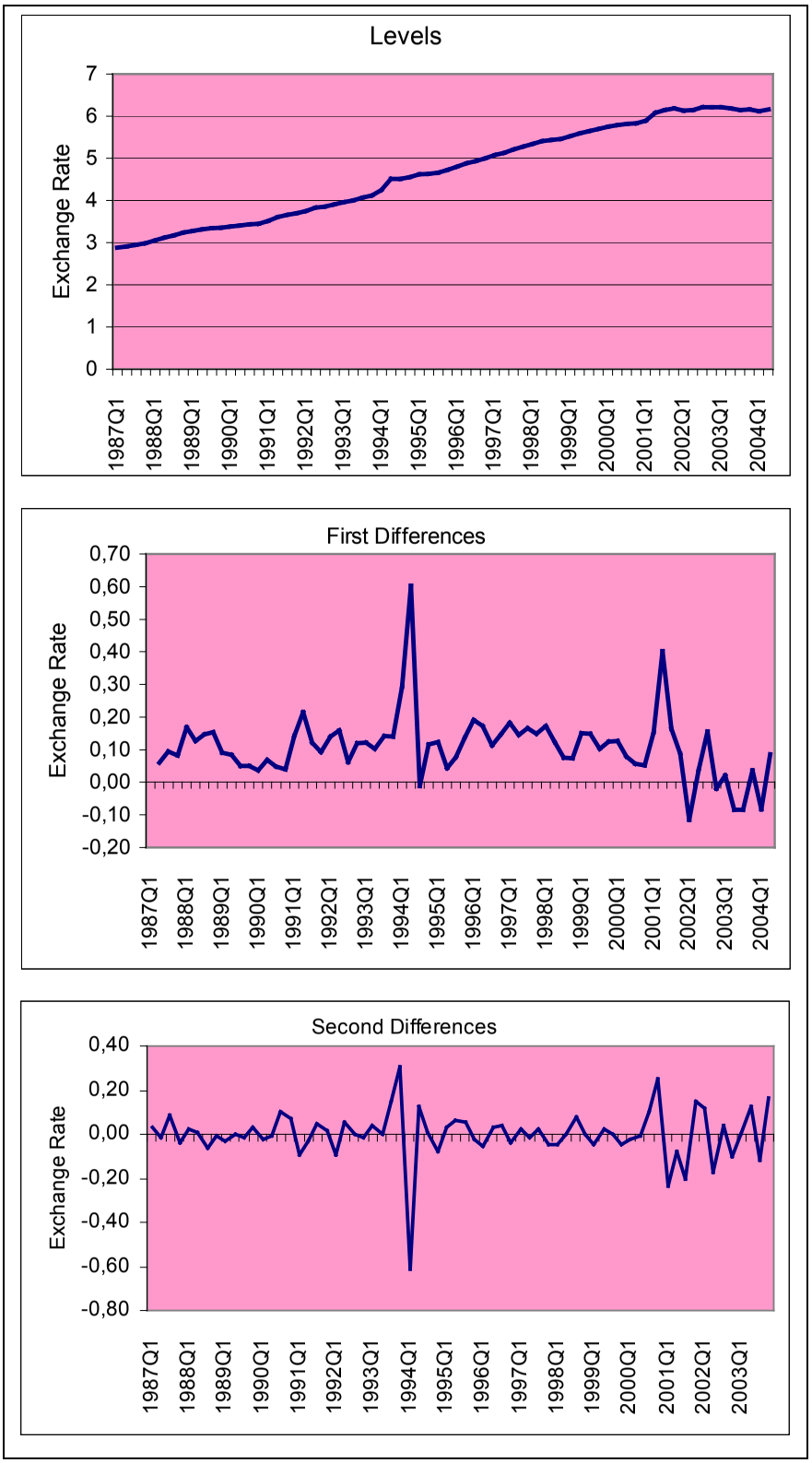


Figure IV.4: Time series of Exchange Rate

Unit Roots and Cointegration

We consider a four variable system z_{t1} = (cs_t, $\Delta e^e{}_t$, r_t, r_t*) postulated to explain currency substitution cs_t proxied by the difference of the (log of) broad money M2Y (M2+FXD) to (log of) M2. In the system, Δe^e is the expected exchange rate, r is the rates of return on domestic currency and r* is the rates of return on foreign currency. As already discussed, Δe can proxy Δe^e under the UIP hypothesis with rational expectations. The sample period is between 1987:01-2002:04 but effective estimation periods may change to accommodate the dynamic structure of the estimated equations.

Table IV.1 reports the results of the augmented Dickey-Fuller (ADF) tests for the integration orders of the variables in z_t. For the ADF tests we started from a maximum lag order (k) of 5, which is plausible for quarterly data, and followed a data-based general-to-specific methodology for the choice of optimum k. Table IV.1 presents the ADF(k) results with the lag length k selected also to contain no serial correlation. The results suggest that all the variables are non-stationary in their levels. The first differences of cs, r and r* appears to be stationary as suggested by the strong rejection of the unit root null for them. The non-stationarity null for Δe cannot be rejected at the 5 % level. The acceleration of the exchange rate, $\Delta^2 e_t$, appears to be stationary suggesting that Δe_t is I(0).

Table IV.1: Augmented Dickey fuller (ADF) Test Statistics

	Levels		First Differences		Second Differences	
Series	λ_c (k)	λ_{ct} (k)	λ_c (k)	λ_{ct} (k)	λ_c (k)	λ_{ct} (k)
cs	-1,8407(0)	-1,1768(0)	-7,1150(0)*	-6,9635(1)*		
e	-1,2810(1)	-0,5423(1)	-2,3703(4)	-2,5758(4)	-11,424(0)*	-11,336(0)*
r	-2,4744(0)	-2,3328(0)	-7,4208(1)*	-7,6952(1)*		
r*	-2,3039(1)	-2,2472(1)	-5,9505(0)*	-5,9270(0)*		

Note: All the ADF regressions contain a constant term. The equations for λ_{ct} include also a linear trend. Numbers in parentheses are the lags (k) used in the augmentation of the ADF regression. An asterisk (*) indicates that the unit root null hypothesis is rejected at the %5 level, using MacKinnon's (1991) critical values

Table IV.3 presents the results of the Johansen cointegration analysis for the I(1) system $z_{t1} = (cs_t, \Delta e^e_t, r_t, r_t^*)$ postulated to explain currency substitution cs_t. The VAR for the Johansen analyses contains two lags, an unrestricted constant and restricted trend. For the choice of the VAR lag length k, we started with VAR(5) which is plausible for quarterly data and based the final choice of k on Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) criterion. The results presented at Table IV.2 suggest the choice of k as two according to SC and HQ, whilst AIC appear to prefer k =3. The AIC for k = 2 and k = 3 are -14.87 and -14.92, respectively. As noted by Harris and Sollis (2003) and Johansen *et al.* (2000), when information criteria suggest different values of k, it is common practice to prefer the HQ criterion. Considering also the fact that the AIC values for k=3 and k=2 are almost the same, we choose k =2 as suggested by SC and HQ[6].

Table IV.2 : Choice of the Lag Length of the VAR System

Lag	AIC	SC	HQ
0	-8.395095	-8.260165	-8.341940
1	-14.29619	-13.62154	-14.03041
2	-14.87203	**-13.65765***	**-14.39362***
3	**-14.92237***	-13.16828	-14.23134
4	-14.85769	-12.56387	-13.95404
5	-14.86733	-12.03379	-13.75105

[6] Furthermore, residual diagnostics of the unrestricted reduced form equations and system as a whole are also considered to evaluate the congruency of the maintained VAR systems. The systems and equation diognastic tests suggested the lack of serial correlation for the systems estimated in this study. These results which can be interpreted as a further support for the empirical validity of the systems are not presented here to save the space.

Table IV.3: Cointegration Rank Test For The System For Z_{1t}

Eigenvalues	0,4190	0,2054	0,0867	0,0639
Hypothesis	r=0	r≤1	r≤2	r≤3
$\lambda_{\max}$	35,84*	15,18	5,98	4,36
95% fractiles	31,46	25,54	18,96	12,25
λ_{trace}	61,37**	25,53	10,53	4,36
95% fractiles	62,99	42,44	25,32	12,25

Note: The critical values for $\lambda_{\max}$ *and* λ_{trace} are from MacKinnon, Haug and Michelis (1999). * and ** indicate significance at the 5% and 10 levels, respectively.

The Johansen and Juselius (Johansen (1988) and Johansen and Juselius (1992)) trace λ_{trace} and maximum eigenvalue $\lambda_{\max}$ statistics suggests the rejection of the null of no cointegration but not the null of at most one cointegrating vector between the variables in the four variable system z_{1t} = (cs_t, $\Delta e^e{}_t$, r_t, r_t*) at the 10 % level. According to the $\lambda_{\max}$ statistics the null can be rejected also at the 5 % level. The results, thus, suggest the presence of a single cointegration vector for the system. The cointegration vector normalized by cs_t is:

$$cs = \underset{(0,00174)}{0,009564T} - \underset{(0.42937)}{0,515925\, r} - \underset{(1.04300)}{0,390976\, r^*} + \underset{(0.66800)}{3,9526\, \Delta e^e}$$

where T is the time trend and the values in parantheses are the standard errors. This is indeed the General Portfolio Balance Model discussed earlier:

$$M_t^* - M_t = \beta_1 r_t + \beta_2 r_t^* + \beta_3 \Delta e^e{}_t + u_t \qquad (15)$$

The expected signs of coefficients of the Portfolio Balance Model are $\beta_1<0, \beta_2>0, \beta_3>0$ We include a trend term to the model to proxy the presence of

hysteresis and inertia of currency substitution. The significant positive trend term coefficient suggests that currency substitution has an increasing trend, which is independent from the other variables. This is consistent with the presence of hysteresis in the currency substitution process. All the coefficients except r* has the expected signs. The coefficients of r* and r are individually insignificant. Only expected exchange rate (Δe^e) appears to be significant in explaining currency substitution.

We proceed with omitting the insignificant variable with incorrect sign r* and consider a three variable system z_{2t} = (cs_t, $\Delta e^e{}_t$, r_t). Table IV.4 reports the results of the Johansen-Juselius cointegration analysis for z_{2t} with the lag length k = 2. The trace λ_{trace} and maximum eigenvalue $\lambda_{\max}$ statistics suggests the rejection of the null of no cointegration but not the null of at most one cointegrating vector between the variables in the system at the 5 % level. The results, thus, suggest the presence of a single cointegration vector for the system. The cointegration vector normalized by cs_t is:

$$cs = \underset{(0,00205)}{0,009288\ T} \underset{(0.52032)}{-0,552923\ r} + \underset{(0,81170)}{4,340559\ \Delta e^e}$$

Table IV.4. Cointegration Rank Test for the System for Z_{2t}

Eigenvalues	0,3796	0,1838	0,0681
Hypothesis	r=0	r≤1	r≤2
$\lambda_{\max}$	31,51*	13,40	4,65
95% fractiles	25,54	18,96	12,25
λ_{trace}	49,58*	18,06	4,65
95% fractiles	42,44	25,32	12,25

Note: The critical values for $\lambda_{\max}$ *and* λ_{trace} are from MacKinnon, Haug and Michelis (1999).* indicates significance at the 5% level.

Although the normalized cointegrating vectors have the expeced signs, the domestic interest rate coefficient is still insignificant. Omitting r gives:

$$M_t^* - M_t = \delta \Delta e^e_t + u_t \qquad (16)$$

which is indeed the Sequential Portfolio Balance Model under Uncovered Interest Parity (UIP) as discussed earlier. The Sequential Portfolio Balance Model is also formulated as:

$$M_t^* - M_t = \lambda (r_t - r_t^*) \qquad (17)$$

The model under the UIP condition $r_t - r_t^* = \Delta e^e$ in the long run is observationally equivalent to equation (16). An important implication, which is often ignored in the empirical literature is that, the General Portfolio Balance Model (15) may be misleading under the UIP condition. To assess whether the reduction from the General Portfolio Balance Model to the Sequential Portfolio Balance Model is theory-consistent, we first test the validity of the UIP for the Turkish data.

Testing For Uncovered Interest Parity Condition in Turkey

The uncovered interest parity (UIP) hypothesis postulates that the rates of return on domestic and foreign assets expressed in the same currency are equal:

$$r_t = r_t^* + \Delta e^e_t$$

Under rational expectations,

$$r_t = r_t^* + \Delta e_t + v_t$$

where v_t is a stationary white-noise disturbance term. Considering, $i^*_t = r_t^* + \Delta e_t$, where i^*_t is interest rate on FX deposits in terms of domestic currency, the UIP condition can be written as:

$$r_t = i_t^* + v_t$$

A cointegration between r_t and i_t^* is consistent with the validity of the UIP hypothesis. (Gökcan and Özmen, 2004).

Table IV.5 presents the results of the Johansen-Juselius cointegration analysis for the system $z_{3t} = (r_t , i_t^*)$ with the lag length k = 2. The results strongly suggest the presence of a single cointegration vector between domestic and foreign interest rates at the 5 % level. The vector normalized by the domestic rate is:

$r_t = 0{,}483\ i_t^*$
$\quad\quad (0{,}051)$

The cointegration result and the strong significance of i_t^* for the long-run evolution of r_t strongly support the validity of the UIP for the Turkish data[7].

Table IV.5: Cointegration Rank Test for the System for Z_{3t}

Eigenvalues	0,411130	0,037472
Hypothesis	r=0	r≤1
$\lambda_{\max}$	33,36*	2,4061
95% fractiles	14,26	3,84
λ_{trace}	35,76*	2,4061
95% fractiles	15,49	3,84

Note: The critical values for $\lambda_{\max}$ *and* λ_{trace} are from MacKinnon, Haug and Michelis (1999). * indicates significance at the 5% level.

The validity of the UIP allows us to reduce Model 17 to Model 16:

$M_t^* - M_t = \delta \Delta e^e{}_t + u_t$

The coefficient δ shows the elasticity of currency substitution. We use the quarterly change of the nominal exchange rate as a proxy for expected exchange rate as explained before.

Table IV.6 presents the results of the cointegration analysis for the Sequential Portfolio Balance Model Variable space $z_{4t} = (cs_t , \Delta e_t)$, where $cs_t = M_t^* - M_t$, with the lag length k = 2. The VAR (2) system contains also intercept (unrestricted) and trend (restricted) terms. According to the results there is a single cointegration vector between the variables.

[7] Note that, the FX interest rate denominated in domestic currency, i_t^* is defined as $\Delta_4 e_t + r_t^*$ as the interest rate r_t^* defines the annual return.

Table IV.6: Cointegration Rank Test for the System for Z_{4t}

Eigenvalues	0,3189	0,0438
Hypothesis	r=0	r≤1
$\lambda_{\max}$	25,35*	2,96
95% fractiles	18,96	12,25
λ_{trace}	28,31*	2,96
95% fractiles	25,32	12,25

Note: The critical values for $\lambda_{\max}$ and λ_{trace} are from MacKinnon, Haug and Michelis (1999).* indicates significance at the 5% level.

The cointegrating vector normalized by the currency substitution ratio is:

$$cs = \underset{(0,00145)}{0,009871T} + \underset{(0.42850)}{2,823443}\,\Delta e^{e}$$

The result appears to be data-acceptable and theory-consistent with the Sequential Portfolio Balance Approach. The expected exchange rate change proxy is strongly significant in the cointegration relation. The significance of the trend term is consistent with the presence of the ratchet/hysteresis affect.

The estimated expected exchange rate change coefficient (2.82) suggests that elasticity of currency substitution is very high in Turkey. This result is consistent with those obtained for high inflationary developing countries. For instance, Ramirez-Rojas (1985) estimates the long-run semi-elasticity of currency substitution as 3.5 for Argentina. Bufman and Leiderman (1991) estimate the model for Israel for the period 1978-1988. They conclude that the elasticity of currency substitution is generally greater than one (most of the estimates are about 3). According to Bufman and Leiderman (1991), the high elasticity suggests that currency substitution is an important factor in the optimal choice problem faced by consumers in Israel. Friedman and Verbetsky (2001) consider the Russian monthly data for the period 1995-2000 and estimate the elasticity of currency substitution as between two and three. Friedman and Verbetsky (2001) conclude that the Ruble and the Dollar are

good substitutes in Russia for producing liquidity services. Viseth (2001) find the long-run semi-elasticity of currency substitution equals 4.41 using M1 and 3.96 using M3 as the domestic money aggregate in Cambodia. Imrohoroglu (1991) considers a low inflationary economy, Canada. The GMM results by Imrohoroglu (1991) suggest that the elasticity of currency substitution is about 0.3 and the share of foreign currency in the production of liquidity services is also small. This is consistent with the argument that currency substitution is important especially in high inflation countries.

CHAPTER V

CONCLUSION

Many developing countries including Turkey appear to be “addicted to dollars” according to Reinhart *et al.* (2003) as the main sectors; firms, banks, governments and households, hold a significant amount of sound foreign currencies in their assets and liabilities. This addiction however, not tends to disappear even in the presence of credible monetary policy and price stability albeit it has severe costs for financial and economic stability. These costs are not limited to monetary policy credibility and real seigniorage revenue as suggested by the conventional currency substitution literature. Financial dollarization can create maturity and currency mismatches in the balance sheets of banks, firms, government and households and thus make the economy financially fragile and vulnerable to external shocks. This vulnerability can be a plausible reason for the “fear of floating” and thus limit the scope of a floating exchange rate regime. As the results of Levy-Yeyati (2004) convincingly suggest, financially dollarized economies tend to display higher inflation rates, higher propensity to suffer banking crises and slower and more volatile output growth, without significant gains in terms of domestic financial depth. All these may plausibly suggest that currency substitution and financial dollarization are crucially important topics for a developing country like Turkey worthing to be investigated. This thesis aimed to accomplish this task.

This thesis aimed to accomplish two interrelated goals. First of all, we aim to present the distinctions of financial dollarization and currency substitution and provide a brief discussion of their causes and consequences. Secondly, we aim to investigate empirically the process of financial dollarization and currency substitution in the Turkish economy. The basic problem with the analysis of financial dollarization appeared to be the availability of the relevant data spanning for a plausible sample period. Specifically, for the Turkish case, the data for the dollarization of the domestic banking system liabilities are readily available whilst those for the banking asset dollarization ratio span only for a limited period of time. As a solution to these measurement problems, we followed the suggestion by Levy-Yeyati (2004) and used deposit dollarization to proxy loan/financial dollarization as these two measures often mirror each other due to prudential limits on banks foreign

exchange positions. However, as argued by Reinhart *et al.* (2003) an adequate financial dollarization measure should consider all the available dollarized balance sheet items in an economy. Consequently, we considered also corporate sector aggregated foreign exchange debts in Turkey to assess the magnitude of firm level liability dollarization in Turkey.

The conventional currency substitution measures which are defined as the share of foreign currency deposits in the broad monetary aggregates show that the deposit dollarization ratio in Turkey has been very high during the last two decades. The available data for the credit dollarization ratio shows a similar picture for the Turkish economy. These observations are found to be consistent with the composite dollarization index. Accordingly, the Turkish economy can be characterized with a high level of domestic and external liability dollarization. The analysis of the aggregated balance sheets of the manufacturing firms in Turkey shows that the Turkish corporate sector is highly dollarized as the bulk of their both short-term and long-term debts are denominated in foreign currencies. Therefore, all these descriptive measures can be interpreted as showing a high degree of financial dollarization in Turkey potentially causing currency and maturity mismatches in the economy. These mismatches can be seen both at the domestic banks' balance sheets through local currency on-lending of foreign currency funds or it can also be seen in the balance sheets of local producers or the public sector through real exchange rate exposure of dollar borrowers which have income denominated in non-tradable. Thus, as a result of the currency mismatch and the real exchange rate exposure, the negative impact of real shocks on debtors' balance sheet increases and leads to financial fragility.

Given the fact that financial dollarization has severe economic costs, a dedollarization strategy may be expected to be considered priorily in the economic policy agenda. As Levy-Yeyati (2003, 2004) note, dedollarization policies are now shifting from a generally passive stance (learning to live with it) type approach to a more active stance. This active dedollarization strategy can be characterized as a "carrot and stick" approach which contains diminishing incentives for the use of foreign currency denominated instruments and encouraging incentives for the use and creation of domestic currency denominated instruments.

The empirical part of this study contained an investigation of the long run relationships between the variables in a system containing currency substitution

ratio, expected exchange rate change, rates of return on domestic currency and rates of return in foreign currency. The results of the Johansen cointegration analysis for the Turkish quarterly data from 1987 to 2004 appeared not to be strongly supporting the General Portfolio Balance Model. Considering the arguments presented in the theoretical part of this study, the General Portfolio Balance Model can be reduced to the Sequential Portfolio Balance Model under the validity of the uncovered interest parity (UIP) hypothesis. In this context, it may be argued that, the General Portfolio Balance Model may be misleading under the UIP condition. The Johansen cointegration results suggested the presence of a single cointegration vector between domestic and foreign interest rates strongly supporting the validity of the UIP for the Turkish data. The estimation of the Sequential Portfolio Balance Model suggested that there is a long-run relationship between currency substitution and expected exchange rate change in Turkey. The elasticity of currency substitution appeared to be high but perfectly in line with those estimated for other high inflation developing countries. The results further supported the presence of a ratchet/hysteresis effect proxied by the trend variable. All these results are consistent with the argument that currency substitution and financial dollarization are important especially in high inflation countries.

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