

FINANCIAL DOLLARIZATION IN THE TURKISH ECONOMY:
“THE PORTFOLIO VIEW”

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ABSTRACT

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The purpose of this study is to analyze financial dollarization phenomenon in the Turkish economy since the beginning of 1990's based on Ize and Levy Yeyati's (2003) minimum variance portfolio (MVP) framework. Financial dollarization, steamed by unfavorable macroeconomic conditions and uncertainties, is revealed by the experiences of recent banking and financial crisis as carrying significant drawbacks such that it complicates economic policy implementation and contains the seeds of fragility for the whole economy as well. Although, considerable progress has been achieved in reducing inflation levels and sustaining macroeconomic stability, financial dollarization displays rather an enduring stance. MVP approach is based on optimizing the currency composition of financial contracts depending on the risk and the return profile of agents' portfolios. According to this approach, financial dollarization is an increasing function of the inflation volatility and a decreasing function of the real exchange rate volatility. In line with this framework, financial dollarization in the Turkish economy during 1990-2011 period is studied by also considering other important macroeconomic risk indicators and it is tried to shed some light on the success of inflation targeting policy in dealing with dollarization phenomenon.

Keywords: Financial Dollarization, MVP Framework, Volatility, VAR

ÖZ

TÜRKİYE EKONOMİSİNDE FİNANSAL DOLARİZASYON: “PORTFÖY YAKLAŞIMI”

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Yüksek Lisans, İktisat Bölümü

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Bu çalışmanın amacı, 1990’lı yılların başından itibaren Türkiye ekonomisindeki finansal dolarizasyon olgusunu, Ize ve Levy Yeyati’nin (2003) minimum varyans portföy (MVP) modeli temelinde incelemektir. Olumsuz makroekonomik koşullar ve belirsizliklerden beslenen finansal dolarizasyon, ekonomi politika uygulamalarını güçleştirmesi ve bütün ekonomi için kırılganlık kaynağı oluşturması gibi ciddi sakıncaları taşıması nedeniyle son bankacılık ve finansal kriz deneyimleriyle birlikte açıklanır. Enflasyon oranlarının düşürülmesi ve makroekonomik istikrarın sağlanmasında önemli ilerlemeler kaydedilmesine karşılık, finansal dolarizasyonun kalıcı bir durum sergilediği gözlenmektedir. MVP yaklaşımı, ekonomik birimlerin portföylerinin risk ve getiri profilini gözleterek finansal işlemlerdeki para birimleri bileşimini en uygun hale getirmesine dayanır. Bu yöntemle göre, finansal dolarizasyon, enflasyon volatilitelerinin artan, reel döviz kuru volatilitelerinin ise azalan bir fonksiyondur. Bu çerçevede doğrultusunda, diğer önemli makroekonomik risk göstergeleri de göz önünde bulundurularak Türkiye ekonomisindeki finansal dolarizasyon olgusu 1990 – 2011 dönemi için incelenmiş ve dolarizasyon olgusuyla mücadelede enflasyon hedeflemesi politika stratejisinin başarısı üzerine ışık tutmaya çalışılmıştır.

Anahtar Sözcükler: Finansal Dolarizasyon, MVP Yaklaşımı, Volatiliteler, VAR

To My Family

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CHAPTER I

INTRODUCTION

Dollarization which is especially a phenomenon in emerging market economies has evolved as one of the noteworthy features of globalization during the last three decades. However, it was the 1990's that the term "dollarization" has become a well-known term. In this period, some countries preferred official dollarization by giving foreign currencies the legal tender status, alternatively unofficial or partial dollarization has expanded even more and become a pervasive phenomenon in a wide range of developing countries. In the process, the integration of the international financial system and the removal of restrictions on capital mobility have contributed to rising dollarization ratios in these economies. In addition to this, different scope of unfavorable macroeconomic conditions and uncertainties that the countries are subject to, can be taken as determinants for a diverse picture of the extent and the pattern of dollarization in the emerging market economies (Yilmaz (2006)).

In general, dollarization occurs in circumstances where residents lose confidence in their own currency. According to Levy Yeyati (2006) unofficial dollarization can be defined by two features which are "currency substitution" and "asset substitution". These specifications depend on traditional functions of money. Accordingly, currency substitution refers simply to the use of foreign currency as a means of "payment and exchange" or "unit of account". However, the view of asset substitution tries to answer why residents are tempted to save in a foreign currency. Therefore, in the case of asset substitution, interest rate bearing financial assets are taken into consideration. Apart from this, the concept of resident's liability dollarization is the other form that is researched by giving a particular emphasis on vulnerabilities to external shocks under this phenomenon. Finally, as financial globalization process gathers pace, the term "financial dollarization" becomes a

widely accepted term referring to asset and liability dollarization together. Accordingly, holdings of any foreign financial assets by public and private sector on whatever side of the balance sheet in the banking sector and also official lending to the country such as sovereign debt are all included in the term of financial dollarization (Levy Yeyati (2006)).

The present question is why we should care about dollarization. Although, there are some arguments on the benefits of unofficial dollarization in terms of its role in enhancing domestic financial markets and closer integration with international capital markets, the broad range of literature evaluated high levels of dollarization as a source of financial fragility which raises concerns among policymakers. Needless to say that financial dollarization stemming from unfavourable macroeconomic conditions and uncertainties, is revealed by the experience of recent banking and financial crisis as carrying significant drawbacks such that it complicates economic policy implementation and contains the seeds of fragility for the whole economy as well.

Earlier literature which was based on currency substitution models have regarded dollarization as an impediment to conduct monetary policy. Dollarization affects monetary policy through the increased volatility of money demand. Therefore, the traditional transmission mechanism of monetary policy does not work properly as central banks have no direct control over foreign currency assets. Furthermore; Reinhart et al. (2003) evidence that dollarization reinforces the impact of exchange rate movements on nominal prices so that increasing pass – through makes difficult to bring inflation under control. Hence; high level of exchange rate pass-through is one of the other aspect of “fear of floating” specified by Calvo and Reinhart (2002) who consider this as an epidemic case for especially emerging market economies.

More recent efforts to explain the risks associated with financial dollarization have focused on the effects of the balance sheet channel. Recent financial crisis experienced by a number of emerging market economies in East Asia, Latin America and Turkey have justified that balance sheets of the main sectors of an economy lie at

the heart of concerns about financial dollarization. Due to currency mismatch problem, the net worth position of households, firms and the government become fragile to changes in the exchange rate which in turn makes the financial position of economic agents to be exposed to solvency risks. Recall that the risks for both financial and real sectors are interrelated; the banks that lend in foreign currency to firms can also be indirectly affected where non-exporting corporate sector earn revenues in domestic currency. In other words, the risk exposure of one sector in the economy cannot be isolated from other agents' financial positions. Hence, financial dollarization carrying the seeds of fragilities may end up with systemic consequences in the economy. Due to fear of floating, dollarization complicates economic policy implementation as well. Because of the limits on the implementation of counter-cyclical economic policies, dollarized economies are more prone to experience boom and bust cycles in retrospect.

Early theories on explaining the dollarization phenomenon was based on the currency substitution view. This focus is reflected in the emphasis on the expected nominal returns of holding different currencies as a determinant of dollarization and the presumption that dollarization should recede with price stability. As a result, the literature has typically pointed at the dynamics of money demand and in particular the link between dollarization and the inflation level as well as the network externalities associated with the use of money for transaction purposes.

Ize and Levy Yeyati (2003) develop the portfolio view and criticized the currency substitution view. According to them, it is the dollarization of interest-bearing financial assets that generally accounts for the bulk of measured dollarization and not the cash holdings of foreign currency as in the currency substitution view. In this case, there is no theoretical reason to expect inflation levels to have any effect on the currency choice of the portfolio, as long as they are captured by nominal interest rates to leave real interest rates intact (Ize and Levy Yeyati (2003)). Similarly, as financial assets can be easily converted to an alternative currency at almost no cost, then network externalities cannot be attributed a significant role to affect the denomination of financial assets.

Levy Yeyati (2006) indicates that financial dollarization reflects the interaction between demand and supply of foreign currency denominated financial assets through loanable funds market. Accordingly, financial dollarization is the outcome of a financial equilibrium between creditors and borrowers that both optimize the currency composition of their contracts according to the risk/return profile of the financial assets. Accordingly, while the real return on TL assets is affected by changes in the inflation rate, the real return on dollar assets is influenced by the changes in the real exchange rate. Then, in the absence of real interest rate differentials across currencies, the investor chooses the currency composition of savings so as to minimize the variance of portfolio returns which depend on the respective volatilities of the inflation and the real exchange rate. Within this benchmark, it is expected that the degree of financial dollarization should be intensified whenever the expected volatility of the inflation rate remains high in relation to that of the real exchange rate.

Having inspired by this methodology, the basic motivation that lies behind the topic and the aim of this study is also the following observation. While the levels of inflation have been reduced on a global scale and substantial progress has been achieved during the last decade on the grounds of macroeconomic stability, we cannot state that dollarization is a past phenomenon. Although, we have already witnessed the signs of dedollarization, financial dollarization seems to display rather an enduring stance and casts doubts on the dedollarization process.

Turkish economy has also been experiencing dollarization since the residents have been allowed to open foreign currency deposits in the local banking system at the end of 1983. By observing similar patterns for partial dollarization in the Turkish economy, we can state that high and volatile rates of inflation, gradually depreciating nominal exchange rate in addition to unsuccessful stabilization efforts, financial crisis and underdeveloped capital markets have an influence in the rising dollarization ratios. After nearly two decades with a rising trend of dollarization in Turkey, foreign currency denominated deposits as a share of total deposits (or deposit dollarization ratio) reached to 57,2 percent by October 2001. However, one can observe that dollarization trend has begun to change its course to dedollarization

with the implementation of the inflation targeting (IT) policy framework after the 2001 economic crisis. Although, there is no direct policy initiatives aimed at reducing the level of dollarization, its intensity has been receded as a side benefit of macroeconomic stability and declining uncertainties. Finally, deposit dollarization decreased to the level of 27,7 percent as of February 2011. Therefore, recent developments in the last decade tended the efforts to analyze dedollarization under the sign of a reversal in the dollarization trend. Now, the question centers on whether the persistent nature of dollarization is to be broken and the decreasing path for dollarization can be sustainable.

In the meantime, offshore dollarization measured as the share of foreign credits used by the banking sector in total credits borrowed have surged on the other side of the coin. Liquidity abundance on the global scale together with domestic financial stability, robust growth rates and declining risk perceptions in this period have led offshore dollarization to reach to 95 percent. Hence, these benign conditions in the international financial system facilitated the domestic banking sector to raise funds from abroad at lower costs.

Taking both deposit and offshore dollarization into account, we consider this phenomenon in terms of the macroeconomic risk profile of the economy in general. Motivated by Ize and Levy Yeyati's minimum variance portfolio (MVP) approach depending on relative volatilities of the inflation and the real exchange rate, we have investigated what the drivers of dollarization are, whether the trend in dedollarization can be taken for granted and also the role of the IT policy in attaining such an outcome. So, by testing the validity of their framework including also the post crisis period, we bring a new view in explaining financial dollarization in Turkey. To the best of our knowledge, this is the first empirical study applying MVP approach to Turkish economy spanning such a broad time period. Furthermore, relying on the fundamental key of the portfolio view stating that "*financial dollarization is all about risk differences*" (Ize and Levy Yeyati (2005) p.4), we also investigate the effects of other risk factors such as interest rate spread, speculative pressure index (SPI), credit default swap (CDS) and volatility index on the course of deposit and offshore dollarization. So, this can be considered as the second contribution of this study.

According to our results from dynamic responses for the full period, our baseline model showed that deposit dollarization increases in response to inflation volatility, while it decreases as real exchange rate volatility rises. This result provides evidence that the portfolio view is valid for the Turkish case of financial dollarization. This means that investors care about real return of their portfolio and tend to diversify currency denomination of the portfolio when relative volatilities alter the currency risk. When we take the inflation targeting period into account, we find that an innovation in inflation volatility is insignificant to affect deposit dollarization while the effect of a shock given to real exchange rate volatility continues to be significant in reducing deposit dollarization. This means that implementation of inflation targeting policy framework from the beginning of 2002 becomes to be influential in reversing the course of dollarization. As for the other risk indicators such as spread, SPI and CDS, we find that deposit dollarization regarding both the full period and inflation targeting period rises in general following an innovation in these variables. Finally, our results reveal that offshore dollarization responds to risks negatively. This evidence is consistent with the fact that domestic banking system can afford more credits abroad in tranquil macroeconomic conditions.

The rest of the thesis is structured as follows. Chapter II goes over conceptual framework in order to make clear on what we have been dealing in this study. Chapter III reviews the literature by discussing the empirical evidence on financial dollarization in terms of its benefits and its sources of concern and the road for dedollarization policies as well. Chapter IV presents the theories explaining financial dollarization including also the portfolio view. Chapter V provides empirical analyses for the Turkish economy in three subsections. Firstly, the variables used in the analyses are introduced with some descriptive statistics and related technique for data generation is explained. Secondly, the dollarization experience of the Turkish economy is described in retrospect by focusing on main macroeconomic policies and their reflection on relevant indicators. Thirdly, empirical evidence from the analyses is revealed. Finally, Chapter VI concludes with a review of important results of the analyses.

SECTION II

CONCEPTUAL FRAMEWORK

II.I How the Definitions of Dollarization Evolve?

There are various but interrelated explanations of the term “dollarization”. Following convention in the literature, when a foreign currency acquires the status of legal tender, it means “official” (“de jure” or “full”) dollarization. On the other hand, “unofficial dollarization” (“de facto” or “partial”) corresponds to proliferation of a foreign currency in the economy whilst national currency still preserves its legal tender position. (Ferrer (2003) and Levy Yeyati (2006)) Furthermore, an economy that is unofficially or partially dollarized is defined as the one where economic agents hold a share of their portfolios in foreign currency assets and / or where the public and private sectors have liabilities denominated in dollars.¹ (Reinhart, Rogoff and Savastano (2003))

According to Levy Yeyati (2006) unofficial dollarization is specified by two features, which are called “currency substitution” and “asset substitution”. The distinction between these two concepts relies on money and its traditional functions. Referring to these definitions, currency substitution refers simply to the use of foreign currency as a means of “payment and exchange” or “unit of account”. In this case, nominal interest rate differential, that determines relative opportunity cost between currencies, is expected to affect the composition of cash holdings. Therefore, domestically high inflationary episodes associated with interest rate

¹ Actually, we meet a broad range of usage of unofficial dollarization in which dollar assets abroad are included when there is no permission for holding foreign currency deposits in the banking system and / or maintaining them domestically in an illegal way through a black market. Furthermore, following the above definition, it is not just dollar banknotes or assets pertaining to dollarization, rather different leading or hard currencies like Euro or Japanese Yen widespread in the economy, are no doubt employed by this general term. (Savastano 1992))

differential on behalf of home currency leads to strengthen currency substitution, because domestic currency is expected to depreciate assuming that the uncovered interest parity holds. However, in the case of asset substitution, the focus is on the asset side of balance sheets. Asset substitution tries to answer why residents are tempted to save in a foreign currency. In case of asset substitution, interest rate bearing financial assets are taken into consideration. Hence, if home currency weakens to function as a store of value, then the currency composition of financial assets is expected to change towards dollarization.

Reinhart et al. (2003) put forward a historical perspective on what a dollarized economy is. In this regard, until the late 1990's, a dollarized economy was featured by the fact that residents held foreign currency banknotes or assets as part of their portfolios. However, after the Asian financial crisis in the late 1990's, one strand of the literature used the term dollarization for its official meaning, as countries began to substitute their national currency for a more stable foreign currency. The other strand of the literature raised an equally important question that is why economic agents in many countries also borrow in foreign currency. Motivated by this, later studies have focused on researching the concept of resident's liability dollarization, giving a particular emphasis on vulnerabilities to external shocks under this phenomenon and on the effects of macroeconomic management in emerging market economies. Finally, as the inclination towards financial globalization unfolds, the term "financial dollarization" is widely accepted to refer to asset and liability dollarization altogether.

Ize and Parrado (2002) bring forward two alternative classifications to dollarization other than its financial framework. While "payments" dollarization corresponds basically to the use of dollars for transaction purposes where foreign currency in cash, demand deposits or central bank reserves are enclosed; "real" dollarization refers to the use of foreign currency formally or de facto to index wages, prices of goods and services and other real contracts to a hard currency. From the above explanation, it can be inferred that payments dollarization does not sound different from currency substitution.

Recall that financial dollarization includes the use of foreign currency to index financial contracts on both asset and liability sides. In turn, financial dollarization may occur domestically and / or externally depending on the claims of residents and / or nonresidents against residents and the government. Ize and Levy Yeyati (2005) point out the distinction between “domestic” and “external” dollarization even they both reflect financial dollarization. While the former covers onshore foreign currency deposits and loans belonging to residents, the latter spans financial contracts between domestic and foreign residents such as external bonded debt issued by private and / or public sector. According to Yeyati (2003), the difference between the currency composition of residents and non – residents with the latter more prone to invest in dollars, is reflected in this definition. Finally, as suggested in Reinhart et al. (2003), external dollarization also captures the share of private sector foreign borrowing in total external financing.

Levy Yeyati (2006) indicates that financial dollarization reflects the interaction between demand and supply of foreign currency denominated financial assets through loanable funds market. According to this broad definition, holdings of any foreign financial asset by public and private sector on whatever side of the contract they stand and official lending to the country such as sovereign debt, are included in the term financial dollarization. In Levy Yeyati (2003), a compact definition of financial dollarization which is residents’ foreign currency denominated assets and liabilities in the banking sector is broadened to include also non – bank assets such as commercial papers and external debt. Hence, financial dollarization is thought to reflect the actual scope of dollarization in an economy much better, because it looks at both sides of a balance sheet. As depicted in Kokenyne, Ley and Veyrune (2010), there are various types of assets and liabilities that can be subject to dollarization and can exist in different sectors in an economy (See Table II.I).

In the course of time, there are also empirical reasons why this phenomenon evolves from currency substitution to financial dollarization. As one can witness, most of the existing literature on unofficial dollarization centers on currency substitution and the associated focus is on the dynamics of money demand. This approach provides a link between dollarization and inflation with the presumption

that dollarization should recede once price stability has been achieved. However, the country experience especially in Latin America of the 1990's indicate that dollarization remains at a large extent and exhibits a hysteresis even after inflation levels have reduced. This enigma, combined with the fact that interest bearing financial assets constitute the bulk of measured dollarization rather than the usage of dollars for transaction purposes only, turns the research efforts into financial dollarization² (Levy Yeyati 2003)).

Table II.I: Typically Dollarized Assets and Liabilities in Different Sectors

	Assets	Liabilities
Households / Firms	<ul style="list-style-type: none"> ▪ Foreign currency cash ▪ Foreign currency bank deposits ▪ Foreign currency linked assets ▪ Foreign currency assets abroad 	<ul style="list-style-type: none"> ▪ Foreign currency debt ▪ Foreign currency linked liabilities ▪ Foreign currency liabilities abroad
Banks	<ul style="list-style-type: none"> ▪ Foreign currency assets held abroad ▪ Foreign currency credit to households and firms ▪ Foreign currency credit to the public sector ▪ Foreign currency linked assets 	<ul style="list-style-type: none"> ▪ Foreign currency deposits of households, firms and public sectors ▪ Foreign currency external debt
Public Sector	<ul style="list-style-type: none"> ▪ Foreign currency held abroad by governments 	<ul style="list-style-type: none"> ▪ Foreign currency denominated reserve requirements on foreign currency on foreign currency bank deposits ▪ Net foreign currency bank credits ▪ External foreign currency debts ▪ Foreign currency indexed debts

Source: Kokenyne et al. (2010)

² There is also a definitional problem as argued by Calvo and Vegh (1992). Although, currency substitution is related to the use of dollars for transaction purposes (medium of exchange), due to lack of data on foreign currency circulating in an economy, dollarization ratios such as interest bearing deposits are used as an indicator of currency substitution. So, this is why Yeyati (2006) states that the early empirical tests of dollarization based on currency substitution models actually reflect the assets substitution phenomenon.

Since we try to build a conceptual framework in this section, it will be useful to consider briefly the stages of dollarization as well. Dollarization goes through the stages shaped by the functions of money. This is why the discussion of dollarization has been so branched out and many references are attributed. According to Calvo and Vegh (1992), especially in highly inflationary episodes, foreign currency is firstly substituted for local currency in order to satisfy the store of value function of money. At this stage, real value of wealth is tried to be conserved in foreign assets by appealing to foreign currency banknotes, domestic foreign currency deposits and cross – border deposits or foreign bonds. This stage within which domestic currency ceases to function as a store of value also corresponds to the initial form of unofficial dollarization. (Ferrer (2003)) Hence, it is claimed by following the famous quotation that the Gresham’s Law was reversed such that “*good money tended to drive out bad and not the other way round.*”³ (League of Nations (1946) p.48 cited in Calvo and Vegh (1992) p.1) At the second stage, while official accounts are maintained through local currency, private sector financial accounts including leasing contracts are begun to be carried out in a foreign currency. Likewise, price indexing can be observed at the exchange rate of the anchor currency. This means that domestic currency loses its function to act as a unit of account. Only then, foreign currency is used as a medium of exchange which can be specified as a gradual transition to semi – official or full dollarization at the end. (Ferrer (2003)) Ultimately, currency substitution can be evaluated as a last stage of dollarization.

³ Gresham’s Law is an explanation of monetary instabilities under a bimetallic standard where the central bank freely exchanges two metals at a fixed exchange rate for money in terms of gold and silver coins. In addition to this, there is an industrial or non – monetary market where gold and silver are traded at market values. Now, think about an exogeneous shock which tends to lead the relative market price of these metals to deviate on behalf of gold. In this case, it become to be profitable to exchange bad money for gold at the official exchange rate and resell gold in the industrial market for more of the bad money. So, bad money drives out good money, because arbitrage opportunity results in a disappearance of gold from monetary circulation. As monetary systems evolved towards use of fiat currencies, the relevance of Gresham’s law is reduced in that low inflation currency that is good money is widely used for saving and transaction purposes in the absence of legal restrictions. (Dutu, Nosal and Rocheteau (2005) For example, following a devaluation expectation, bad currency is brought to the central bank in exchange for the good or sound currency. (Giovannini and Turtelboom (1992))

II.II. A Bird Eye View on Worldwide Dollarization

Financial dollarization has been a widespread phenomenon among emerging market economies and the developing world in general. Although, financial dollarization has been a defining characteristic among emerging market economies as financial globalization gains momentum in the 1990's, it displays not only a diverse picture across different regions and countries, but also a dynamic pattern in the course of time.

Levy Yeyati (2006) provides the extent of deposit dollarization among non-industrial economies for 2000. By taking a glance at these figures, one can observe that developing countries dollarized above 10 percent are scattered rather in a fairly balanced way among Europe, Asia, Africa and Latin America. Furthermore, according to Reinhart et al. (2003), while dollarization has been consistently low in Africa and in most of Asia, there has been a wide extent of dollarization in the Middle East and especially in South America. Moreover, it is interesting to note that beginning from the 1990's, the degree of dollarization in the transition economies reached levels by more than doubling the average of the Western Hemisphere economies consisting of the Caribbean, Central America and South America. Following the results provided by Reinhart et al. (2003), this proves that the spread of dollarization has not been uniform both across and within regions and the worldwide "*addiction to dollars*" in parallel to the Levy Yeyati's (2006) study.

Reinhart et al. (2003) reveal the scope and the variety of dollarization in the 1980's and 1990's for the developing world in general by constructing composite indexes. According to their figures, the incidence of dollarization has occurred between the early 1980's and the late 1990's. However, the degree of dollarization has increased in the latter period according to their composite index where domestic bank deposits in foreign currency and government external debt are accounted for this rising trend. Moreover, the activities of private sector has been responsible for financial dollarization in the majority of the developing countries in the 1990's. This trend is compatible with the evidence provided by Galindo and Leiderman (2005) regarding the Latin American countries. Indeed, after the 1998 Russian crisis,

financial sector deposits and loans have begun to dollarize significantly in the place of public sector liability dollarization which can be explained by rapid expansion of domestic bond markets during the 1990's.

According to Inter-American Development Bank (IADB) (2005) figures, the share of dollar deposits and loans in high income countries has showed a decreasing trend between the years 1990 – 2001. On the other hand, low and middle income economies except Latin American and the Caribbean countries display an increasing path in their dollarization levels for the same period. However, one should also note that beneath these average figures, there are substantial regional disparities in dollarization levels which seem to be result of imposing restrictions and / or outright prohibitions. (IADB 2005) Similar to the conclusion reached by Reinhart et al. (2003), the degree of dollarization in Latin American countries are revealed to be higher in any form compared to other emerging market economies.

Reinhart et al. (2003) figure out the composite scores regarding the average of 1996 – 2001 with respect to developing countries. Accordingly, we see that Argentina, Bolivia, Cambodia, Ecuador, Lao PDR, Paraguay, Peru and Uruguay are found to exhibit a very high degree of dollarization. Also, Bosnia & Herzegovina, Belarus, Estonia, Hungary, Indonesia, Moldova, Pakistan, Philippines, Russia, Thailand and Turkey are major countries that are represented as having high degree of dollarization. Further; Albania, Azerbaijan, Brazil, Chile, Czech Republic, Egypt, Hong Kong, Israel, Latvia, Lithuania, Poland, Romania, Slovenia and South Korea are certain countries which are revealed as having a moderate degree of dollarization than the former countries. Finally; China, Kuwait, Singapore, South Africa and Taiwan are some of the countries displaying a low degree of dollarization.⁴

⁴ More updated figures about the degree of dollarization in country level are derived by Alvarez – Plata and Garcia – Herrero (2008). Relying on the assumption that foreign currency assets and liabilities exhibit nearly a symmetric outlook as regulations limit the scope of open foreign currency positions in the balance sheets, they use deposit dollarization in order to measure the extent of dollarization.

CHAPTER III

EMPIRICAL EVIDENCE ON FINANCIAL DOLLARIZATION and THE ROAD FOR DEDOLLARIZATION

III.I Can it be a noise about nothing?

According to Baliño, Bennett and Borensztein (1999), as financial integration in the world economy progresses; dollarization may occur as a natural consequence of financial competition in a liberalized environment. Since financially integrated countries become increasingly open to external shocks, hedging needs of domestic investors emerge particularly for those who are exposed to foreign exchange risk. These requirements are fulfilled by creating various kinds of financial instruments which may in turn foster closer integration with international markets, so this process may warrant some level of dollarization as well. Apart from portfolio diversification of residents, foreign currency denominated assets can also attract international investors at least by mitigating exchange rate risk and can reverse capital flight. Borrowing from international financial intermediaries and allowance for holding foreign currency deposits provide domestic banking system with new sources of funds to supply credits. This will help not only to remonetize the economy by encouraging a reversal from currency substitution to foreign currency deposits but also to gain financial depth to the economy. In addition, offering corporate sector and households an opportunity to borrow at lower cost, investment and domestic consumption expenditures can be positively affected which will help to boost economic activity. Hence, financial dollarization may enhance domestic financial markets in a country which suffered from high nominal instability in the past.

Kubo (2008) examines the impact of foreign currency denominated deposits on bank lending to test whether dollarization really helps to boost financial intermediary development in especially low income developing countries.

Accordingly, dollarization under medium and high inflation circumstances leads to mobilize foreign currency savings of households into the banking system which will eventually be transformed into private credits. However, the size of these dollar deposits has still remained as a question. Moreover, in low inflation environment, foreign currency deposits actually undermine financial intermediation by having an adverse effect on private credits. Due to credit risk in an underdeveloped financial system, banks choose to hold these resources as foreign asset in terms of U.S. Treasury bonds rather than to expand private credits. Also, considering the persistent nature of dollar deposits in all circumstances, the existence of dollarization might be concluded to cause more danger than safe to financial development. (Kubo 2008) Similarly, Nicolo, Honohan and Ize (2003) claim that dollarization promotes the deepening of financial markets only in high inflationary environment.⁵

Similar to Baliño et al. (1999), Arteta (2003) emphasizes the process that financial dollarization might facilitate integration with international capital markets which might imply efficiency gains to financial intermediation by providing access to richer set of financial instruments. According to the author, banking system could improve its management skills in the process of further integration with international capital markets as well. However, Arteta (2003) goes a step further and asserts that financial dollarization might serve as a buffer to contractionary currency crisis (provided that bank runs do not take place) in that residents with dollar holdings could preserve their purchasing power and wealth, so they could carry on their consumption or investment expenditures which can lead to smooth the impact of a crisis. Moreover, as regards to credit dollarization, it might lead to a redistribution of currency risk from banking sector to firms and households requiring the latter to improve their risk management skills and to increase the hedging activities.

Although Arteta (2003) describes the side benefits in this way, one should also note that there are not always well functioning domestic financial and capital markets in especially emerging market economies where all economic agents are

⁵ One can also refer to a recent study by Court, Özsöz and Renfigo (2010) in order to look into detailed analyses of the impact of deposit dollarization on financial deepening in developing countries. In a nutshell, they draw attention to the dual role of dollarization which in fact has a negative effect on financial deepening.

able to hedge themselves. Also, when a crisis occurs, most probably the effects cannot remain in one sector. In other words, the associated risks of financial fragilities in one sector cannot be isolated from the others. If we take these interlinkages among financial, household and corporate sectors into consideration, then Arteta's (2003) arguments of financial dollarization about mitigating the impacts of a crisis seem to be too optimistic. Therefore, we think that effective supervision of financial system is required in any case to observe the developments in the size of the systemic risk accumulating in the economy.

To conclude, we can claim that there can be an optimal degree of dollarization in an economy as suggested by Kokenyne, Ley and Veyrune (2010) According to them, this level can be determined by structural factors such as the size and the openness of the economy and the degree of financial market development and financial integration. Likewise, Arteta (2003) also admits that financial crisis might be more likely and also be more costly only after a certain threshold level for dollarization. Following portfolio models by Ize and Levy Yeyati (2003), Arias (2005) analyzes the optimal degree of dollarization in terms of social welfare. Accordingly, he defines "*warranted*" financial dollarization which can be considered as excessive or in his terms as "*constrained optimal*" in some circumstances when financial dollarization may be a response to weak institutions and missing financial markets. Further, the optimal level can also be constrained by moral hazard or policy distortions which call for policy intervention to resolve these imperfections. Therefore, if financial dollarization is proved to be excessive in an economy, reducing the level of it can serve well to arrive at a better social and private outcome as they are welfare improving. Then, dedollarization strategies come into agenda which are also current issues and will be explored in detail in the subsequent section.

III.II. Sources of Concern

Although there are arguments about the benefits of unofficial dollarization in terms of its role especially in financial markets, as stated above, the broad range of literature evaluated a high level of dollarization as a source of financial fragility which raises concern among policymakers. Ize and Parrado (2002) state that if

dollarization is a reflection of globalization and a natural outcome of financial integration accompanied with sound macroeconomic management, then it should not be a matter of great concern. However, when the business cycle is largely determined by external developments and is subject to global shocks, then dollarization can actually be regarded as a source of concern. It means that dollarization phenomenon carries significant drawbacks that it contains the seeds of fragility for the whole economy and complicates economic policy implementation as well.

Concerns about dollarization phenomenon have been mainly associated with emerging market economies where dollarization plays a role as a catalyst not only in paving the way to an economic crisis but also in deepening the impacts of a crisis. Mishkin (2004) provides certain common peculiarities of these economies in order to explain the reasons of why this phenomenon has been considered as a serious issue to cope with. According to him, emerging market economies can be characterized as having fundamental institutional weaknesses that differentiate them from their advanced counterparts. These peculiarities are weak fiscal and financial institutions including insufficient or absent government prudential oversight and regulation, and additionally having monetary institutions with low credibility. Due to these weaknesses, emerging market economies are subject to frequent macroeconomic instabilities with high inflation and currency and banking crises which are more pronounced though in the case of large extent dollarization.

In this section, we deal with different aspects of concerns associated with financial dollarization. Firstly, we look at the monetary policy effectiveness under partial dollarization by elaborating different channels that affect transmission mechanism and how dollarization may influence the design and implementation of the monetary policy. Secondly, we go through another strand of the recent literature which has mainly focused on the repercussions of financial dollarization through its impact on the balance sheets of households, public and corporate sectors. We will see how dollarization leaves the economy in a fragile position to exchange rate volatility and makes it prone to crises. It is justified that authorities living with financial dollarization have to think twice when they decide on a policy prescription, because it can simply complicate the effects of a certain strategy implementation. At the end

of this section, we will glance at empirical studies that examine the overall economic performance of dollarized economies in terms of the evolution of main macroeconomic variables.

III.II.I Financial Dollarization and Monetary Policy Effectiveness

As dollarization tendency expands in an economy, the question about the compatibility of dollarization with monetary policy effectiveness and its independence is raised. Earlier literature about financial dollarization which is especially based on currency substitution models regards currency substitution as an impediment to conduct monetary policy.⁶ This obstacle results from the fact that the dollar holdings in terms of savings and credits are beyond the control of the monetary authority, therefore this situation dilutes the transmission mechanism. Therefore, the main rationale behind this conventional view is that the central bank operating under currency substitution cannot influence effectively the relevant interest rate that directs economic agents' consumption and investment decisions. (Galindo and Leiderman (2005)) Even the relevant interest rate is set by the monetary authority; associated change in the exchange rate can neutralize its effects through the net worth of dollar indebted borrowers. (Ize and Levy Yeyati (2005))

Recall that under monetary targeting where money supply (growth) is set as an intermediate target to achieve price stability, the suitability of the target whether it should include or exclude foreign currency creates an essential problem in dollarized economies. (Baliño et al. (1999)) As a matter of fact, domestic money supply gets out of monetary authority's control as foreign currency component constitutes a large portion of broad money. Although, monetary authorities are not in a position to directly influence money supply under a high level of dollarization, they can at least set the reserve requirement rates for banks and manage narrow definitions of money like the monetary base. Nevertheless, this may also become difficult as financial intermediation is largely carried out by foreign currency (Plata and Herrero (2008)).

⁶ One can refer to studies such as Sahay and Vegh (1995), Calvo and Vegh (1992), Baliño et al. (1999) and Giovannini and Turtelboom (1992))

Apart from the incidence provided by Blejer and Leone (2000) that over time the relation between money supply and inflation erodes, as money demand becomes responsive to structural changes and displays strong fluctuations. As the sensitivity of money demand to changes in the exchange rate increases, money demand becomes unstable which leads to undermining the effectiveness of monetary policy. In such an environment, difficulties in managing liquidity and controlling monetary aggregates (changes in the composition of deposits have also an effect on the demand for reserves) result in weaker monetary transmission and hence hinder inflation control.

Depending on the extent of de facto dollarization in an economy, the central bank loses part or all of its seigniorage revenues, since only a portion of the monetary base is in local currency. This means that a country pays some seigniorage to the issuer of the currency used unofficially in the home country (IMF 2010). Further, if there is a widespread use of foreign money, the country that appeals to monetary financing to cover a given budget deficit should bear a higher level of inflation to generate a certain seigniorage revenue which can be attained at a much lower rate of inflation in the absence of currency substitution. Following this idea, the optimal level of inflation tax will be higher for a given level of government expenditure. Therefore, resorting to inflation tax seems to be less attractive for policy makers when the national currency is not deemed to be sound (Calvo – Vegh 1992).

When a foreign currency begins to deliver medium of exchange function of money, it gets more difficult for a central bank to accumulate international reserves in terms of that currency. Moreover, a central bank already having limited reserves in foreign currency may not ensure enough funding in foreign currency that will calm foreign currency dollar deposit holders in case of bank runs. Hence, ineffective operation of lender of last resort facility can cause a liquidity crisis and undermine financial stability (Kokenyne (2009)). Likewise, Calvo (2006) evaluates the existence of domestic liability dollarization in emerging market economies as a monetary policy challenge and explains how this undermines the role of the central banks to function as the lender of last resort. Whereas a credit line provided by a central bank following a liquidity crunch will not be inflationary, the same operation

results in a different outcome if some of the liquidity is held in foreign currency. The reason is that the injection of domestic liquidity is swiftly diverted to foreign currency which will put an upward pressure on the exchange rate and prices. Therefore, countries longing for an independent monetary policy and satisfying an effective lender of last resort function of the central bank should aim at eliminating domestic liability dollarization.

When we look at studies to understand whether these types of concern are verified by data, it can be claimed that the discussions for some of these shortcomings remain to be mixed at empirical level. Some authors challenge the prevailing view that monetary policy is much less effective in dollarized economies. The arguments are relied upon the fact that worldwide declining inflation rates to single digit levels and rising dollarization or persistently high dollarization levels exist simultaneously in recent years.⁷ Hence, by ruling out the issues of credibility and sustainability, these authors argue that dollarization does not pose an obstacle to conduct monetary policy in order to achieve its ultimate objective of keeping inflation under control.

For instance, Reinhart et al. (2003) bring an alternative perspective such that there are not significant differences in the ability of monetary policy to combat inflation across countries which are dollarized at various extent. Observing high correlation of the monetary aggregates with inflation, they claim that financial dollarization does not complicate monetary transmission mechanism. However, Nicolo et al. (2003) state that if the exchange rate is pegged in combating inflation, this will make local currency to be less attractive and adds to the degree of financial dollarization in the course of time. Then, it is not surprising to observe low rates of inflation and high levels of dollarization together. Reinhart et al. (2003) further evidence that the degree of dollarization is not found to have a negative influence on the growth performance during disinflation and the duration of disinflation process. In turn, they argue that dollarization does not preclude monetary policy to attain its

⁷ One can browse to studies by Reinhart et al. (2003) for an alternative view about the effectiveness of monetary policy and Galindo and Leiderman (2005) to review the respective figures related to Latin American countries.

primary goal of price stability. The authors also indicate that seigniorage revenues do not show large difference across countries that are dollarized at various extents. In fact, revenues from seigniorage are found to be much higher in more dollarized countries which are evaluated as a reflection of effectiveness or autonomy of monetary policy. However, we think that this way of expression can be misleading. Since we are dealing with developing countries in general and it might most probably be the case that seigniorage revenues are raised to cover large amounts of fiscal deficits. Hence, monetary policy in these countries can be evaluated as dependent to serve fiscal needs. Eventually, dollarization is an ultimate outcome with resultant high levels of inflation.

One of the serious concerns about dollarization on the effectiveness of the monetary policy is centered on the pass – through from exchange rate to prices which are strongly supported also by empirical results. It is evidenced that currency substitution reinforces the impact of exchange rate movements on nominal prices, hence increasing pass – through causes the control of inflation difficult again. High level of exchange rate pass – through is the other aspect of “*fear of floating*” specified by Calvo and Reinhart (2002) that is an epidemic case for especially emerging market economies. Again, Reinhart et al. (2003) claim that inflation becomes much more sensitive to changes in the exchange rate when the degree of dollarization increases. Next, the inflationary impact of exchange rate changes are smaller where domestic dollarization was negligible. Taking these into consideration, we can claim that pricing behavior of economic agents is substantially influenced by the movements of the exchange rate. To sum up, as stated in Baliño et al. (1999) dollarization in the financial system makes it difficult to follow an independent and coherent monetary policy.⁸

⁸ According to Ize and Levy Yeyati’s (1998) two – assets portfolio approach, the causality runs from pass – through to financial dollarization. They indicate that the coefficient of the regression of inflation rate on nominal exchange rate which can be regarded as a measure of the pass – through simply equals to the share of foreign currency assets of the minimum variance portfolio. In that case, the behaviour of investors can be explained as follows: They hedge their portfolios through resorting to dollarization as an implicit guarantee for exchange rate movements. On the other hand, in an environment that facilitates dollar transactions and foreign currency is used for indexation of wages and prices of goods which can be ascribed to real dollarization, then financial dollarization inherently convey the pass – through effect.

Since the 1990's, a new thinking about monetary policy strategy with the recognition of the time – inconsistency problem emerges in search of a better nominal anchor as targeting monetary aggregates and the exchange rate ends up with disastrous outcomes. (Mishkin 2006) This new strategy, called inflation targeting (IT) regime which takes inflation as the only nominal anchor, has been widely adopted by both industrialized and emerging market economies since then. However, the implementation of this policy regime is also not immune to some institutional and structural deficiencies of the countries. Therefore, a sound policy advice on IT policy framework especially to emerging market economies becomes a challenging task.

There are numerous studies in the literature that elaborate the applicability of this policy regime to emerging market economies. According to Mishkin (2004), emerging market economies have fundamental institutional differences from their advanced counterparts which cause the applicability and the effectiveness of this regime to be constrained by these differences. Apart from fiscal and financial dominance, liability dollarization and external dominance set limits to implement IT policy.⁹

According to Mishkin (2004), exchange rate fluctuations may increase the burden of foreign exchange denominated debt, leading to a decline in net worth in balance sheets of firms, households and banks in an economy with a high degree of financial dollarization. Therefore, financial dollarization increases the risk of a financial crisis. To avoid these shortcomings, Fraga, Goldfajn and Minella (2003) suggest that the central banks are required to include additional goals in their objective function in order to prevent a financial crisis. For example, Armas and Grippa (2005) discuss the experience of highly dollarized Peruvian economy where the IT framework is designated in a way that it does not show a benign neglect to drastic movements of the exchange rate. Thus, the policy interest rate is allowed to be transitorily raised in order to prevent large domestic currency depreciation. However, according to Mishkin (2004), limiting exchange rate movements due to “fear of floating” should not get ahead of the sole policy target (i.e. inflation).

⁹ External dominance referred as vulnerability o sudden stops of capital inflows by Mishkin (2004).

External dominance associated with high level of dollarization not only undermines IT policy framework through the balance sheet effect, but also through diluting “transmission capacity” of the monetary policy as Ize and Levy Yeyati (2005) indicate. This means that when most of the intermediation in the economy is in foreign exchange, the effectiveness of the interest rates is decreased, since domestic interest rates may have little effect on the cost of foreign currency loans. Hence, the domestic economy priorities will be subordinated to the country whose currency is favored by domestic residents.

Although, substantial set of knowledge is accumulated in the course of time about sound monetary policy implementation under financial dollarization, there are still risks in achieving better outcomes. First of all, we are living in a time of global shocks rather than idiosyncratic shocks, since the world economy is highly interconnected. Although, sound macroeconomic management is ensured by individual countries, the existence of systemic risk in a globalized world economy may still be effective in the inclination towards hard currencies. Secondly, the demanding objectives of IT policy strategy such as central bank independence, technical capability and lack of binding fiscal, financial and external dominance issues may be beyond the reach of some developing countries. Finally, the fear of central banks due to vulnerabilities created by dollarization avoids monetary policy authorities to let the exchange rate float and engage in counter – cyclical monetary policies. This makes monetary policy to be constrained and hence to be suboptimal which in turn fuels dollarization. The vicious circle of this challenge can be broken by consistent monetary policy management that can lower pass – through and remove the associated fears over time so as to limit financial dollarization (Ize and Parrado (2002)).

All in all, reliance on the sustainability of monetary policy regimes whatever they are, matters for the extent of dollarization. Actually, subjective expectations towards the response of monetary policy to a scenario of a currency crisis can be a determinant on the level of dollarization under tranquil times. Then again, one can be optimistic about monetary policy independence and the viability of national currencies in emerging market economies as the practices of IT policy progress and

its preconditions are largely satisfied in the course of time. The resulting credibility gain will sooner or later be influential in rallying demand for national currencies (Ize and Parrado (2002)).

III.II.II. Financial Dollarization as the Source of Increasing Vulnerabilities and Crises

More recent efforts to explain the risks associated with financial dollarization have focused on the effects of balance sheet channel. As financial markets have increasingly interlinked over the past twenty years, the financial structure of many emerging market economies have become a source of vulnerability to crisis. Fairly volatile characteristic of international capital flows require to take care of the size and the currency composition of assets and liabilities (Allen, Rosenberg, Keller, Setser and Roubini 2002). Recent financial crises which were experienced by a number of emerging market economies in East Asia, Latin America and Turkey have justified that balance sheets of the main sectors of an economy and the currency composition of public debt dynamics lie at the heart of concerns about financial dollarization (Kesriyeli, Özmen and Yiğit 2005).

The implications of the balance sheet channel in the framework of financial dollarization are eventuated through “currency mismatches” which make net worth position of households, firms and the government fragile to changes in the exchange rate.¹⁰ Eichengreen, Hausmann and Panizza (2003) specify currency mismatch as the difference between the values of foreign currency denominated assets and liabilities on the balance sheets of the economic agents. Following Calvo and Reinhart (2002) and Ize and Levy Yeyati (2005), it can be argued that if the depreciation of domestic currency ends up with a disparity such that the local currency value of dollar

¹⁰ Actually, balance sheet approach comprises of four types of financial fragilities on balance sheets. Following Allen et al. (2002) p.5, these are as follows: (i) **Maturity mismatches**, where a gap between liabilities due in the short term and liquid assets leaves a sector unable to honor its contractual commitments if the market declines to roll over debt, or creates exposure to the risk that interest rates will rise; (ii) **currency mismatches**, where a change in the exchange rate leads to a capital loss; (iii) **capital structure problems**, where a heavy reliance on debt rather than equity financing leaves a firm or bank less able to weather revenue shocks; and (iv) **solvency problems**, where assets—including the present value of future revenue streams—are insufficient to cover liabilities, including contingent liabilities.

liabilities exceeds the value of assets of the same currency, then borrowers in dollars cannot service their foreign currency debt obligation which can lead to capital losses and eventually trigger a costly economic crisis. Moreover, the fact that the inability of a country to borrow abroad in its own currency is referred to as “original sin” of the international financial architecture which is regarded as a contributing factor to cause currency mismatch phenomenon in the economy as a whole. Additionally, the difficulty of emerging markets to borrow in domestic currency at long maturities and fixed rates even at home is known as “domestic dimension of original sin” which leads to maturity and currency mismatches together on the balance sheets. Hence, financial dollarization of private and public sectors in developing countries is accelerated by original sin causing these economies vulnerable to interest rate and exchange rate shocks through mismatches stated above.¹¹

As dollarization intensifies in the course of time, currency mismatch in the balance sheets of economic agents is inevitable. After a certain level of financial dollarization, this currency mismatch may appear either at domestic banking system as residents prefer to save heavily in foreign currency due to its perceived soundness to preserve their purchasing power and / or at the firms’ level by financing their operations with foreign currency credits because of its relatively low interest payments (Levy Yeyati (2003)). In addition, these economic agents can be in an unhedged position altogether. Then, these sectors which are solvent in tranquil times can easily face with capital loss or even become indebted with respect to their balance sheets. Even if one sector attempts to hedge currency risk, this means simply transferring currency mismatch to other sectors within a country. In other words, the risk exposure of one sector in the economy cannot be isolated from other agents when the risks are realized following an attack to foreign currency. One can realize

¹¹ Calvo, Izquierdo and Mejia (2004) differentiate domestic liability dollarization from foreign liability dollarization in that the former accounts for the dollar obligations with the domestic banking system while the latter is associated with the foreign creditors. While, sound macroeconomic policies are sufficient to solve especially the problem associated with domestic dimension of original sin and hence domestic liability dollarization, redemption from the international dimension of original sin and a consequent external dollarization require to develop a new financial architecture allowing complete markets for all currencies (Özmen and Arınsay (2004) and Honig (2005)).

from table III.I how the main sectoral balance sheets of an economy are interlinked through currency mismatch risk.

Table III.I: How currency mismatch risk applies to different sectors

Risk Sector	Currency Mismatch
Government	Government's domestic and external debt denominated in foreign currency versus government's hard currency assets (reserves)
Banks	Difference between foreign currency assets (loans) versus foreign currency liabilities (deposits / interbank lines)
Firms	Domestic and external debts denominated in foreign currency versus hard currency generating assets.
Households	Difference between foreign currency assets (deposits) versus foreign currency liabilities (often mortgages)
Country as a whole	External assets denominated in hard currency minus external debt denominated in hard currency. (i.e. net hard currency denominated external debt.

Source: Allen et. al. (2002)

According to Nicolo et al. (2003), a dollarized financial system can be inherently considered to be fragile in that such a system carries not only currency mismatch but also solvency and liquidity risks associated with balance sheet positions of economic agents. Solvency risk emerges from the case of large exchange rate depreciations. However, the risk does not need to be emanated from the liability side of the banking system where existing tight regularities can already limit open foreign exchange positions of banks. Rather, the problem can arise from the financial conditions of the corporate sector and the households that are indebted to banks in dollars. Since firms engaging in especially nontradables sector often cannot borrow directly in international markets; they borrow from financial intermediaries via domestic banks and subject to balance sheet weaknesses of domestic liability dollarization. Eventually, the banking sector and the corporate sector generating no foreign currency revenues remain both susceptible to exchange rate changes (Calvo et al. (2004)). Then, the corporate sector and also households carrying currency

mismatch in their balance sheets constitute credit risk for the banking sector. Following a depreciation in the exchange rate, falls in net worth of respective economic agents result in massive bankruptcies in a dollarized system with serious economic costs (Nicolo et al. (2003)). Therefore, even there is no open position in the banking system including the off balance sheet items, non performing loans stemming from insolvency of the corporate sector and households can trigger bankruptcies in the banking sector as well. Therefore, the degree of loan dollarization is also paid attention, because it contributes to the risk exposure of the financial system in terms of the credit and solvency risk in the case of large changes in the exchange rate (Levy Yeyati (2003)).

These cases regarding sectoral balance sheets also help us to draw an important inference about risks that remain hidden in the consolidated country balance sheet. Although, currency mismatch may not appear in the country's aggregate balance sheet, for example through netting out of foreign currency debt between residents, related vulnerability in one sector can spill over into other sectors following a domestic currency depreciation and thereby creates a systemic risk in the economy (Allen et al. (2002)). In such an environment, risk premiums on both local and foreign currency denominated assets will increase as confidence to financial system deteriorates among all of the economic agents. Unfortunately, a central bank can only sustain sufficient level of liquidity in national currency to calm the financial markets. Therefore, the fear of investors with dollar deposits about the incapability of banks to provide enough liquidity in foreign currency on demand and their anticipation of confiscatory measures in a currency crisis lead to bank runs as a reaction to devaluation (Nicolo et al. (2003)). In addition, resultant capital outflows create pressure on reserves which can be aggravated by net foreign currency debtor's attack anticipating further depreciation within a country. Ultimately, this sequence of events can leave the government unable to roll over its hard currency debts to residents which can trigger an external balance of payments crisis (Allen et al. (2002)).

Arteta (2003) does not provide a direct link between financial dollarization and banking and currency crisis and further suggest that deposit dollarization can

serve as a buffer to severe crisis. In contrast with this study, Domaç and Martínez – Pería (2003) point out that there is a positive relation between banking crisis and the ratio of foreign currency liabilities to total assets. However, according to Levy Yeyati (2006), none of these studies rely on the balance sheet channel where the risks emerging from financial fragility can only be materialized following exchange rate depreciation. Therefore, Levy Yeyati (2006) proposes a model for a number of developing countries in which the probability of a banking crisis is determined as a function of the nominal exchange rate changes, two different measures of financial dollarization and dummy variables in order to capture the crisis years. According to regression results, both financial dollarization and devaluation increase the propensity of crisis. Furthermore, taking also the interactions between the explanatory variables into account, it can be argued that exchange rate shocks endanger financial stability only in the existence of financial dollarization. Besides, there are in fact numerous studies in the literature stressing the role of balance sheet imbalances deriving from financial dollarization.¹²

Balance sheet fragilities associated with financial dollarization aspect appear in explanations of third generation crisis models. Rather than traditional fiscal imbalances, vulnerabilities in the private sector are at the core of a crisis (Allen et al. (2002)). According to Krugman (1999), substantial levels of foreign currency denominated debt combined with financial market imperfections increase the possibility of a self – fulfilling crisis. As there is a fall in confidence of foreign creditors towards the economy, capital outflows begin and result in exchange rate depreciation. Ultimately, this will trigger the risks associated with balance sheet weaknesses to come to the surface which lead to a decline in investment and output. The Asian crisis of 1997 – 98 highlight that currency crisis driven by sharp and

¹² One can refer to the studies by Krugman (1999), Aghion et al. (2004), Calvo et al. (2004), Frankel (2005) and Bebczuk, Galindo and Panizza (2006) in order to see deeper elaboration of the implications of the currency composition of balance sheet channel in economic crisis. There are also studies which examine firm level experience of financial dollarization again along with the balance sheet channel. Some of them are as follows: Galindo, Panizza and Schiantarelli (2003), Kesriyeli, Özmen and Yiğit (2005), and Janet, Garcia and Novaes (2008). Finally, it is worth to note that the IMF also gives a special emphasis on the balance sheet effects in evaluation of the causes and the evolution of recent crisis of emerging market economies. In order to see the IMF's approach, one can look at Allen et al. (2002) where the Fund's policy advice and program design during crisis are also provided.

unexpected reversals of capital inflows are often associated with banking crisis in which microeconomic distortions come into play as well. These distortions include government implicit and explicit guarantees not only to banks but also to international creditors in a weakly supervised and regulated financial system. In addition, fixed exchange rate policy creates a bias in the direction of short – term foreign currency debt (Allen et al. (2002)). Therefore, banks willingly exposed themselves to currency risk by borrowing in foreign currency and lending in domestic currency due to high profitability of this act in the presence of government guarantees. Afterwards, if devaluation occurs, banks prefer to repudiate their foreign currency liabilities and to go bankrupt. Consequently, potential liabilities of the government turn into real and bring huge fiscal costs with it. These developments undermine the confidence towards the economy and resultant capital outflows lead to banking and currency run crisis (twin crisis) to be seen at the same time (Burnside et al. (2003)).

The mechanism of how devaluations in developing countries have contractionary effects on the economy has already been discussed by Frankel (2005) emphasizing balance sheet effects.¹³ For him, the resulting downturn is not rooted in the pass – through effect from the exchange rate to prices of vital imported goods, because the pass – through coefficient has lost its significance in the 1990’s. Instead, large amounts of debts denominated in foreign currency on the balance sheets of domestic banks and firms cast doubts on how they will service their debt if the exchange rate goes up sharply. Bebczuk et al. (2006) analyze contractionary devaluation hypothesis as opposed to standard Mundell – Fleming models with a large sample of both industrial and developing countries. They find out that the expansionary effect of devaluations diminishes as external dollarization rises. As for most of the developing countries with domestic liability dollarization, contractionary

¹³ In theory, it is expected that devaluation by increasing the competitiveness of tradable goods leads to enhance production and net exports, thereby to raise the growth rate which is quoted in the story of “singing in the bath” of British Chancellor after devaluation of the pound. However, the story works the other way around in developing countries due to their substantial differences already mentioned. Increasing the interest rates in order to avoid capital flight and to defend the currency is not convenient as opposed to the case in the Mundell – Fleming model, because rising interest rates are evaluated as a higher probability of default by foreign investors. (Frankel (2005))

effect dominates the expansionary effect of exchange rate depreciations. Furthermore, they indicate that the adjustment following real exchange rate devaluations comes through investment rather than consumption at the macroeconomic level.

On the other hand, Kesriyeli et al. (2005) emphasize that incomes and expenditures of economic agents are not insensitive to real exchange rate changes which can be observed through the currency composition of their balance sheets at microeconomic level. Following the Mundell – Fleming tradition, real exchange rate depreciations through increasing the net export component of gross domestic product become expansionary in a conventional open economy structure, because this will increase the competitiveness of tradable firms. As a result of improving financial positions, firms tend to invest more in the exporting sector. On the other hand, firms facing with credit constraints prefer to borrow in foreign currency accompanied by moral hazard constituent. Then, economic agents with unhedged financial positions are negatively affected by a sharp depreciation which undermines their net worth and make way for massive bankruptcies. Moreover, if banking sector is exposed to currency risk, then currency depreciation cause significant losses also for banks which further deteriorates the borrowing capacity of the corporate sector and constitutes an impediment to the investment expenditures of firms. Therefore, currency depreciation can also be contractionary. (Aghion, Bacchetta and Banerjee (2004)) At the end, which one of these mechanisms dominates the overall impact of real exchange rate depreciations remains an empirical issue and critically depends on the microeconomic factors such as firm and industry level characteristics and macroeconomic factors of stability and the prevailing exchange rate regime (Kesriyeli et al. (2005)).

Bleakley and Cowan (2002) investigate micro evidence about contractionary outcomes of the net worth effect by considering over 450 non-financial firms in some Latin American countries over the 1991-1999 period. Nevertheless, their results do not support a negative balance sheet effect as firms tend to weather an exchange rate shock by generating solid income streams through their rising competitiveness that exceed more than their inflated domestic currency values of dollar denominated debt.

On the other hand, Galindo et al. (2003) take the results provided by Bleakley and Covan (2002) with a pinch of salt since around half of the observations are derived from Brazil where there is a limited level of dollarization in the corporate sector under legal restrictions (Kesriyeli et al. (2005)). In parallel with the arguments of Bleakley and Covan (2002), Luengnaruemitchai (2003) finds a limited balance sheet effect for the Asian non-financial firms following currency depreciation as firms in the exporting sector tend to match their foreign currency debt with their foreign currency revenues.

Calvo, Izquierdo and Mejia (2004) portray developing countries such that they are often subject to sudden stops in capital flows associated with large exchange rate fluctuations. More importantly, sudden stops affect these countries in bunches, meaning that international investors evaluate these countries together which are different in many respects such as economic structures, fiscal stance and monetary and exchange rate arrangements. However, Calvo et al. (2004) notice that there are common peculiarities of these countries that causes fundamental weaknesses in their economic structures. They find out that holding a sizable amount of dollar liabilities in their financial structure and a high level of current account deficit coupled with limited supply of tradable goods are key determinants that heighten the risk of a speculative attack to foreign currency and trigger sudden stops in capital flows towards these countries. IADB (2005) also confirms that high dollarization causes a dramatic increase in the probability of a sudden stop when it is combined with a low ratio of the supply of tradable goods to the absorption of tradables. According to Calvo et al. (2004), since countries are tested by foreign creditors in bunches, it is suggested that domestic policies in order to reduce balance sheet vulnerabilities should be taken into consideration.

To sum up, as Bordo (2006) states, externally driven sudden stops are part of the landscape of financial globalization in historical perspective and history is replete with currency and banking crises experiences of emerging market economies at which similar factors like original sin, the degree of liability dollarization, currency mismatches and unsound macroeconomic policies work together. Having said that limiting mismatches by backing hard currency total debt with foreign reserves and

having a large exporting sector matter in reducing costs of economic crisis, it cannot be evaluated as a substitute for sound monetary and fiscal policies in decreasing the incidence of sudden stops of capital inflows and financial crisis.

III.II.III Macroeconomic Policy Management under Financial Dollarization

Although, one can reach broad range of literature about financial dollarization that elaborates its theoretical foundations and implications in the economy through various channels, there are in fact not as much studies that analyse empirically the effects of financial dollarization on main macroeconomic indicators such as output, inflation, their respective volatilities and employment. In this subsection, consolidated form of these few works are presented with their empirical results so as to give an insight about macroeconomic performance of countries under dollarization. Furthermore, as we have already dealt with the conduct of monetary policy above, we focus more on the macroeconomic policy management and macroeconomic stabilization efforts in the context of policy responses to exogenous shocks. In the meantime, it can be argued that the prevailing exchange rate regime and the scope of dollarization are important determinants which in turn influence overall macroeconomic performance of a country.

There are various channels that link financial dollarization with the growth rate of output and its volatility. For example, financial dollarization may constitute an impediment to insouciantly benefit from real exchange rate depreciations as a shield against adverse real economic shocks. Therefore, relatively more dollarized countries are expected to exhibit more cyclical volatility. In addition, as mentioned above, it is argued that more dollarized economies owing to their vulnerability to currency depreciations are prone to sudden stops of capital inflows and associated currency and banking crises. Considerable period of economic expansion can be followed by the episode of capital flight as a response to increasing risks accumulated in the economy which result in reducing the average rate of economic growth and add to output volatility. Hence, the so called boom and bust cycles can be more pronounced in dollarized economies. In the meantime, the relation between

financial dollarization and the long-run growth rates seem to be less transparent, because adverse real effects of an economic crisis may endure for a considerable time (Levy Yeyati (2006)).

The data covering a large sample of industrial and developing countries provided by Levy Yeyati (2006) for the period 1990-2001, yield that countries having low levels of deposit dollarization in their financial systems display significantly faster and more stable growth rates than highly dollarized economies. Levy Yeyati (2006) also research the link between external or offshore dollarization (measured as the ratio of foreign currency denominated debt over national income) and output volatility as depreciations undermine the pay off capacity of local debtors including the public sector. The results show that the scope of external dollarization in developing countries rather than industrial economies is positively and significantly correlated with output volatility. Finally, although there is a negative relation between average growth rates and average deposit/onshore dollarization, respective link turns out to be positive but becomes insignificant when external dollarization is taken into account. This is attributed to the facts that all of the external debt of developing countries denominated in foreign currency and secondly, achieving faster growth rates enable these countries easily to access international bond markets which stimulate their domestic investment and output (Levy Yeyati (2006)).

The trend of financial dollarization in an economy by its nature is highly correlated with flows of international capital, where procyclical movements of capital flows with financial dollarization process present another drawback in macroeconomic management. When capital inflows towards emerging markets take place with lower costs following benign risk perceptions, there seems an inclination of financial assets to be dollarized because of insufficient depth of long-term markets. Hence, financial dollarization helps credit expansion during good times. On the other hand, as risk appetite of international investors diminishes, they return to their safe heaven markets and leave the country in trouble by requiring financial markets to offer higher interest rates. In turn, this procyclical behavior of international funds magnifies the impact of external shocks and complicates to

implement countercyclical macroeconomic policies with respect to the whims of international capital markets. Therefore, a country aiming to benefit fully from financial globalization but having fragility due to financial dollarization should deepen her domestic currency markets (Levy Yeyati (2003a)).

On the inflation front, Reinhart et al. (2003) find out that average inflation and its volatility tend to be greater in highly dollarized economies regarding whole of the sample for the 1980-2001 period. They attribute this empirical result to the “hysteresis” or “ratched” effect of dollarization which stems from a country’s high inflation history. Hence, monetary policy credibility of a country is remarked as an important determinant to achieve disinflation together with low levels of dollarization. Finally, following the empirical findings of Levy Yeyati (2006), data confirms that as financial dollarization deepens, inflation rate becomes more responsive to monetary expansion or to the changes in the exchange rate. Empirical evidence through impulse responses of inflation to exchange rate variations presented also by Plata and Herrero (2008) who indicate that pass – through effect in highly dollarized economies is observed to be persistent and pronounced, because the volatility of exchange rate tends to be greater. These results manifest why central banks in economies with a high pass – through coefficients are intolerant to large swings in the exchange rate.

By looking into highly dollarized Peruvian economy for the period 1995-2004, Bigio and Salas (2005) show that the real exchange rate shocks have non – linear effects on output and inflation. According to their results, depreciations exacerbate economic downturns through the balance sheet effect, while appreciations strengthen economic expansion through the same way. In addition to this, they indicate that inflation response to a real exchange rate shock seems to be more powerful during economic expansions through superior pass – through coefficient.

Guidotti, Sturzenegger and Villar (2004) study the developments of output growth and foreign trade regarding a number of developing countries in Asia and Latin America in the aftermath of sudden stops of international capital inflows. According to them, while the degree of openness and floating rates are conducive to

a better output recovery, liability dollarization hinders economic recovery after a sudden stop in capital inflows. Furthermore, they reveal that the contribution of exports under liability dollarization significantly lowers over the first two years following a sudden stop which also adds to the worsening of recovery period. This evidence is interesting in the sense that the exporting sectors can also display balance sheet fragility under dollarization which offers to reconsider the presumptions about these sectors already being hedged. Furthermore, Gruben and Welch (2001) indicate that among other precautions taken towards Brazilian devaluation in 1999, hedging foreign liabilities of the private sector in advance avoided a banking crisis following a currency crisis as opposed to other Latin American and Asian countries. Moreover, as stated by Obstfeld (2004), limited extent of liability dollarization in Brazil enables its central bank comfortably to devalue the domestic currency “real”, which facilitated a rapid turnaround of the Brazilian economy.

Arias (2005) clarifies the link between “fear of floating” and liability dollarization in the sense that financial dollarization prevents to implement counter – cyclical policies. In a country where the public debt or liabilities of different economic agents are highly dollarized, allowing real exchange rate depreciation in order to promote the recovery of the economy cannot be considered as a feasible option by the authorities. Moreover, in extreme cases where a real exchange rate depreciation increases the risk of insolvency and triggers a financial crisis, then the optimal policy may become even pro-cyclical.

Hausmann, Panizza and Stein (2001) try to explore the potential reasons why countries having flexible exchange rate systems display different responses to exchange rate volatility to large extent. By taking the level of international reserves and the tolerance on interest rates of developed and emerging market economies into consideration, they show that G-3 countries (United States of America, Euro Area and Japan) exhibit more tolerance to exchange rate movements, although these countries have relatively low levels of international reserves. On the other hand, emerging market economies suffering particularly from original sin of international financial architecture and subject to a wide scope of liability dollarization accumulate a large amount of foreign liabilities which make them vulnerable to the movements

of the exchange rate to a large extent. Therefore, these countries do not tend to display a benign neglect of high exchange rate volatility. This is why their exchange rate policy including the interventions with international reserves and interest rates is specified as “dirty float” in the literature.

According to Obstfeld (2004), there are indeed very few emerging markets (such as Chile) that can afford a fully-fledged floating exchange rate arrangement. Smoothing volatility of the exchange rate without losing the track of its long-term trends related to competitiveness seems a general practice among these countries. While too much focus on limiting exchange rate movements increases the risk of a speculative attack to foreign currency, full flexibility generates excessive volatility problem of the exchange rate and makes dollarization related financial vulnerabilities visible. Therefore, emerging market economies are obliged to maintain a delicate balance in their exchange rate regimes regarding this tradeoff.

Céspedes, Chang and Velasco (2000) show that the lesser the extent of liability dollarization, the weaker the link between real exchange rate fluctuation and financial vulnerability. According to them, the effects of an adverse foreign shock are magnified depending on the level of dollarized debt. Taking this fragility aspect into account, they compare the performance of fixed versus flexible exchange rate regimes in the presence of liability dollarization. Accordingly, they conclude that flexible exchange rates are better in terms of absorbing real shocks, because expected real depreciations are higher under the fixed rates after the initial period which leads to aggravate the damaging impact on investment and the levels of output and employment.

Regardless of the exchange rate regime in the country, the existence of dollarization associated by large currency mismatches constitutes an inherent weakness for the whole economic structure. Arias and Talvi (1999) point out that the adjustment decision of governments to a deflationary shock in the countries with some form of currency peg to the U.S. dollar will be completely changed under liability dollarization due to its contractionary effects through the balance sheets

fragilities.¹⁴ In order to accommodate this type of a shock, the governments will choose to devalue rather than the price deflation option only after assuring that the degree of dollarization of corporate debt is low.

III.III The Road to Financial Dedollarization

Due to its major drawbacks in macroeconomic policy implementation and a growing consensus that it is a source of financial fragility which can lead to severe crisis under external shocks, the debate centered on how to overcome the risks relating to financial dollarization.

Dedollarizing an economy is evaluated as a daunting process. This is why such a task is not determined as a policy objective; instead dedollarization in an economy is realized as a positive externality emerging from persistent disinflation and stabilization efforts. For Galindo and Leiderman (2005), it is not surprising to see that there is only a few countries which can sustain dedollarization in both their financial and public sectors. Moreover, according to Levy Yeyati (2003), following this strategy is not without its costs and can outpace the gains related to soundness of financial system in the long run. Financial dollarization process goes hand in hand with deepening of financial markets and attempts to reverse this trend may end up with serious disintermediation.

On the other hand, attempts to restrict the foreign currency assets by regulations can cause another problem in the balance sheets of the financial system, namely maturity mismatch, as the confidence to domestic currency is weakened and depending on this, residents favor to hold much of their local currency assets with a shorter maturity. Another shortcoming of banning financial dollarization lies in financial contracts that are frequently repriced depending on increasing volatility of interest rates. Besides, investors can circumvent these restrictions by opening off – shore accounts which adds to already faint state of financial intermediation (Levy Yeyati (2003)). IADB (2005) also points out that the severity of financial

¹⁴ Appreciation of dollar results in a deflationary shock in a country whose currency is pegged to US dollar. Hence, the required adjustment can be maintained through either a nominal devaluation or a deflation.

dollarization can be missed when respective measures do not include offshore dollar financial assets which constitute a substantial share of investors' portfolios especially in Latin American countries. Moreover, this situation is resulted from the policy makers' attempts to reduce dollarization level by regulations which lead to increase in offshore accounts and smaller domestic financial systems.

As stated by Arias (2005), optimists about dedollarization strategies point out that previous attempt to dedollarize an economy had been carried out under very adverse conditions and were subject to credibility of shock treatment policies. However, a low inflationary environment and a contributing credibility factor of implementing IT policy in Latin America constitute an absolute break from the past and will not turn dedollarization strategies into preceding fiascos.

Taking all aspects for (de)dollarization into account, recent efforts for dedollarization strategies inclined to undertake a more active stance rather than a passive attitude of "learning to live with it" type approach to combat with dollarization. Accordingly, Levy Yeyati (2003b, p.17) highlights two fronts for the efforts towards the dedollarization policies. One of the roots that cause excessive dollarization lies in mispricing of risk which necessitates *"the revision and adaptation of existing prudential regulation, in a way that eliminates distortions that hamper the use of the local currency for financial transactions minimizing the costs in terms of financial disintermediation or distortions elsewhere."* On the other hand, the second pillar is put forward in order to strengthen the effectiveness of the former and to sustain low level of dollarization permanently. Again for this purpose, Yeyati (2003b, p.17-18) stated the necessity of *"the design of local currency instruments so as to create and enhance the local currency substitutes for dollar assets, and the development of (mainly domestic) markets for these instruments."*

Levy Yeyati (2003b) resembles the first approach relating to prudential regulations to a "stick". Standart prudential efforts address currency imbalances in the financial sector where the open positions are strictly limited through the regulations. However, prudential regulations should address the incentives that lead to foreign currency intermediation in the economy. For example, deposit insurance

schemes regardless of the currency denomination can lead the investors to hold more deposits denominated in dollars. Therefore, this inclination should be avoided by requiring banks to contribute higher premiums for dollar deposits. Alternatively, insurance amount may be restricted to an amount denominated in local currency for both type of deposits.

Levy Yeyati (2003b) also suggests additional measures for the real sector in order to eliminate dollarization bias. Accordingly, the cost of access to financing by nontradable sectors or non-dollar earners in general should be raised up until it will not be prohibitively costly. Then, exporting sectors are allowed to benefit from low cost dollar financing freed from other users. Furthermore, exchange rate related credit risk can also be reflected on capital adequacy ratios which require banks to implement higher risk weights for dollar loans to non-dollar earners. Hence, it will be useful for banks to increase their provisioning ratios for dollar loans in general.

Although prudential regulations are designed to eliminate the inclination towards dollarization, they may not be sufficient if there is a perception of implicit guarantees that can lead to underestimation of exchange rate risk. This concern is related with the time inconsistency argument of government which is expected to intervene following a sudden depreciation. Therefore, when market-based measures that induce local currency intermediation (for example, tax like measures proportional to risk weights such as higher liquidity requirements and larger bank contributions to insurance fund) may proved to be ineffective, strict quantitative limits to determine maximum loan dollarization ratios should be taken into consideration. Therefore, exchange rate related credit risk in financially dollarized economies requires any safety net whose value should be set higher for dollar instruments. All in all, with prudential norms, it has to be achieved that relatively inexpensive dollar funding can be weighed against the risk exposure coming from a financial distress. Prudential norms should make this trade-off more visible to economic agents in order to influence their ultimate decisions (Levy Yeyati (2003b)).

According to Kokenyne et al. (2010), regardless the choice of dedollarization attempts, the policy formulated usually should combine both microeconomic and

macroeconomic measures that can attract use of a local currency versus a foreign currency. After the first step of sustaining macroeconomic stabilization focusing on reducing the level of inflation permanently, market-based measures should be taken into consideration which can provide incentives to domestic currency intermediation. According to the authors, exchange rate regimes, monetary and fiscal policies, public debt management, financial market developments and prudential regulations on financial system can be regarded as main pillars of market-based dedollarization policies. In some cases, the use of dollar can be so entrenched that the appeal to forced dedollarization may become inevitable. For example, suspending access to foreign currency deposits (FCD) and mandatory conversion of FCDs, compulsory holding period for FCDs, interest rate control on FCDs and capital controls are measures that interfere private contracts and revert dollarization abruptly. However, pursuing such an approach is not without cost as they cause massive disintermediation followed by capital flight and undermine the credibility of economic policies in general. Therefore, implementation of these measures must be regarded temporary and accompanied with strong macroeconomic stabilization plan (Kokenyne et al. (2010)).

Flexible exchange rate regimes are proved to be superior than fixed exchange rate regimes on the way to dedollarization. For instance, Claessens, Klingebiel and Schmukler (2007) state that flexible exchange rate regimes are conducive to domestic currency intermediation through affecting the risk taking incentive of economic agents. On the other hand, fixed exchange rate regimes rule out the conduct of independent monetary policy which makes it difficult to mitigate risks to financial stability. Also, sustainability concerns towards the peg pose a threat to dedollarization process. While devaluation expectations give rise to foreign currency deposits, expectations of intervention create moral hazard so as to induce financial intermediation in foreign currency. Apart from this, efficient liquidity management by the central bank through the management of reserve requirements and open market operations are useful to satisfy stable short-term interest rates which make local currency more attractive. Besides, declines in the level of public sector borrowing requirement can directly reduce the appeal to foreign currency borrowing

on the one hand and can be conducive to decrease the interest rate differential between domestic and foreign currency on the other.

Following the arguments of Levy Yeyati (2003), developing local currency instruments that are made attractive to both savers and borrowers are particularly important in order to compensate underfinancing of the non-tradables sectors in the economy. These efforts are denoted by Levy Yeyati (2003) as the “carrot” approach. For instance, Kokenyne et al. (2010) also suggest that developing a deep and liquid bond market offering different kinds of alternative local currency denominated financial assets can contribute to decrease the incentive for holding dollar denominated instruments. Moreover, active public debt management aiming at issuing local currency debt instruments together with development of domestic financial markets, as stated above is likely to support the demand for domestic currency instruments. Also, pension funds can be encouraged to enhance domestic investor base to sustain the demand for investing in longer-term local currency financial instruments. Even there are sufficient flexible alternative instruments to foreign currency assets; the problem associated with confidence cannot be often overcome. Therefore, it requires a credible indexation of the local currency instruments to local inflation.¹⁵ However, this method should be pursued with care of current country specific conditions in order not to cause inflation inertia.¹⁶ According to Levy Yeyati (2003) and Yılmaz (2005), effectiveness of indexation can be achieved by aiming at limiting the temptation of government to inflate on the one hand and carrying a coherent and consistent monetary policy on the other. Therefore, the credibility of fiscal and monetary policy is essential for indexation to be successful.

A more competitive domestic financial system that is free from administrative controls on interest rates are conducive to make local currency instruments attractive,

¹⁵ Indexation can also serve to increase the average maturity of domestic deposits in case of concerns about the confidence (Yeyati (2003)).

¹⁶ Country experience indicates that indexation enduring unnecessarily can complicate macroeconomic management by creating rigidities in monetary transmission mechanism. (Kokenyne et al. (2010)).

because they can offer a higher real interest rate than does the financial assets denominated in a foreign currency. However, if we are dealing with developing the financial system as a whole, one should also take the derivative markets into consideration besides indexed or non-indexed local currency deposits and loans. These markets can serve as a practical instrument to hedge currency risk without letting firms tend to increase large amount of dollar holdings. Therefore, deep forward markets and specialized financial institutions in this respect should be developed and promoted especially in emerging market economies which are vulnerable exchange rate changes under partial dollarization. (Levy Yeyati (2003b))

Licandro and Licandro (2003) admit that creating an alternative for economic agents in order to hedge their exchange rate risk in their portfolios is necessary in order to reduce financial vulnerabilities under partial dollarization. Accordingly, they base dedollarization strategies suggested for Uruguay on two pillars. These are namely “*strengthening of the safety net of the financial system*” and “*recreation of domestic currency asset markets.*” (Licandro and Licandro (2003), p.21-22) The former is related with what is known as prudential regulation specified by Levy Yeyati (2003b). According to them, measures taken against solvency and liquidity requirements can reduce the vulnerability of the financial system even in the case that dollarization is not reduced significantly.

Regarding the second pillar which is assumed to strengthen the effects of the prudential regulations and to sustain the dedollarization process, they suggest the elimination of the commitment to an exchange rate and thereafter focusing on having a stable inflation. In parallel to these efforts, it is necessary to develop financial markets in which local currency constitutes a basis for the future credit system. For this purpose, the government and publicly owned banks should take an active part to issue inflation indexed bonds which can be purchased by the private sector as an opportunity to deepen the local currency market. So, CPI indexed instruments for public debts, mortgage markets and future markets in general are suggested as useful to sustain the development of domestic currency markets.

To sum up, it can be argued that any prudential regulation which does not help to internalize the exchange rate risk or fail to induce local currency usage, can pave way to dollarization again. With this in mind, any dedollarization strategy must be complemented with market based strategies that enhance the attractiveness of the local currency at the same time or even before the implementation of prudential norms. In turn, the success of dedollarization strategies depends on the capability of these measures to orient savings into local currency instruments. Country experiences justify that dedollarization strategies consisting of “*stick*” and “*carrot*” approaches should be followed in parallel with maintaining macroeconomic stability. In addition to this, effective supervision of financial sector can help to internalize the risks of foreign exchange transaction. These components can be considered as the key ingredients to endure dedollarization process in the economies. (Levy Yeyati 2003b, Kokenyne et al. 2010)

CHAPTER IV

THE DRIVERS OF DOLLARIZATION

In the literature, there are a number of theories explaining the roots that give rise to dollarization. These are currency substitution view, the time inconsistency argument and the institutional view, the market failure view and the portfolio view in retrospect.

IV.I Currency Substitution View and Inflation

Early theories of the dollarization phenomenon are based on “currency substitution view”. The degree of currency substitution is estimated by the ratio of nominal balances of domestic and foreign currencies in balance sheets which depend on the nominal interest rates in each currency. According to this view, the demand for domestic currency and the rate of inflation are negatively correlated and there exists a relation between nominal instability and the choice of the currency as a unit of account. In this regard, as economic agents begin to perceive the stability of the local currency as a matter of concern, they will shift their currency preference to dollars as a unit of account. The memory of long-lasting inflationary episodes in the country with imprudent monetary management over the years is considered to cause currency substitution. However, historical evidence revealed that currency substitution was not a widespread phenomenon even in Latin American countries that displayed high levels of financial dollarization but wages and most of the transactions were denominated in domestic currency (Levy Yeyati (2006), Levy Yeyati (2003)).

Furthermore, this view is fiercely challenged by the experience of marked declines in the rates of inflation in the 1990’s, though dollarization phenomenon continued its persistence among several developing economies (Levy Yeyati (2006)). This persistent nature of dollarization is tried to be explained by some authors who

link this phenomenon to the response of past episodes of inflation and macroeconomic mismanagement. As such, Savastano (1996) already points at recurrent inflationary episodes in Latin American countries which lead to protracted dollarization pattern. Moreover, Guidotti and Rodriguez (1992) put forward that the level of inflation causing high nominal instabilities lies in the roots of dollarization in Latin America. Accordingly, they assert that in domestic country even lower inflation rates than that of dollars are required in order to reverse the ongoing dollarization process. On this account, dollarization is evaluated by this view as a reflection of past inflation memories rather than current inflation. Parallel to this, it is argued that long lasting appreciation periods are required in order to reduce the extent of dollarization (Levy Yeyati (2006)).

IV.II The Time Inconsistency Argument and the Institutional View

Relevancy of the “time inconsistency” argument in explaining financial dollarization is based on the fact that borrowing instruments denominated in domestic currency suffer from the government’s temptation to inflate away the real burden of domestic debt. The lack of credible commitment to low inflation induces economic agents to demand higher nominal interest rates on local currency instruments which results from anticipation of inflation bias. Then, this anticipation makes local currency denominated debt costly to service and to become unsustainable at the end. Also, poor track record of the government leads to self-fulfilling expectations which cause high interest rates, high inflation bias and high probability of repudiation vicious circle. If the government cares about low levels of inflation much more than the concerns related to real exchange rate exposure, then public debt dollarization becomes a deliberate decision of the government to avoid inflation bias (Levy Yeyati (2003)). Furthermore, according to the institutional view, “currency-blind” regulations which constitute a bias towards dollarization may be a deliberate choice of the government. By increasing the cost of devaluation through dollar-friendly regulations, a government can build a confidence to an exchange rate anchor. Therefore, dollarization bias can be viewed as the result of low institutional credibility, as well (Levy Yeyati (2006)).

While time inconsistency argument for dollarization is related to the public sector balance sheet, its relevance for the private sector financial dollarization relies on convincing the private sector about the government's commitment to low inflation. Accordingly, high fiscal cost of devaluation can serve as a guarantee for economic agents who perceive that inflationary policies such as monetization of public debt will not be pursued. Therefore, dollarization in the public sector may be conducive to private sector dedollarization, as transactions in local currency again become attractive by increasing confidence to its perceived stability (Levy Yeyati (2003)).

Honig (2006) argues that dollarization arises from a response to “*myopic governments*” in pursue of re-election. They prefer to set lower interest rates in order to spur growth rates with palliative measures which in turn endanger long run stability of domestic currency. Respective treatments of the governments on the way to economic crisis are illustrated by Frankel (2005) who states that policy makers typically prefer to postpone the adjustment and insist on targeting the exchange rate, because they hope that favorable conditions in the economy will endure and add to their political viability. Unless the required measures taken to avoid the shortening of maturity of the debt both in local and foreign currency, the continuity of borrowing in dollars and running down of official reserves following balance of payments deficit will facilitate self-fulfilling expectations in the course of time with a costly economic crisis. Then, transparent and accountable implementation of sound macroeconomic management in any case seems to be vital in order to reverse dollarization process.

IV.III The Market Failure View

Another group of theories ascertaining dollarization concentrate on the “market failure view” in which market imperfections, externalities and insufficient regulations are embodied. According to this view, “*dollarization is a market response to suboptimal market, legal or regulatory asymmetries that favor the dollar*” (Ize and Levy Yeyati (2005, p.13)). This approach focuses on the decisions of risk-neutral agents in the presence of default risk when different kinds of

imperfections are at play. Hence, the bias towards dollars is derived from two facts: First one is that the default risk moves in line with the real exchange rate changes and second one is the existence of the information asymmetry on the risk taken by the borrower regarding his/her choice of currency composition. This market imperfection is strengthened by the following situations: Firstly, the creditor cannot adjust the interest rates according to risk depending on the debtor's currency composition. Next, the costs associated with the debtor's bankruptcy are distributed proportionally among creditors. Also intuitively, in the case of the borrower's default, dollar creditors attain a higher gain than domestic currency lenders due to the fact that a higher exchange rate dilutes the real return of the domestic credit (Levy Yeyati (2006)).

Taking all of the above arguments into account, it is specified that banks tend to take the devaluation risk to a large extent for granted and reduce the interest rate spread between two currencies for credit expansion which makes borrowing in foreign currency relatively attractive. Therefore, the borrower having limited liability prefers to be funded in dollars because of its low cost relative to the local currency. In parallel to this case, a uniform creditor guarantee which paves the way to recover a failed investment can increase the benefits of dollar lending in default cases and leads to a rise in the opportunity cost of local currency intermediation in non-default cases. Hence, the removal of creditor guarantees helps to undermine the inclination towards dollarization. A scheme of full deposit insurance can reiterate a similar argument. If dollar depositors are provided with a protection against exchange rate risks, the deposit insurance agency which does not appropriately internalize this default risk in the insurance premium fosters dollarization bias. In building financial safety nets such as deposit insurance, creditor guarantee or lender of last resort policies, an appeal to this kind of "currency-blind" approach in the regulations leads to mispricing of risk and causes market imperfections eventually (Levy Yeyati (2006), Levy Yeyati (2003)).

Reflecting the currency risk fully into aforementioned premiums may not be sufficient to reverse this trend just because of the time inconsistency argument for the government, stated above. That is the government is expected not to allow massive

bankruptcies and cause a systemic financial crisis in the case of large devaluations. Actually, the government evaluates the situation ex-post as optimal to intervene in the financial markets even under flexible exchange rate regimes and realizes bail-outs in order to avoid a substantial social cost. However, debtors also anticipate this incentive of the government and price the exchange rate risk accordingly. This market imperfection referred as “too many to fail” label and fuelled by the implicit borrower guarantee leads to deepen again the incentive for dollarization (Levy Yeyati (2003)).

The existence of “non-linear liquidation costs” between domestic and foreign currency intermediation is also considered as one of the market imperfections that paves the way to financial dollarization. This differentiated cost between currencies arises from bankruptcy procedures, confiscation risk, corruptible judges, inadequate regulations and any factors that undermine the creditors’ claim. In this case, allocation of currency composition is optimized through the minimization of probability of default so as to avoid facing liquidation cost. In a pegged exchange rate regime, the case of large devaluation is assigned a small probability. However, this threat is conducive to widen local and foreign currency spread up to a level where the default risk of domestic currency borrower from high interest rates exceeds the risk of a dollar borrower only in a devaluation scenario. Hence, in the borrowers’ context, this chance is worth trying which eventually ends up with dollar financing (Levy Yeyati (2006)).

IV.IV Financial Dollarization as a Reflection of Financial Equilibrium: The Portfolio View

Although there is a general presumption that dollarization restrains macroeconomic policy implementation through monetary and exchange rate policies, there should be a theory also to shed light on how to use these macroeconomic policy tools in an effort to alter the dollarization process. In this subsection, we elaborate on Ize and Levy Yeyati (2003) in order to find out convincing reasons about why financial dollarization displays persistence even after price stabilization has been achieved in most of the emerging market economies.

As explained in chapter II, currency substitution results from the difference of expected nominal returns between alternative currencies. Therefore, the focal point is on the link between the inflation level and financial dollarization with the assumption that dollarization should disappear as price stability has been achieved. However, one should note that the interest bearing financial assets generally account for the bulk of dollarization phenomenon. Unlike in the case of the currency substitution, here we take the expected real returns of interest bearing financial assets into consideration as a determinant of dollarization. Hence, there is no theoretical reason to expect that currency choice of the portfolio is influenced by the inflation level as nominal interest rates adjust to leave the ex-ante real interest rate of respective financial assets intact (Ize and Levy Yeyati (2003)). It means that financial dollarization of the portfolio view is immune to systematic differences in rates of returns through elimination of arbitrage opportunity between financial assets (Ize and Levy Yeyati (2005)).

According to the portfolio view, financial dollarization is emanated from the risk differences between alternative currency denominations of respective assets. Therefore, currency risk brings about uncertainty in real returns which can be seen as the main starting assumption of the portfolio paradigm. Then, the portfolio choice of currency denomination is responsive to probability distribution of real returns in each currency. Since, the focus of the study is financial assets only and not real dollarization, this paradigm can also be referred to as “Capital Asset Pricing Model (CAPM).” Under a CAPM model, risk averse creditors and borrowers both optimize their currency composition of loan contracts depending on the risk and the return profile of their portfolio in units of the local consumption basket. Therefore, financial dollarization can be regarded as an outcome of a financial equilibrium where risk averse agents choose a currency composition that optimizes the risk return profile of their portfolio in terms of the units of the local consumption basket. The last sentence reveals that there is an implicit assumption in the portfolio argument which is the presence of both internal and external markets in the model. In other words, for a given risk and return characteristics of financial assets, resident investors would rather to hold local currency denominated financial instruments as these assets reflect

their future income stream more closely in terms of their local consumption expenditures.

On the other hand, off-shore or cross-border deposits held by the local investors cannot be comparable to foreign currency deposits in local banks in that the appeal to the former stems from all sources of risk that are not precisely macroeconomic by nature. Underlying risks that are internalized by deposits held abroad can be banking system risk as well as confiscation risk. Moreover, foreign currency denominated loans or deposits can be regarded as imperfect substitutes for home currency deposits or loans due to foreign exchange rate risk. All of these different risk considerations become to be significant determinants in the expressions of the real returns.

According to the definition of the CAPM model, the financial equilibrium in the market occurs by the interaction between depositors and borrowers in the loanable funds market where hedging needs against inflation and foreign exchange risk on the financial contracts determine the optimal currency composition. Unlike earlier literature, currency composition of portfolio is determined on both sides of a bank's balance sheet through the interaction of participants in the loanable funds market. Then, deposit and loan dollarization ratios are the outcomes of financial equilibria where they gravitate around interest rate parity and minimum variance portfolio (MVP) allocations.

Beginning with the depositors' financial equilibria in terms of the interest rate differentials and the foreign currency share of their portfolio, Ize and Levy Yeyati (2003) assume that there are three kinds of assets available to depositors. These are home currency deposits held domestically (HCD), foreign currency deposits held domestically (FCD) and cross-border foreign currency deposits (CBD). Respective real returns of these assets in terms of domestic consumer price index are denoted as R_h , R_f and R_c successively. Further, they assume that economic agents do not have cash holdings other than financial assets. Then, the real returns are expressed as follows:

$$R_h = E(R_h) - \mu_\pi + \mu_c \quad [S_{\pi c}] = 0$$

$$R_f = E(R_f) + \mu_s + \mu_c \quad [S_{sc}] = 0$$

$$R_c = E(R_c) + \mu_s$$

where E is the expectation operator. Also, μ_π , μ_c and μ_s are the respective risks corresponding to inflation, country risk and the real exchange rate, having a distribution with zero mean. $[S_{xy}]$ is the variance-covariance matrix with the assumption that the disturbances of real exchange rate and inflation are not correlated with country risk. Then, depositors maximize their preferences represented by U_D :

$$U_D = E(R_D) - c_D \text{Var}(R_D) / 2$$

where R_D corresponds to the depositors' average real return of their portfolio. Var is the variance operator and c_D is specified to reflect risk aversion of the depositors, hence it is greater than zero. Then, the first order condition for a solution to the portfolio selection problem yields the optimal shares of portfolio that maximizes U_D such that:

$$\lambda_D = \lambda^* - \delta_D^I / (c_D V), \quad (\text{IV.IV.I})$$

$$\text{where } V = \text{Var}(R_h - R_f) = S_{\pi\pi} + S_{ss} + 2S_{\pi s}$$

$$\gamma = 1 - \delta^X / (c_D S_{cc})$$

where λ_D is the share of total foreign currency denominated deposits that consists of both FCD and CBD. γ represents the share of cross-border deposits in the portfolio of depositors. Further, δ_D^I and δ^X correspond to expected internal and external deposit rate differentials such that

$$\delta_D^I = E(R_h - R_f) \text{ and}$$

$$\delta^X = E(R_f - R_c)$$

Finally, λ^* represents the foreign currency share of the depositors' minimum variance portfolio allocation which can be specified as a function of the second moments of inflation and the real exchange rate depreciation.

$$\lambda^* = (S_{\pi\pi} + S_{\pi s}) / (S_{\pi\pi} + S_{ss} + 2S_{\pi s}) \quad (\text{IV.IV.II})$$

Following the expression in Ize and Levy Yeyati (2003), λ^* denotes the “MVP dollarization ratio.” From the above equation, one can realize that MVP dollarization rises as the inflation volatility increases and as the volatility of the real exchange rate depreciation decreases, since the volatilities of inflation and real exchange rate depreciations affect the real returns of local currency and foreign currency denominated financial assets successively (Ize and Levy Yeyati (2005)). Therefore, what matters for financial dollarization is that the unexpected variabilities of inflation and the real exchange rate depreciation where the former determines the volatility of real cash flow of home currency denominated assets and the latter accounts for the respective volatility of the foreign currency denominated assets (Levy Yeyati (2003)). Put it differently, also the covariance of inflation and nominal exchange rate over their variances which can be observed from equation (IV.IV.II) can be regarded as a measure of exchange rate pass – through. If we assume perfect pass – through, inflation and nominal exchange rate cancel out each other and leaves the real exchange rate constant. Then, the return of the foreign currency denominated financial assets become risk free which strengthens dollarization bias as it is captured by MVP dollarization ratio. On the contrary, as pass – through effect disappears, then it can be argued that a volatile exchange rate attenuates the attractiveness of foreign currency denominated instruments and a volatile inflation does the same for the home currency financial assets (Ize and Levy Yeyati (2005)).

Furthermore, for a given level of country risk, the preference of the currency denomination is only influenced by foreign exchange rate risk and inflation, though the choice of cross-border deposits depends only on country risk. This follows from the assumption that the variations in the inflation rate and the real exchange rate are uncorrelated with the country risk. Moreover, as country risk induces depositors to flow the funds abroad, δ^X can be considered as the positive risk premium in order to induce depositors to hold foreign currency deposits rather than to hold cross-border deposits.

Now, we can display the borrowers' financial equilibria in general. Borrowers' loan portfolio consists of home currency loans (HCL), foreign currency loans (FCL) and cross-border loans (CBL) if they are intermediated by the domestic banking system. As it is known, because of difficulty to access international capital markets, there is an incomplete arbitrage between cross-border and local foreign currency loans which result in lower interest rates on cross-border loans. Ize and Levy Yeyati (2003) assume that there is no credit risk faced by borrower. Thus, borrowers' optimization problem is only to minimize the cost of borrowing which is adjusted for risk. The portfolio preference of the borrowers resembles to that of the depositors in terms of the structure but with a negative sign in front of the expected real interest payments.

$$U_L = -E(R_L) - c_L \text{Var}(R_L) / 2$$

where R_L represents the real cost of debt service. Borrowers' risk aversion is denoted by c_L . Then, solving the optimization problem of borrowers gives the optimal share of foreign currency denominated loans in their portfolio. Similar to the notations in the depositors' problem, λ_L denotes the dollar share of loan portfolio.

$$\lambda_L = \lambda^* + \delta_L^I / (c_L V), \quad (\text{IV.IV.III})$$

where δ_L^I denotes the differential on the lending rate between local currency and foreign currency:

$$\delta_L^I = E(R_L^H - R_L^F)$$

At the end, we arrive at the financial equilibrium where the optimal portfolio share of currency choice on both sides of domestic banks' balance sheets can be explained by the MVP. If interest rate differentials on deposits and loans are the same, then the equations of (IV.IV.I) and (IV.IV.III) imply that the share of foreign currency denominated loans and deposits should be MVP equilibrium. For instance, beginning from the MVP equilibrium, a decrease in the domestic interest rate differential of the contracts in local and foreign currency attracts home currency loans on the one hand, diminishes the incentive to hold local currency deposits on the

other. By this way, while deposit dollarization ratio goes down to a level below MVP, the share of loan dollarization goes up beyond MVP.

If we assume that there are no open positions in the banking sector and no free movement of capital in the economy, theoretically loans and deposits in the local banking system should exactly be matched. In these circumstances, because of the identical portfolios of depositors and borrowers, MVP equilibrium should be the sole outcome which accounts for all the shares of foreign currency deposit and loan contracts. Moreover, any deviation from this equilibrium can only occur when supply and demand of loanable funds do not overlap.

In practice, MVP framework of financial dollarization is followed by several interesting economic policy implications. First of all, a monetary policy aimed at stabilizing high levels of inflation by fixing the exchange rate may unintendedly reinforced the dollarization bias in the economy. In that sense, the portfolio view brings a new perspective to dollarization hysteresis in the developing world without resorting to network externalities or past inflationary memories. The portfolio view suggests that even when the institutional and macroeconomic structure of a country is improved in such a way that past macroeconomic imbalances has faded away, dollarization bias may endure if the expected volatility of inflation remains relatively higher than that of the real exchange rate.

Secondly, the portfolio view provides an intuition that financial dollarization may be intensified with the degree of openness and the existence of real dollarization, because the relation between inflation and the exchange rate is amplified in such an environment which is reflected by higher exchange rate pass-through eventually. Likewise, Ize and Parrado (2002) state that financial dollarization reflects to some extent the trade structure of the economy. Therefore, the degree of financial dollarization should be expected to be elevated in relatively more open economies with higher inflation volatility. Thirdly, MVP approach provides an explanation to why financial instruments which are indexed to inflation are generally more preferred than foreign currency denominated assets. This is due to

the fact that CPI indexation reduces or eliminates the volatility of real returns of these assets (Ize and Levy Yeyati (2005)).

Finally, the importance of credibility and expectations in explaining financial dollarization is also highlighted by the MVP model. For example, the credibility of the pegged exchange rate regimes determines the currency risk perceived by market participants. If the fixed rate is fully credible, then there is no currency risk and so the dollarization ratio cannot be determined. However, if the credibility to fixed exchange rate begins to erode away, then financial dollarization in the economy can be explained again by the expectations of changes in the inflation rate and the exchange rate depreciation. In addition to this, even if better conduct of the monetary policy implementation is achieved; financial dollarization can exhibit persistence due to inflation and exchange rate volatilities (Ize and Levy Yeyati (2005)).

In recent literature, there is an increasing appeal to benefit from the portfolio view in order to explain dollarization phenomenon regarding emerging market economies. Ize and Levy Yeyati (2003) provide empirical evidence for financial dollarization in five Latin American countries (Argentina, Bolivia, Mexico, Peru and Uruguay) over the period 1990 – 1995. Motivated by the experience of these economies where financial dollarization phenomenon persists together with favorable macroeconomic conditions, they estimate the level of dollarization by approximating it with the MVP approach. When the computed MVP dollarization ratio is put in the regression to explain actual deposit dollarization, the effect of inflation in explaining deposit dollarization decreases significantly which has high explanatory power on its own. Therefore, the empirical evidence indicates that MVP dollarization explains the observed dollarization in these countries to a large extent. Moreover, net foreign assets are found to be significant to cause actual deposit dollarization to exceed MVP. On the other hand, indexed financial instruments are proved to reduce actual deposit dollarization below MVP as these kinds of instruments eliminate currency and country risks.

Several determinants of financial dollarization are tested by Rennhack and Nozaki (2006) regarding a broad regional coverage of developing countries between

1990-2001. Other than the MVP dollarization ratio, they also add central government deficit, inflation, institutional quality and political stability indices and legal restrictions to their specification. According to their results, the MVP dollarization accounts for a significant part of deposit dollarization observed in OECD countries, transition economies, certain countries in Asia and Africa as well as in Latin America in the 1990's. According to their results, the hysteresis in financial dollarization observed in these economies does not have roots in highly inflationary environment of the 1980's, instead economic policies including monetary and exchange rate policies, currency mismatches and financial market imperfections that favor the use of foreign currency are thought to be effective factors in persistence of financial dollarization. According to their findings, adopting flexible exchange rate as a policy and preventing the bias towards depreciation of domestic currency can limit financial dollarization. Also, preserving macroeconomic stability in general and increasing confidence in the home currency with prudential regulations might help to reduce the intensity of dollarization trend.

Basso et al. (2007) develop a model to explain the determinants of loan and deposit dollarization by giving a particular emphasis on foreign banks and interest rates in several transition economies over the period from 2000 to 2006. In line with the arguments of MVP dollarization, inflation volatility rather than real exchange rate variability is found out to be significant in explaining both the level and the change in financial dollarization. Furthermore, they empirically evidence that having a possibility to access to foreign funds which is mainly through the subsidiaries of foreign banks in transition economies intensifies credit dollarization while it reduces deposit dollarization over time.

Castro and Morón (2005) extend the CAPM model to include the credit risk and calibrate a model for the Peruvian economy for the period 1998 – 2004. They link credit risk to unanticipated shock to the real exchange rate which alters the perception about real returns of alternative currency denomination. If the economy with a substantial currency mismatch is extremely vulnerable to even small real depreciation shock, this gives rise to fear of floating among market participants.

Consequently, increasing appeal to foreign currency denominated instruments which serve better for hedging purposes, fuels financial dollarization. On the contrary, alleviation of the size of this fear revert the dollarization process towards the levels consistent with the predictions of MVP framework.

In a different study, Castro and Morón (2003) evaluate alternative policies for dedollarization in the Peruvian economy by emphasizing the portfolio approach. According to their results, based on the comparison between two policy options, prudential regulations aimed at discouraging the tendency towards foreign currency or decreasing the scope of coverage for dollar instruments are demonstrated as having the potential to cause financial disintermediation. On the other hand, decreasing the volatility of inflation relative to real exchange rate consistent with the MVP approach, is found to be effective policy response to financial dollarization.

Metin-Özcan and Us (2007) analyze the Turkish experience of dollarization phenomenon, by putting a particular emphasis on the period after 2001 when the share of foreign currency denominated deposits in broad money began to lose some of its ground. Utilizing vector-autoregressive modeling, they model dollarization in relation to respective volatilities depending on the portfolio view. Accordingly, they reveal that dollarization in the Turkish economy emerges mainly from its own autoregressive component which suggests the inertial nature of dollarization. Besides, the innovations in depreciation volatility and expected depreciation are also found to have significant effects on dollarization that takes a long period to stabilize.

CHAPTER V

EMPIRICAL ANALYSES FOR THE TURKISH ECONOMY

V.I. Data and Methodology:

Our main objective in this study is to analyze the determinants of dollarization and dedollarization trend in the Turkish economy by referring to the portfolio view. Within the MVP framework, we analyze the pattern of financial dollarization and its altering features based on the macroeconomic risk profile of Turkey in the course of history. Therefore, we provide measures for financial dollarization and develop alternative proxies for risk indicators. Then, we proceed with vector autoregressive models (VAR) in order to test the validity of the portfolio view for the Turkish economy. We also draw inferences about the effects of surprise innovations in respective risk indicators on the financial dollarization.

In this paper, we use a data set of monthly observations for the Turkish economy with the longest period coverage as possible. We mainly use publicly available data provided by the CBRT (Central Bank of the Republic of Turkey) – EDDS (Electronic Data Dissemination System), TURKSTAT (Turkish Statistical Institute), SPO (State Planning Organization) and Reuters database.

There are alternative measures of financial dollarization in the literature and the choice among alternative measures is closely related to the specific issue under study. Further, data availability and the period coverage constrain the choice of dollarization measure. For example, Metin-Özcan and Us (2009) define three kinds of source for financial dollarization, namely asset, liability and offshore dollarization. Accordingly; they measure asset dollarization as the share of foreign exchange accounts in broad money and liability dollarization is by the ratio of foreign currency denominated loans to total loans provided by domestic banking system. Finally,

offshore dollarization used as a proxy of external dollarization and is defined as the ratio of cross-border credits borrowed by the domestic banking system to total credits borrowed.

On the other hand; Akıncı, Özer and Usta (2005) develop indicators in order to arrive at the most reasonable estimates of asset and liability dollarization. They specify asset dollarization as the share of non-bank sector's foreign exchange assets in their portfolio. Actually, foreign exchange denominated assets consists of broad range of instruments that have become available in recent years as financial markets in Turkish economy have been enhanced.¹⁷ On the other hand, the degree of liability dollarization is computed by summing up successive ratios which are foreign currency loans over total loans, foreign exchange and foreign exchange indexed domestic debt stock over total domestic debt stock and finally total external debt stock over gross domestic product.

Deposit and loan dollarization are used as proxies of actual dollarization of the financial system in the empirical literature frequently due to convenience in terms of data availability and the period coverage. Levy Yeyati (2006) measures deposit (loan) dollarization ratio as the share of foreign currency denominated deposits (loans) in total deposits (loans). Due to prudential regulations that limit open foreign exchange positions in domestic financial system, deposit dollarization ratio can be treated as a good proxy for loan dollarization ratio as they closely mirror each other.

Finally, IADB (2005) points out the importance of offshore accounts in order to draw attention to the severity of financial dollarization. Cross- border deposits may become very significant for the countries where the policies restrict holding foreign currency assets domestically. Unfortunately, we exclude external deposits from our analyses because of data limitations in terms of period coverage and

¹⁷ One can refer to Akıncı et al. (2005) for alternative financial instruments in the domestic and foreign currency denominated portfolios.

frequency. Instead, we use cross-border loans by referring to the definition provided by Metin-Özcan and Us (2009) as mentioned previously.¹⁸

As we test the validity of MVP framework for the dollarization experience of the Turkish economy, we stick especially to the measure of asset dollarization which accounts for the bulk of dollarization in Turkey. Thereby, we construct deposit dollarization as the ratio of foreign currency accounts (foreign currency denominated deposits) to the total sum of home currency deposits and foreign currency accounts. Our broad data set for deposit dollarization ratio covers the period from January 1986 to February 2011. Home currency deposits and foreign exchange accounts includes both residents' and non-residents' accounts within domestic financial system. In other words, they account for the onshore (domestic) deposit dollarization in Turkey. Furthermore, home currency deposits consist of time deposits, trade associations' deposits, official institutions' deposits, other institutions' deposits, certificates of deposits and interbank deposits.

Furthermore, offshore dollarization is also an important source of dollarization. These accounts are important in the sense that borrowing from abroad by the local banking system can also add to domestic financial dollarization. Therefore, we measure offshore dollarization as the share of foreign credits used by the banking sector in total credits borrowed, as suggested by Metin-Özcan and Us (2009).

Recall that the MVP framework provides a benchmark to explain dollarization as a function of macroeconomic risk and uncertainty. Hence, within the framework of the portfolio view, a representative investor chooses the currency composition of savings so as to minimize the variance of portfolio returns which in turn depend on the respective volatilities of inflation and the real exchange rate.

¹⁸ There have not been any limitations in the opening of foreign currency denominated accounts in Turkey from the beginning of the financial liberalization. Therefore, domestically held foreign currency deposits can be thought as an instrument fulfilling the hedging needs of residents in retrospect. Also, as stated by Ize and Yeyati (2003), the inclination towards cross-border deposits emanated from dollarization motive is only reasonable in case of high level of country risk. Moreover, as legal and institutional financial environment stays the same, analyses of dollarization based on narrower definition will still be valid in a strict sense. (Civcir (2003))

Therefore, we should determine the respective volatilities of inflation and the real exchange rate in order to apply the portfolio view. In addition to this, following the literature, we also take the nominal exchange rate volatility into consideration in our analyses.

According to Poon (2005), one of the ways to calculate volatility is to benefit from the variance or coefficient of variation. However, this type of measures treat volatility as it is constant through time. Moreover, one of the characteristics of financial market volatilities is the changing nature of the fluctuations. Therefore, as introduced by Engle (1982), we benefit from autoregressive conditional heteroscedasticity (ARCH) models in order to model and estimate time-varying conditional volatilities. As Poon (2005) indicates, the art of modeling volatility requires employing time series properties and stylized facts of financial market volatility. Keeping in mind that the Turkish economy went through two serious economic crises in 1994 and 2001 with a monetary policy regime shift after the latter, we provide proxies for the risk by estimating respective volatilities. Therefore, we take such events into account in modeling volatilities in the sense that they have financial repercussions which gave financial time series their unique characteristics.

If σ^2 is a measure of volatility, the varying nature of this dependent variable is modeled as a function of its past values and exogenous variables if needed, plus a white noise error term. Let us consider an AR(p) model of volatility such that

$$\sigma^2 = \beta_0 + \beta_1 \sigma^2_{t-1} + \beta_2 \sigma^2_{t-2} + \dots + \beta_p \sigma^2_{t-p} + u_t \quad (\text{V.II})$$

Equation (V.II) relates the volatility in the current period to volatility in the past p periods, though the value of p is an empirical question. Gujarati (2003) suggests that this empirical question can be resolved by using model selection criteria such as the Akaike information measure (AIC). Beginning from the highest lag length value such as 12 months, the lowest value of AIC is preferred for comparison of alternative models. Afterwards, we tested the significance of any individual β coefficient by the usual t test.

After the introduction of ARCH models by Engle (1982), Bollerslev (1986) and Taylor (1986) generalize these processes as generalized conditional heteroscedasticity (GARCH). Accordingly, the simple GARCH (1,1) model can be written as:

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \alpha_2 \sigma_{t-1}^2 \quad (\text{V.I.II})$$

The equation (V.I.II) states that the conditional variance of u at current period depends on both the squared error term in the previous period, u_{t-1}^2 and on its conditional variance in the previous time period, σ_{t-1}^2 (Gujarati (2003)).

Variance of these dependent variables (X_t^2) over time is measured by the value of the logarithmic difference of the respective dependent variables which are inflation, real exchange rate and nominal exchange rate in our analyses. By doing this, we arrive at the stationary series of the dependent variables for the ARCH process. Given this brief background, inflation volatility is assumed to follow GARCH (1,1) process and it is modeled by using the logarithmic difference of the consumer price index (CPI), its past values and two crises dummies for 1994 and 2001 respectively. Similarly, real exchange rate and nominal exchange rate volatilities are supposed to follow GARCH (1,1) process and they are modeled by using the logarithmic differences of them, their past values and the crises dummy variables for years 1994 and 2001. After we have run each of the mean equation regressions, then we have used respective residual series of these regressions as proxies for volatilities.¹⁹ The statistical representations of the E-views estimation results regarding these three equations can be viewed in the Appendix A, B and C.

Current CPI series are based on year 2003. However, we need consistent monthly index series for inflation beginning from 1986. Therefore, CPI based on the year 2003 are brought back to 1986 by monthly inflation rate of the indices with base years 1994 and 1987. Furthermore, nominal exchange rate is simply chosen as the value of TL per US Dollar.

¹⁹ Although, there are many ways in calculating the volatility series, the methodology we have used is one of the legitimate ways among alternative modeling techniques.

In calculation of the real exchange rate, we take the associated weights of foreign currencies with respect to the pattern of Turkey's international trade into consideration. Accordingly, we specify a basket exchange rate of 1 US Dollar plus 1,5 Euro which can be regarded as simplified trade weighted exchange rate. This basket nominal exchange rate is then deflated by using a weighted producer price index for the United States and the Euro Area.

Additionally, we also include interest rate spread, credit default swap (CDS) for Turkey and speculative pressure index (SPI) as proxies for various indicators of macroeconomic conditions in the economy. Accordingly; spread is specified as the difference between weighted average of 3 month TL and USD deposit interest rates. CDSs are referred to products in the credit derivative asset class and they are bilateral contracts in which a protection buyer should pay a periodic insurance premium in exchange for a payment by the protection seller in the case of a credit default. CDSs are traded in international financial markets and associated market price of the CDS premium is therefore, an indication of the perceived risk related to the reference entity (i.e. Turkey in our case) (ECB (2009)). To measure domestic risk, we also use a measure of financial pressures in the market. As described by Özatay (2009), Speculative pressure index (SPI) is calculated by the weighted average of the percent changes in the yearly compounded interest rates of treasury discounted auctions, CBRT gross international reserves and nominal TL/\$ exchange rate, successively. These weights are determined with respect to the inverse of each variable's variance. Finally, we also employ volatility index (VIX) to reflect risk sentiments on a global scale. The higher the risk appetite of the international investors, the lower is the VIX which corresponds to lower risk sentiments across international financial markets. One can refer to Table V.I in order to see the abbreviations and definitions, the period coverage and data sources of the variables used in our analyses.

To check the stationarity of the variables in our analyses, unit root tests are used. We conduct unit root tests for deposit and offshore dollarization ratios in their logarithm forms. In conducting the unit root tests, we benefit from Augmented

Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Maximum number of lags allowed for the order of augmentation is 15 by E-Views 5. Further, optimal lag lengths for the test equations are selected according to Schwarz Information Criterion for the ADF test. With regard to PP test, bandwidth (b/w) is chosen according to Newey-West using Bartlett Kernel estimation method. Table V.II reveals the unit root test results. Accordingly, one can observe that all of the series used in our VAR analyses are level stationary at different degrees of confidence levels with respect to both tests.

Table V.I Definitions of Variables

Definitions of Variables		Data Period and Frequency	Sources
LDD	Log of Deposit Dollarization Ratio	January 1986 – February 2011	CBRT – EDDS and author's calculations
LDOF	Log of Offshore Dollarization Ratio	January 2002 – February 2011	CBRT – EDDS and author's calculations
VCPI	Inflation Volatility	February 1987 – April 2011	TURKSTAT and author's calculations
VDFXR	Real Exchange Rate Volatility	December 1987 – April 2011	SPO and author's calculations
VNFX	Nominal Exchange Rate Volatility	November 1986 – April 2011	CBRT – EDDS and author's calculations
SPRE AD	Spread between 3 months TRY deposit rate and 3 months USD deposit rate	March 1990 – March 2011	CBRT – EDDS and author's calculations
SPI	Speculative Pressure Index	February 1990 – March 2011	CBRT – EDDS, Undersecretariat of Treasury and author's calculations
CDS	Turkey's Credit Default Swap	January 2004 – April 2011	Reuters Database
VIX	Volatility Index	January 1990 – April 2011	Reuters Database

Table V.II Unit Root Test Results

Variables	None		Intercept		Intercept & Trend		None		Intercept		Intercept & Trend	
	ADF	Opt. Lag	ADF	Opt. Lag	ADF	Opt. Lag	PP.	B \hat{w}	PP.	B \hat{w}	PP.	B \hat{w}
LDD	-2.071 (0.037)	0	-3.517 (0.008)	0	-2.217 (0.478)	0	-1.986 (0.045)	3	-3.542 (0.008)	1	-2.218 (0.477)	4
LDOF	-2.599 (0.009)	15	-2.070 (0.257)	15	-4.496 (0.001)	0	-2.805 (0.005)	2	-2.959 (0.040)	0	-4.587 (0.001)	6
VCPI	-17.979 (0.000)	0	-17.957 (0.000)	0	-18.047 (0.000)	0	-18.345 (0.000)	14	-18.334 (0.000)	14	-18.766 (0.000)	17
VDFXR	-16.064 (0.000)	0	-16.071 (0.000)	0	-10.083 (0.000)	4	-16.916 (0.000)	26	-17.179 (0.000)	27	-17.441 (0.000)	28
VNFX	-17.877 (0.000)	0	-17.876 (0.000)	0	-17.921 (0.000)	0	-17.970 (0.000)	7	-17.980 (0.000)	7	-18.062 (0.000)	8
SPREAD	-1.240 (0.197)	0	-1.954 (0.307)	0	-3.968 (0.011)	0	-0.992 (0.288)	11	-1.520 (0.522)	8	-3.738 (0.022)	6
SPI	-5.211 (0.000)	2	-11.444 (0.000)	0	-12.475 (0.000)	0	-10.430 (0.000)	7	-11.676 (0.000)	5	-12.482 (0.000)	1
CDS	-1.449 (0.137)	0	-2.927 (0.046)	0	-3.082 (0.117)	0	-1.296 (0.179)	16	-2.847 (0.056)	6	-3.068 (0.121)	5
VIX	-1.290 (0.182)	2	-4.341 (0.000)	0	-4.525 (0.002)	0	-1.263 (0.190)	14	-4.137 (0.001)	4	-4.376 (0.003)	3

Note: Numbers in parenthesis are the p-values.

V.II. The Dollarization Experience of the Turkish Economy in Retrospect

From historical perspective, experience of the Turkish economy with foreign exchange transactions dated back to 1970's. Following dramatic hike in oil prices in the 1970's, convertible deposits and foreign exchange deposits with credit letter were introduced in order to overcome dollar shortages in the economy. At the beginning of the 1980's, Turkey launched a comprehensive structural adjustment program which aimed not only to stabilize the economy by reducing inflation, government budget and current account deficits but also to direct the economy by altering development strategy from an inward-looking to an outward-looking one. For this purpose, several economic, legal and institutional reforms were carried out by the authorities in order to establish a market-led economy. Liberalization of the trade regime together with the managed floating exchange rate regime was the main pillars of this period (Boratav and Yeldan (2002), CBRT (2002), Metin-Özcan and Us (2006)).

Regarding the financial sector; rigid controls on deposit and loan interest rates, exchange rates and prices were removed and the selective credit system was abandoned. The first turbulence in the financial system took place in 1982 when the first steps to full liberalization had just been practiced. Immature institutional structure with insufficient supervision of the financial system and negative official real interest rates led the emergence of brokerage houses that collected deposits by offering high interest rates without taking adequate care of serving these liabilities. At the end, the so called Ponzi financing could not delay the inevitable ending with a banking crisis which had devastating effects on the credibility to the financial system. These developments were accompanied by partial slowdown of reforms, as a consequence financial liberalization continued gradually (Civcir (2003a)).

Deregulation of financial markets was followed by the liberalization of the foreign exchange system. While foreign investors were allowed to participate in domestic capital markets, Turkish residents also began to purchase foreign securities. At the end of 1983, exporters were allowed to hold their revenues in the commercial banks in terms of foreign currency deposits and commercial banks were admitted to engage in foreign exchange operations in proportion to their foreign exchange

liabilities. Further steps were taken in order to enable residents to hold foreign exchange deposits in the local banking system. Moreover, restrictions on foreign direct investment and foreign travel were eased in 1984. Financial reforms were carried out to phase out multiple exchange rate practices. In line with this objective, an official foreign exchange market under the supervision of the central bank was established in 1988. With the opening of this market, the exchange rate began to be determined by the market participants' demand and supply. (CBRT (2002), Civcir (2003a))

The economic and financial sector reforms whose aim was to integrate the domestic financial system with the international markets were completed in 1989 when the capital account was liberalized with the full convertibility of the Turkish Lira. Then, it became free for residents to purchase and sell foreign currency denominated assets and securities through banks and special finance institutions and engage in cross-border operations. Obtaining foreign credits were also permitted. Non-residents were allowed to engage in operations in all securities issued upon the permission of the Capital Markets and listed at the Stock Exchange and they were free to transfer their accounts in terms of both home and foreign currencies abroad. These kinds of arrangements significantly reduced the transaction costs associated with foreign currency operations which rendered portfolio changes to be more responsive to changes in relative returns on assets (CBRT (2002), Civcir (2003b)).

Over time, financial markets were enlarged by the emergence of new financial instruments like treasury bills and bonds of various maturities, mutual fund shares, corporate finance bills and asset backed securities. These financial assets started to compete with foreign currency denominated financial assets so as to preserve the real value of financial wealth of residents. Since then, the choice of currency denomination is subject to optimal portfolio allocation of residents. (Civcir (2003a))

Beginning from the date when residents were allowed to open foreign exchange deposits, we observe that the volume of foreign currency denominated deposits displayed an increasing trend until the end of the first half of the 1990's.

(See figure V.II.I). According to Civcir (2003b), nominal exchange rate depreciations and high levels of exchange rate pass-through which have effects on rising inflation rates made foreign currency deposits appealing to the residents in order to hedge the real value of their wealth until the 1990's. One can observe that this trend in financial dollarization continued to accelerate in the first half of the 1990's following the rising and volatile inflation rates and exchange rate movements as a reflection of deterioration in fiscal balances. Additionally, fragile and shallow domestic financial markets which were prematurely exposed to international competition and the lax supervision of the financial sector all contributed to risk accumulation in the economy. Beyond these, attempting to change financing style by imposing low interest rates while holding the exchange rate simultaneously in an expansionary fiscal stance ended up with sudden drainage of capital flows and resulted in a severe financial crisis in 1994. As observed from figure V.II.I, deposit dollarization ratio reached its first peak with a level of 55.2 percent as of April 1994 from the level of 23.2 percent since the beginning of the decade. This was also not surprising in terms of relative volatilities of inflation and real exchange rate which increased the appeal of residents towards dollarization to preserve the real value of their wealth.

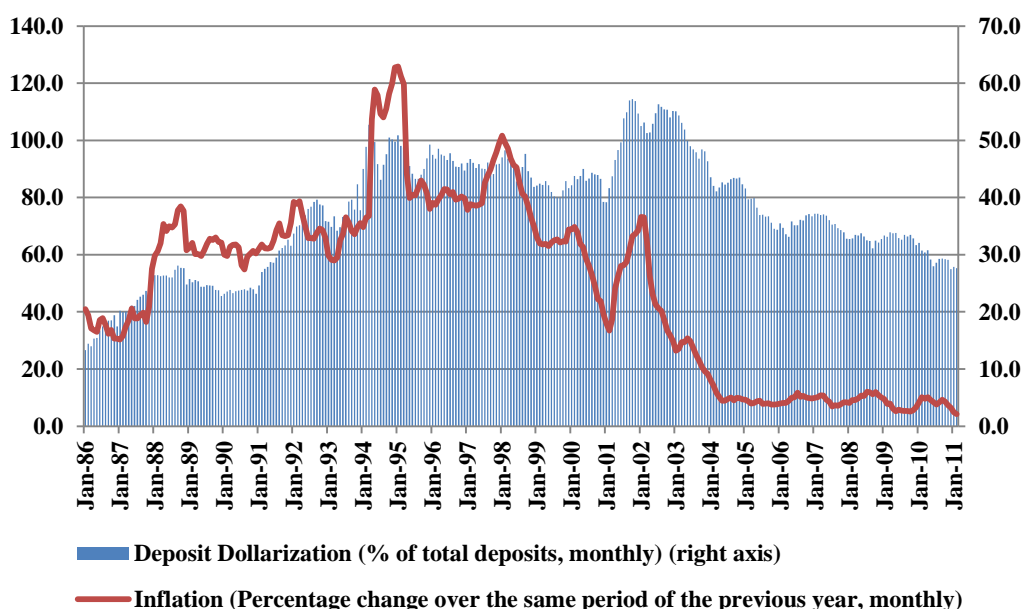


Figure V.II.I: Deposit Dollarization and Inflation

However, when we have a look at the second half of the 1990's, we observe that the rising trend in deposit dollarization made a pause until the beginning of 2001 (See figure V.II.I). While we see declining inflation and relatively stable exchange rates in the second half of the 1990's, dollarization gained persistence with nearly 45 percent of total deposits denominated in foreign exchange. Metin-Özcan and Us (2006) also provided an evidence that deposit dollarization displayed a stabilization in the second half of the 1990's. Nevertheless, it became more persistent and its movement was getting relatively independent of the movements of inflation and the exchange rates. However, we think that the persistence in dollarization can still be explained by the movements of inflation and exchange rate along with other domestic risk indicators. According to MVP approach, rather than the levels, relative changes of these respective variables are important in explaining dollarization. Then, the persistence in deposit dollarization in the second half of 1990's can be understandable, because respective volatilities between inflation and real exchange rate implied a tendency among investors to hedge real value of portfolio by means of dollarization. Although, we see falling inflation rates, relative volatility of inflation mostly outpaced the volatility in the real exchange rate throughout the 1990's.

As Boratav and Yeldan (2002) indicated, the path of dollarization in the 1990's was broadly reflected by unregulated opening of domestic financial markets and consequent financial deepening in the domestic banking system. Changing economic structure combined with improper economic policies heightened domestic macroeconomic risks and had drastic effects on inflation, interest and exchange rates. Therefore, the failure to provide fiscal discipline and to take necessary amendments for the financial markets overshadowed the expected benefits from financial and capital account liberalization. This is why the Turkish economy in the 1990's can be characterized as a boom and bust cycle (Yeldan (2002)). Crisis and ongoing stabilization efforts during this period undermined financial market confidence in general and caused foreign currency denominated financial assets to be more appealing in terms of investors' perception. Ultimately, all of these developments concurrently had repercussions on the course of dollarization.

One of the main features of the economy in 1990's was the public sector with unsustainable fiscal balances. Imprudent fiscal policies in the 1990's resulted in high levels of public sector borrowing requirement and caused ultimately the debt sustainability problem on top of the agenda (Yılmaz (2006)). These developments with successive high levels of public sector borrowing requirement implied higher risk premiums on all government debt instruments eventually. As a matter of fact, the nominal interest rates hovered above the level of 100 percent almost throughout the decade. As a consequence, rising interest payments constituted a large portion of tax revenues in the course of time which caused further widening of public sector deficits. This provided a reason of why the 1990's had been the period of rapid expansion of public securities. In addition, drastic changes in capital movements had an impact in a way to destabilize domestic interest rates. Ultimately, this kind of economic feature brought about high levels and volatile pattern of spread (See Figure V.II.II). (Boratav and Yeldan (2002), CBRT(2002), Yeldan (2002)).



Figure V.II.II Spread of 3 month weighted TL and US deposit rates

In such a financial environment, financial parameters became to be very responsive to market sentiments which had been proved to be highly volatile because

of ongoing macroeconomic instabilities especially observed in the 1990's. Even the real rates of returns for TL denominated assets were higher than that of the foreign currency denominated assets in this period, the appeal for dollarization from the beginning of 1990's was a result of ongoing political and macroeconomic uncertainties (Civcir (2003b) and Metin-Özcan and Us (2006)). The spread between TL and US dollar denominated deposit interest rates which have been influenced by gradual but significant depreciations of the Turkish Lira can also be evaluated as the repercussions of these ongoing instabilities in the domestic financial markets.

However, the more striking aspect of such a pattern of spread is that it has followed a similar path with the dollarization trend. As there is an increase in spread in a way that it reflects rising risk perceptions towards domestic economy and hence about the real value of TL denominated financial assets, then it is observed that deposit dollarization began to gain momentum. The response of financial markets to domestic imbalances was the skyrocketing nominal interest rates in 1994 financial crisis which caused spread to achieve its historical high level. It was also the time when deposit dollarization reached to its first peak. After the spread began to swing steadily at around 60 and 80 percents, deposit dollarization ratio could be argued to display persistence in the second half of 1990's. Note that when deposit dollarization ratio realized its second peak in 2001, spread moved nearly to its record levels. When domestic macroeconomic fragilities began to reduce and associated risk sentiments were stabilizing after 2001, we observe that deposit dollarization also tended to go down in the course of time.

Turkey welcomed 2000 with a stabilization program designed and monitored by the IMF which mainly aimed reduction of inflation. Although, the program worked well at the beginning by bringing some sort of fiscal discipline, familiar shortcomings of the exchange rate based stabilization program such as overheating following real appreciation contributed to rising international risk perceptions related to sustainability of the twin deficit. Also, balance sheet weaknesses of both domestic and real sectors with currency and maturity mismatches increased the risk of speculative attack to foreign currency. At the end, the 2000 disinflation program was

proved to be insufficient to overcome structural deficiencies in the economy and its not well planned exit strategy could not delay the inevitable outcome. Ultimately, the exchange rate was allowed to float freely pronouncing the end of the 2000 program.²⁰

In the aftermath of the financial crisis, a new program was completed with the IMF in May 2001. The new standby agreement called as “the Program for Transition to a Strong Economy” aimed at calming and promoting confidence in financial markets, stabilizing money and foreign exchange markets and establishing macroeconomic balances (CBRT (2002)). Therefore, measures were undertaken to stabilize financial indicators in order to extend the economic agents’ medium term perspective. Banking system was restructured. Public sector was also undergone a reform process. Steps were taken to enhance transparency, budget discipline and accountability in the public sector. With the improvement of macroeconomic balances, a suitable environment for a steady growth was created in the last stage (Özatay 2005a).

At the beginning of 2002, the CBRT announced that it was going to implement implicit IT policy. One of the reasons to implement implicit IT was attributed to the challenge for monetary policy implementation under fiscal and financial dominance during 2001-2004 (Kara (2006)). According to Özatay (2005b), default risk was the main driving force of the economy under fiscal dominance. High public debt right after the crisis period gave rise to excessive sensitivity of risk premium to economic and political news. Therefore, even the economic program is centered on sustaining strong macroeconomic fundamentals; it is exposed to risks stemming from concerns about the continuation of this framework. Then, the CBRT found itself in a position that it cannot insouciantly raise the interest rates to respond a positive inflation shock. This is due to the fear of shifting the economy from good equilibrium to bad equilibrium in which there is high inflation, high real rates and sharp depreciation. So, at the beginning of the program, this type of possibility

²⁰ One can refer the studies by Özatay and Sak (2003) and Yeldan (2002) in order to elaborate the reasons of the 2001 crisis and also the elements and the functioning of the IMF-directed stabilization program.

constituted an impediment to function monetary transmission mechanism effectively. This sentiment in the financial markets constituted a reason why deposit dollarization did not begin to its decreasing trend immediately.

At the end of 2001, the program started to show its strength; inflation expectations followed a downward trend, the inflation rate almost continuously declined, the central government debt-to-GDP ratio was significantly reduced by giving large primary surpluses. Furthermore, the Treasury's borrowing rate declined considerably. Vulnerability indicators that cover aggregate balance sheet vulnerabilities, the so called liquidity/rollover risk, country solvency risk also decreased. Notwithstanding, some significant but temporary, deviations from this positive trend were experienced resulting from the change of expectations. Concerns about the viability of fiscal discipline, external shocks such as September 11 and the outbreak of the war in Iraq in mid 2003 contributed adversely to the perceived default risk and caused weakening of the domestic currency. These were among the reasons why the demand for foreign currency denominated assets continues to show persistence even things were getting well on the inflation front (Özatay (2005a), Özatay (2005b)).

Finally, as the macroeconomic stability had been sustained after necessary structural reforms following the 2001 economic crisis, risk sentiments had gradually been moderated which paved way for decreasing levels of risk premiums on domestic assets. Increasing confidence in financial markets had resulted in an appeal to domestic financial assets in the last decade. Hence, it has not been surprising that the decline in spread had been observed with falling ratios of deposit dollarization. Then, it can be argued that the interest rate spread reflects mainly the risk premium over the local currency denominated instruments.

At the end of 2005, the outcome outpaced the expectations with inflation level falling from 68 percent at the end of 2001 to 7,7 percent at the end of 2005. In the meantime, nominal and real interest rates came down to low levels following the falls in the risk premium and increasing credibility (Kara (2006)). On the deposit dollarization front, we observe that it changed its course toward dedollarization. The

ratio of deposit dollarization subsided to 33,1 percent as of April 2006 which was realized as the lowest record since 1992.

Besides the fall of the inflation level, we clearly see from figure V.II.III that inflation volatility began to decline substantially after the adoption of IT policy. Even though the shortcomings at the beginning, under fiscal and financial dominance, coordinated efforts in monetary and fiscal fronts enabled to build credibility in disinflationary policies by eliminating the risks which could be stemmed from fiscal and financial fragilities. Furthermore, other remarkable observation under the IT framework has been a considerable increase in the real and nominal exchange rate volatility (See figures V.II.V and V.II.VI). However, these types of volatility pattern were not surprising under the flexible exchange rate regime. We observe that real exchange rate volatility has been proved to be higher than inflation volatility nearly throughout the post IT period which helps to the dedollarization process in the IT period.

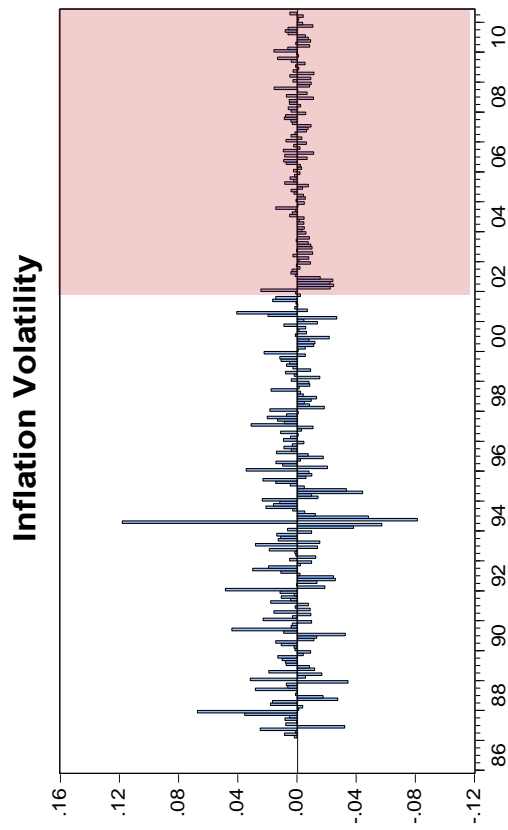


Figure V.II.III

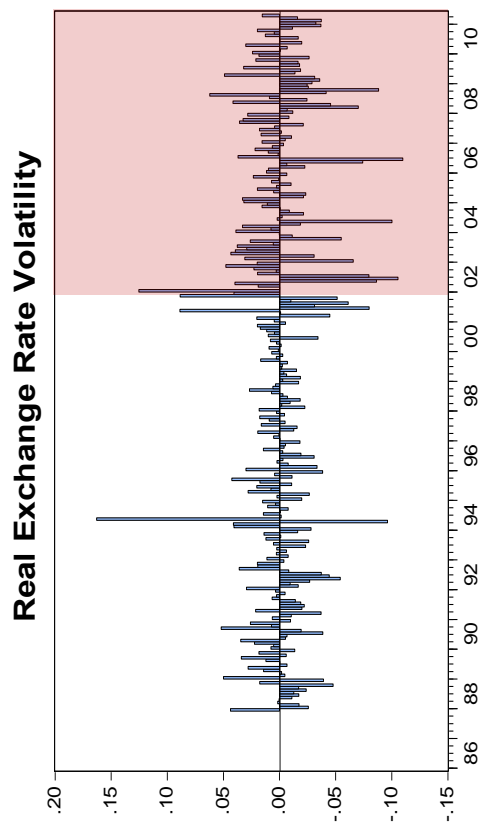


Figure V.II.V

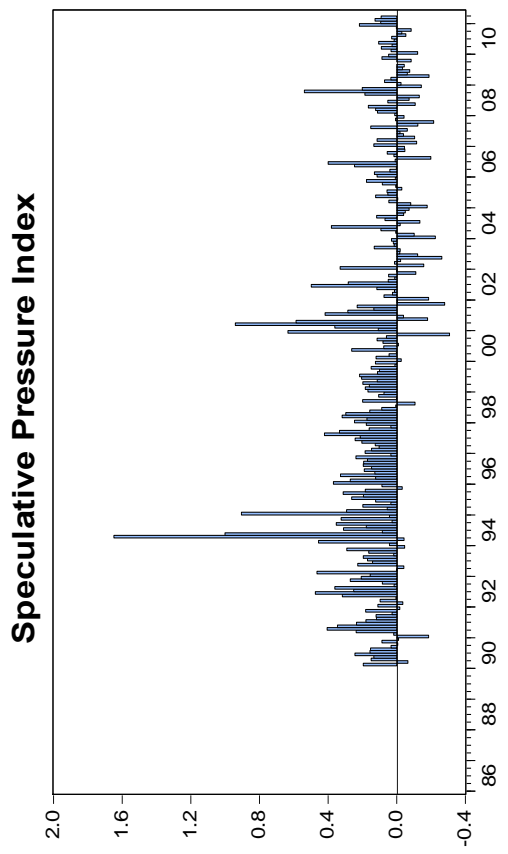


Figure V.II.IV

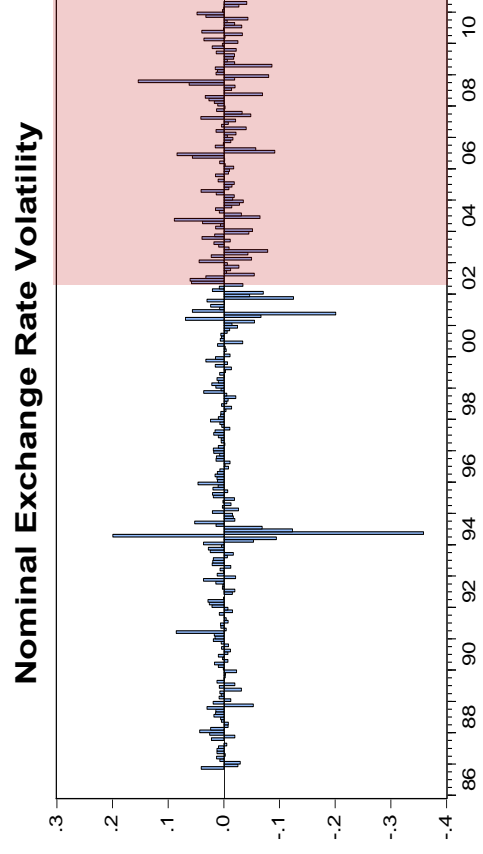


Figure V.II.VI

While macroeconomic conditions have been improving, a new dynamic in exchange rates under the floating exchange rate regime was observed. This was nominal appreciation. The pricing behavior as well as anticipating (currency) risk had been severely affected from this new dynamics. The nominal appreciation was observed after increased confidence to the stabilization program and improved macroeconomic fundamentals which stemmed from reverse currency substitution, repatriation of funds and capital inflows. These developments led to real exchange rate appreciation and lowered the cost of foreign borrowing and hence increased short-term external debt again. These conditions have been conducive for another related phenomenon into light. This is offshore (external) dollarization. Besides observing slowly but surely declines in deposit dollarization, the foreign credits used by the banking sector has risen at an accelerating rate on the other side of the coin.

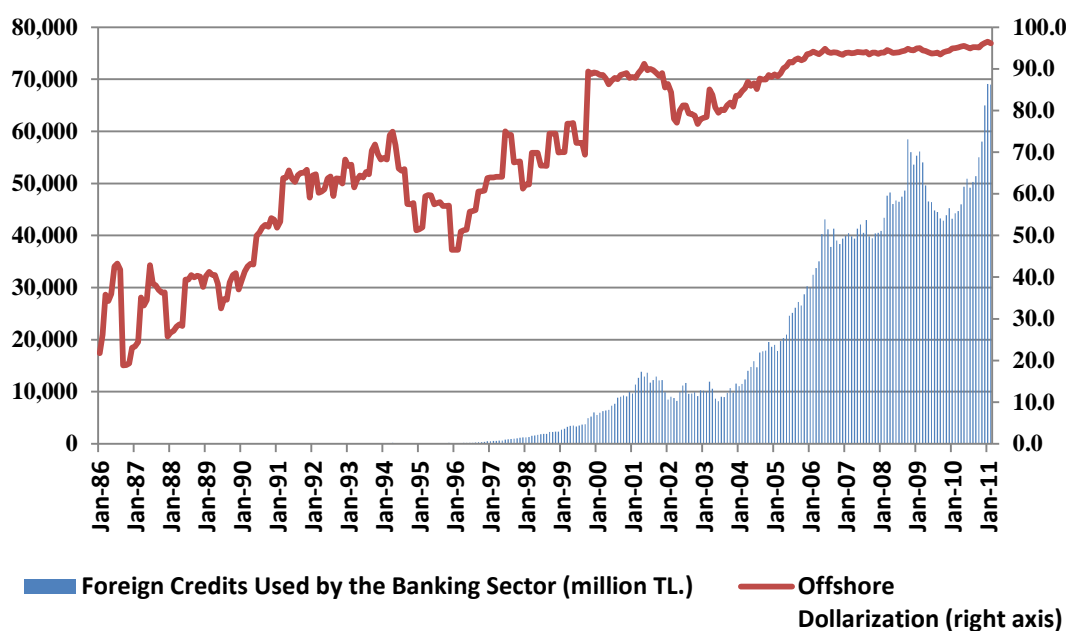


Figure V.II.VII Offshore Dollarization

As can be seen from figure V.II.VII, offshore dollarization became to be more pronounced after 2002 and ultimately the ratio was stabilized at around 95 percent after 2006. It can be argued that this phenomenon coincided with global liquidity abundance in international financial markets that was in search of relatively higher real returns, especially in the period of 2002 and 2007. Furthermore, benign risk

perceptions on global scale as reflected in decreasing trend in volatility index during the aforementioned period led international capital flows to head towards the emerging market economies. Hence, these benign conditions in the international financial system facilitated the domestic banking sector to raise funds from abroad at lower costs.

Before the implementation of formal IT policy at the beginning of 2006, the government declared that Turkey would sign a new stand-by agreement with the IMF covering the period 2005 – 2007. This new program also rested mainly on continuing monetary and fiscal discipline by giving priorities to structural reforms related to improving the quality of fiscal discipline through social security and tax reforms and financial services reform. With the latter, the financial sector was aimed to deepen. Furthermore, progress was achieved on the EU accession process with the announcement about the beginning of the negotiations on EU membership as of October 2005. This served as a second anchor and reinforced the positive impact of the new program. Based on these anchors, positive trend in macroeconomic variables such as the downward trend in debt burden, real interest rates and inflation provided a favorable environment to economic growth (Ersel and Özatay (2008), Metin-Özcan and Us (2007), Özatay (2005b)).

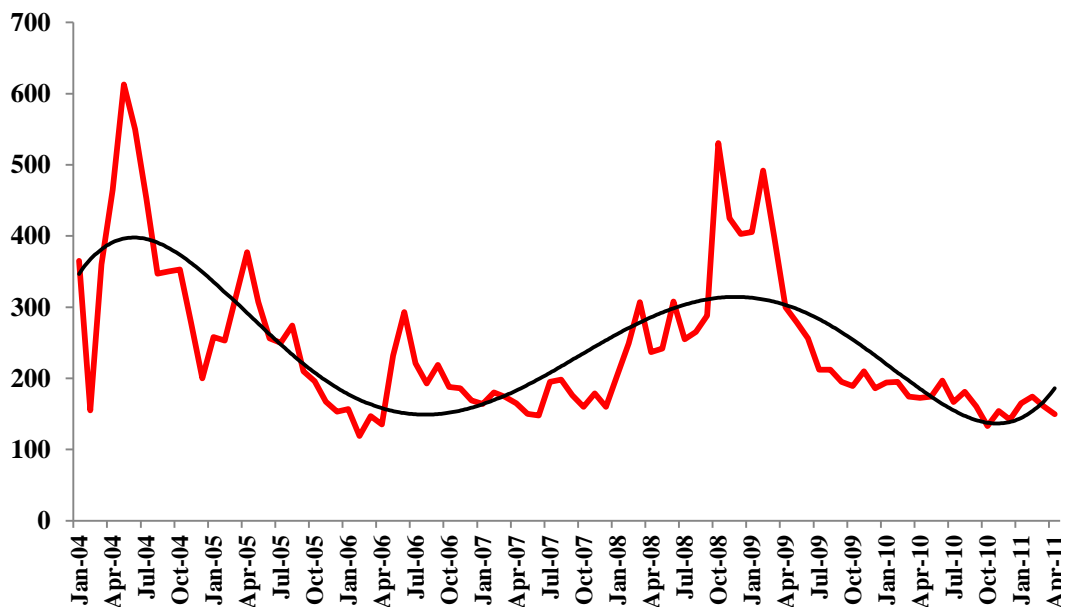


Figure V.II.VIII Turkey's Credit Default Swap (CDS, monthly average)

These favorable economic conditions and increasing stability were also reflected in receding premiums of Turkey's credit default swap (CDS). The decline in monthly CDS premiums to nearly 100 basis points suggested that the sovereign risk was considerably reduced compared to the recent past and paved the way for fully-fledged IT at the beginning of 2006. (See figure V.II.VIII)

After Turkey began to implement IT policy framework in January 2006, the economy faced a major external shock where international liquidity were changed its root towards industrialized or safe heaven economies. Accordingly, the credit risk of Turkey moved upwards together with substantial depreciation in the domestic currency. In parallel to these developments, the turbulences in May 2006 resulted in an interruption of dedollarization trend and led to even redollarization in the second half of 2006. This situation revealed that the decreasing trend in dollarization was by no means for the sustainability of the route to dedollarization. (Metin-Özcan and Us (2007) As we observe from figure V.II.I, the ratio of deposit dollarization displayed an increase of about 4 percentage points starting from the beginning of the financial turmoil until the end of the year.

Following the downturns in developed financial markets beginning from the last quarter of 2008, the world economy entered a serious economic crisis whose amplitude was compared with the Great Depression in 1930's. As the crisis unfolded, emerging market economies began to be markedly affected by the recession and the Turkish economy was not singled out. The first effect of the global downturn was observed by net capital outflows, currency depreciation and a fall in stock prices in the last quarter of 2008. These circumstances were also accompanied with rising risk premiums and tightening liquidity in domestic banking system. Accordingly, confidence in the financial markets was severely undermined by a combination of uncertainties about private sector debt rollover in the face of global liquidity squeeze, surge in the risk sentiments of international investors and the cautious reactions of domestic banks to extend credit (Rawdanowicz (2010)) (See figure V.II.IX how volatility index reacts the turmoil in international financial markets).

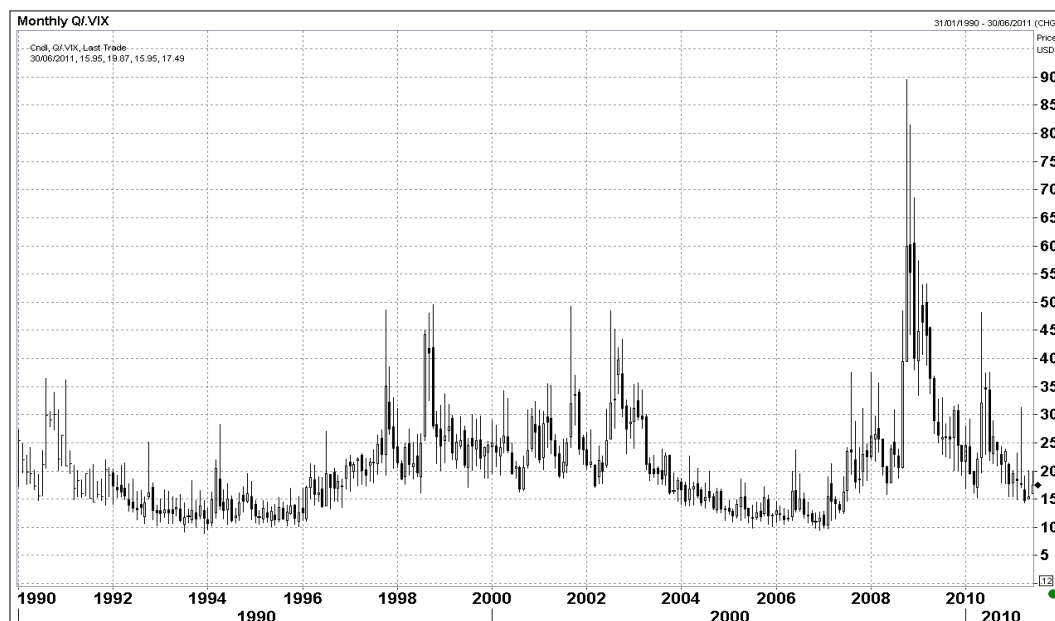


Figure V.II.IX Volatility Index (VIX)

All in all, these unfavorable developments in the financial markets at the beginning caused the ratio of deposit dollarization to slightly move upwards and stabilized at around 33 percent until the last quarter of 2009. On the other hand, global liquidity crunch on global scale and falling risk appetite towards the emerging market substantially constrained the borrowing facilities of domestic banking sector. Thereby, foreign credits used by the banking sector receded by nearly 27 percent in October 2009 relative to the same month of the previous year, though the ratio did not change as total credits borrowed also declined.

As a matter of fact, recent economic crisis was different from Turkey's previous crises in that last crisis did not result from unsustainable macroeconomic fundamentals and structural fragilities in the economy. Thanks to the structural reform process after 2001 crisis, fairly strong position of domestic financial sector relative to the counterparts in many OECD countries especially became supportive in the post crisis period. Having eliminated domestic imbalances and macroeconomic instabilities were also influential in confining excessive fluctuations of the financial variables in the last crisis. For example, the exchange rate and interest rate fluctuations were relatively minor than in the past. Depreciation of the Turkish lira

was limited by only 15 percent in effective terms in the second half of 2008, whereas it was on average 35 percent in the past crisis. With regard to the risk premium as indicated in figure V.II.VIII, one can observe that it has considerably declined to pre-crisis levels in the course of 2009 after a sharp rise at the beginning of the crisis. So, the risk premium came to relatively low levels compared with some other emerging market economies. Another remarkable feature of the recent crisis was the lack of dramatic increases in inflation. Instead, inflation levels fell to substantially low levels following a cease in domestic demand and lower international commodity prices. Additionally, minor depreciation of domestic currency and lower exchange rate pass-through to prices help to contain inflation. (Rawdanowicz (2010))

Briefly, one can argue that the Turkish economy in recent crisis has firstly experienced moderate fluctuations in the financial variables as compared with its own past economic recessions. One can also observe this fact from figure V.II.IV where the speculative pressure index displayed a lower swing in 2008-09 as compared to 1994 and 2001 crisis. These developments can be attributed to two important factors. Firstly, the recent crisis was a global one and not originated in Turkey. Secondly, swift policy response facilitated by sounder macroeconomic positions of public and financial sector ensured stabilization of the financial markets. Hence, we did not observe a strong pick-up in deposit dollarization ratio in recent crisis in a way that could change dedollarization process.

V.III. Empirical Results from the VAR Analyses

We will proceed by Vector Autoregression (VAR) modeling in order to reveal which variables can be accounted for the dollarization and dedollarization trend in the course of time. Doing this, we benefit from a useful tool in VAR modeling which is the impulse response analysis. The impulse response functions traces the response of one of the endogenous variables to a one unit innovation in one of the variables in the system. (Metin-Özcan and Us (2007))

VAR models are introduced by Sims (1980) who relaxes the assumption that the simultaneous or structural equations in the system are exactly identified. So, all

the variables are treated on an equal footing by this macroeconometric framework. A VAR is specified as n variable with n equation linear model in which each variable is explained by its own past values and also current and lagged values of the remaining n-1 variables. Autoregressive term comes from the appearance of the lagged value of the dependent variable on the right hand side and the term vector emanates from the existence of a vector of two or more variables in the system of equations. Since the system of equations allowing current and past values of the variables in the system are solved simultaneously, the VAR framework provides a systematic way to reflect feedback relations. Hence, the VAR toolkit promises a credible approach to structural inference and policy analyses by assessing the dynamic impact of random disturbances on the system of variables. (Gujarati (2003), Stock and Watson (2001))

Following Enders (1995), a general representation of a first order VAR framework can be constructed as in the following model:

$$y_t = b_{10} - b_{12}z_t + c_{11}y_{t-1} + c_{12}z_{t-1} + \varepsilon_{yt} \quad (\text{V.III.I})$$

$$z_t = b_{20} - b_{21}y_t + c_{21}y_{t-1} + c_{22}z_{t-1} + \varepsilon_{zt} \quad (\text{V.III.II})$$

where ε_{yt} and ε_{zt} are white noise error terms with standard deviations of σ_y and σ_z , respectively. Moreover, the disturbance terms ε_{yt} and ε_{zt} are uncorrelated. The coefficients of b_{12} and b_{21} denote the contemporaneous effects of a unit change of z_t on y_t and of y_t on z_t , respectively. Further, c_{12} and c_{21} are the effects of z_{t-1} and y_{t-1} on y_t and z_t successively. Therefore, y_t and z_t contemporaneously affect each other in the system. The disturbance terms of ε_{yt} and ε_{zt} are called impulses, shocks or innovations in y_t and z_t in the language of VAR. While the term ε_{yt} has an indirect contemporaneous effect on z_t if $b_{21} \neq 0$, the term ε_{zt} influences y_t indirectly and contemporaneously if $b_{12} \neq 0$. (Insel (2010))

We can denote in matrix form as follows:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (\text{V.III.III})$$

where y_t denotes the log of deposit dollarization ratio or log of offshore dollarization when appropriate. Further, z_t represent other key financial variables of interest such as volatilities of inflation, real and nominal exchange rates, spread, cds, speculative pressure and volatility index. Now, (3) can be more simply written as in the following form:

$$BX_t = \Gamma_0 + \Gamma_1 X_{t-1} + \varepsilon_t \quad (\text{V.III.IV})$$

In order to normalize the left hand side vector, the equation is multiplied by inverse of B:

$$B^{-1}BX_t = B^{-1}\Gamma_0 + B^{-1}\Gamma_1 X_{t-1} + B^{-1}\varepsilon_t, \text{ hence:}$$

$$X_t = A_0 + A_1 X_{t-1} + e_t, \quad (\text{V.III.V})$$

So, we arrive at the VAR framework in its standard form or its unstructured form as follows:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \quad (\text{V.III.VI})$$

Although, consistent estimates of the parameters yielded by OLS, this representation of structural VAR is underidentified. Therefore, Sims (1980) suggests using a recursive system by restricting some of the parameters in the VAR. This is called triangular or Cholesky decomposition. However, Pesaran and Shin (1998) criticize this method, because results are subject to the assumption of orthogonality of error terms or innovations. This problem arises from the fact that the covariances of the error terms in the equations within the VAR system are not zero. This means that there are contemporaneous effects of y_t on z_t and z_t on y_t . Then, traditional impulse response functions depending on the ordering of the variables remove correlation of the error terms assuming that the contemporaneous effects are zero by imposing a restriction such that $b_{12} = b_{21} = 0$. However, this imposes too strong assumption on the data especially, when the series are highly interdependent within the period of the shock. On the other hand, the generalized impulse response analyses

provided by Pesaran and Shin (1998) and Koop et al. (1996) do not require imposing restrictions. Accordingly, they choose only one element of ε_t to give a shock and the effects of other shocks are integrated out with respect to historically observed distribution of the errors. So, this methodology is not sensitive to the order of the variables and generates more robust results. (Enders (1995), Ewing and Thompson (2008) and İnsel (2010))

Prior to discussing findings of our analyses, we should mention that VAR models with three and four-equations are estimated and the order of VAR (the lag length criteria) is based upon Schwarz information criterion. In addition to this, a constant term is included in each equation. We also conduct generalized impulse response analyses in this paper as financial variables and risk indicators have evolved to be closely interlinked in the last two decades and they have simultaneously affected each other. Therefore, capturing the immediate responses of endogenous variables to innovations seems to be especially appealing. More specifically, the generalized impulse responses to one standard deviation innovations in various risk indicators are revealed over a horizon of 100 months. Significance of the impulse response is determined by the use of confidence intervals reflecting plus and minus two standard deviations. At points where the confidence bands do not coincide with the zero line, the impulse response is regarded to be statistically significant at 95 percent confidence level (or p-value $\leq 0,05$). Because the VAR model is constructed as log-linear models, we comment on the results such that the responses are percentage changes and innovations are in unit forms. One can refer to table V.III.I to see the variables, time period and appropriate lag length for each model estimated.

Table V.III.I VAR Models Estimated

Models	VAR Variables	Time Period	Lag Length
1	LDD, VCPI, VDFXR	(1988.1 – 2011.2)	1
2	LDD, VCPI, VNFY	(1987.3 – 2011.2)	1
3	LDD, VCPI, VDFXR, SPREAD	(1990.4 – 2011.2)	1
4	LDD, VCPI, VDFXR, SPI	(1990.3 – 2011.2)	1
5	LDD, SPREAD, SPI	(1990.4 – 2011.2)	1
6	LDD, VCPI, VDFXR	(1988.1 – 2001.12)	1
7	LDD, VCPI, VNFY	(1987.3 – 2001.12)	1
8	LDD, VCPI, VDFXR	(2002.1 – 2011.2)	1
9	LDD, VCPI, VNFY	(2002.1 – 2011.2)	1
10	LDD, VCPI, VDFXR, SPREAD	(2002.1 – 2011.2)	1
11	LDD, VCPI, VDFXR, SPI	(2002.1 – 2011.2)	1
12	LDD, SPREAD, SPI	(2002.1 – 2011.2)	2
13	LDD, VCPI, VDFXR, VIX	(1990.2 – 2011.2)	1
14	LDD, VCPI, VDFXR, CDS	(2004.2 – 2011.2)	1
15	DOFF, LDD, SPI, SPREAD, VIX	(2002.1 – 2011.2)	1
16	DOFF, LDD, SPI, CDS	(2004.2 – 2011.2)	1

Let's have a look at the empirical results from the VAR analyses. Figures 1 to 14 present the responses of deposit dollarization to different variables derived from estimations of VAR models 1 to 14. Moreover, the last two figures show the

responses of offshore dollarization to different macroeconomic risk indicators derived from estimations of VAR models 15 and 16. First of all, we consider the dynamic responses of deposit dollarization to the one standard deviation innovations in inflation volatility and real exchange rate volatility for the whole period. This constitutes our baseline model. As expected from the portfolio view, the results indicate that the deposit dollarization ratio increases in response to inflation volatility, while it decreases as the real exchange rate volatility rises. The degree of deposit dollarization ratio intensifies immediately up to about 0.7 percent following an innovation in inflation volatility and the effect is significant during two years period. Total effect during this period is realized as 14 percent. In contrast, the intensity of deposit dollarization recedes following an innovation in the real exchange rate volatility up to 1.2 percent and the effect continues to be significant during four years period with total effect of about 39 percent. The other salient feature in this analyses is that an innovation in deposit dollarization (represented on the left hand side in the figure) has an immediate impact on increasing itself up to 3.5 percent and then the effect starts to decrease and loses its significance after about four and a half years period. During this period the effect of own shock reaches to 130 percent.

As we have already elaborated in section IV.IV, the results indicate that MVP framework is valid for dollarization experience of the Turkish economy. Both inflation volatility and real exchange volatility affect deposit dollarization in the expected direction, as relevant literature suggests. This occurs in this way, because a shock given to inflation volatility in a positive direction undermines real value of home currency denominated assets and makes foreign currency denominated assets more attractive to investors in order to preserve their wealth. On the other hand, an innovation in real exchange rate volatility in a positive direction brings uncertainty to the real value of foreign currency denominated assets by its very nature and hence contributes to reversal in the course of dollarization. Last but not least, deposit dollarization on its own have dominant effect in the positive direction can be attributed to a reasoning that deposit dollarization inherently includes reflections of risks emanated from macroeconomic instabilities and uncertainties in domestic

economy. Further analyses will make last point more clear by also considering the effects of other risk indicators on deposit dollarization successively. The table V.III.II below reveals the VAR estimation results.

Table V.III.II VAR Estimate of Baseline Model

Explanatory Variables	Dependent Variables		
	LDD	VCPI	VDFXR
LDD(-1)	0.985501 (0.00878) [112.207]	-0.006380 (0.00405) [-1.57427]	0.012695 (0.00767) [1.65449]
VCPI(-1)	0.025152 (0.12612) [0.19942]	-0.087213 (0.05819) [-1.49865]	0.445961 (0.11019) [4.04717]
VDFXR(-1)	-0.126154 (0.06686) [-1.88685]	-0.039093 (0.03085) [-1.26723]	0.037779 (0.05841) [0.64676]
C	-0.013619 (0.00878) [-1.55032]	-0.006298 (0.00405) [-1.55391]	0.010804 (0.00767) [1.40769]
R-squared	0.978854	0.021616	0.063394
Adj. R-squared	0.978622	0.010904	0.053139
Sum sq. resids	0.333128	0.070920	0.254273
S.E. equation	0.034868	0.016088	0.030463
F-statistic	4227.827	2.017913	6.181854
Log likelihood	540.5671	755.5959	578.1134

Note: Adjusted sample is from January 1988 to February 2011. Total number of observations is 278. Standard errors are shown in () and t-statistics are shown in []. Numbers in () belonging to explanatory variables specify the lag length.

Response to Generalized One S.D. Innovations ± 2 S.E.

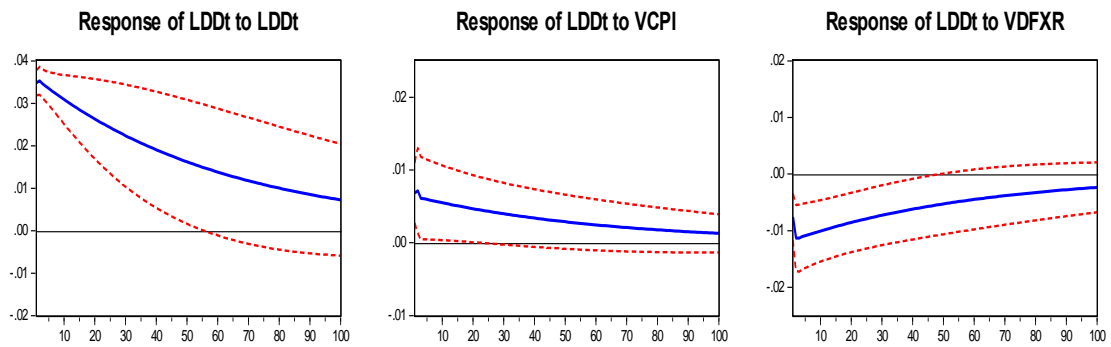


Figure 1. Impulse Responses of Model 1

Although, MVP framework theoretically based upon the effects of both inflation and real exchange rate volatilities as Ize and Levy Yeyati (2003) evidenced, there is a convention in literature also taking nominal exchange rate volatility into account. Therefore, we also employ nominal exchange rate volatility in our analyses which is revealed by figure 2 below. Similar to the findings of Metin-Özcan and Us (2007), we find that dollarization responds positively to nominal exchange rate shocks and this effect continues significantly to be persistent up to four years. In other words, longer period is required for stabilization after an innovation in nominal exchange rate volatility compared to the inflation volatility. Furthermore, the peak response of deposit dollarization occurs just after the shock is given with a magnitude of about 1.1 percent and the total effect of the response is realized as 34 percent. On the other hand, since part of the effects of inflation is reflected by the nominal exchange rate, inflation volatility turns to be insignificant approximately just after a quarter parallel to the results of Metin-Özcan and Us (2007). Moreover, we observe from this analyses that the own effect of deposit dollarization seems to be most persistent where the own shock continue to be significant up to 5 years.

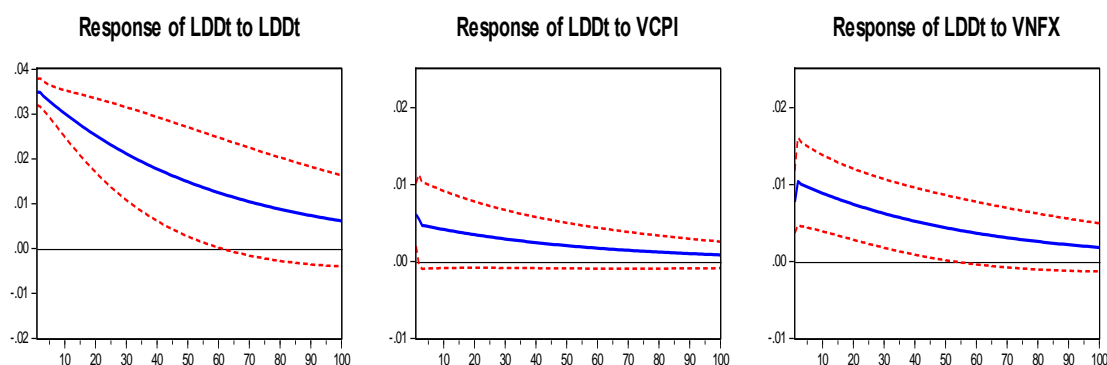


Figure 2. Impulse Responses of Model 2

Now, we add spread to our basic model and look at how the responses will change accordingly in model 3. As can be seen from figure 3, real exchange rate volatility again serves in a way to decrease the intensity of dollarization, while inflation volatility can be regarded to be insignificant for most of the period except for a short period of about half a year. However, we see the innovation in spread affects dollarization positively up to about 2 percent and is significant during two and a half years period. Further, the peak response occurs after nearly two years just before the effect becomes to be insignificant. Also, the total effect of spread is reached 41 percent during this period. Because spread tends to rise in times of macroeconomic uncertainties and falls in tranquil periods, it can be regarded as a reflection of increasing risk premium, as mentioned previously. Moreover, in an economic environment of increasing risk perceptions, deposit dollarization occurs as a result of the natural tendency among investors to hedge real value of the portfolio with a hard currency. Therefore, upward movements in spread induce investors to hold more foreign currency denominated financial assets rather than leading them to local currency assets. This explains why dollarization displays endurance even if higher real returns exist for TL denominated financial assets.

Response to Generalized One S.D. Innovations ± 2 S.E.

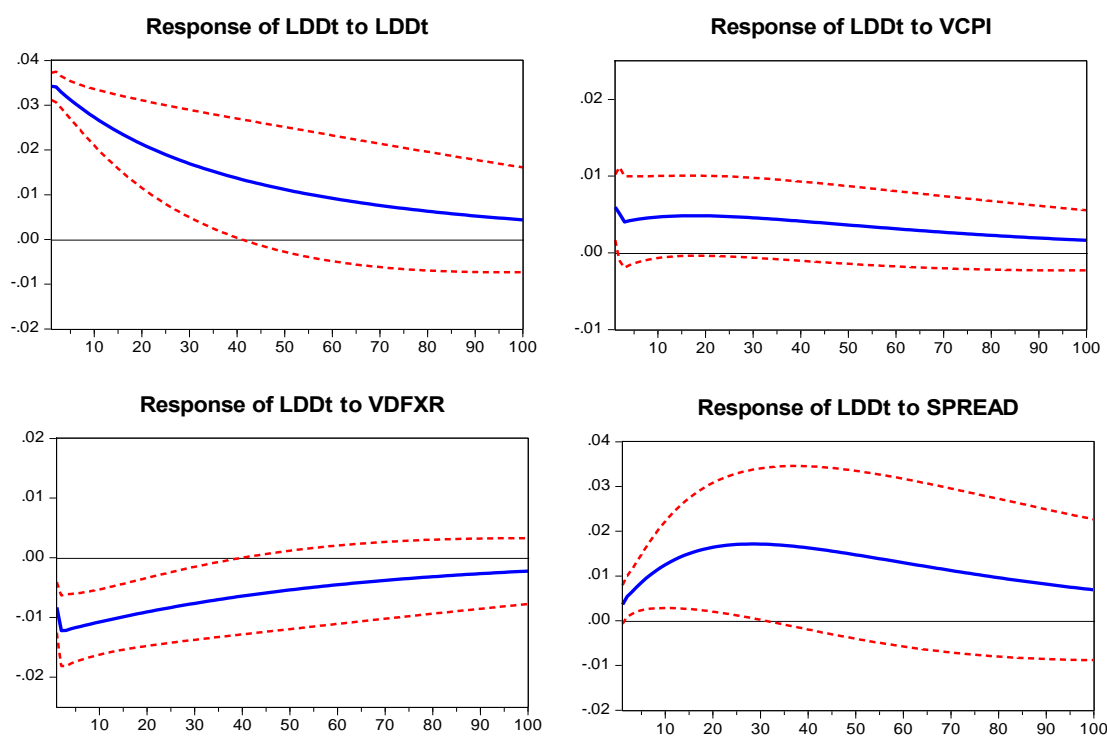


Figure 3. Impulse Responses of Model 3

In model 4, we add speculative pressures to our baseline model through SPI. Figure 4 indicates that innovations in both inflation volatility and speculative pressures do not seem to have any significant effects on influencing the course of dollarization in this case. In other words, effects of a shock given to these financial variables are insignificant for whole of the period. This can be due to the fact that the changes in the movements of the components (nominal exchange rate, interest rate and gross international reserves) with respect to speculative pressures may sometimes cancel out the effects on dollarization in a positive way. In addition, the case that inflation volatility turns out to be insignificant when adding SPI can be reasonable, because SPI also reflects the effects of inflation slightly by containing weighted changes in the nominal exchange rate.

On the other hand, it can be recognized that only an impulse given to real exchange rate volatility again shows a significant influence in changing the course of deposit dollarization inversely. Additionally, the maximum effect seems to have a

similar magnitude as in the previous analyses. Also, stabilization takes a long time with total effect of about 32 percent during three and a half years. Here, the result of the impulse response again indicate that the own effect is the most powerful and persistent on influencing deposit dollarization.

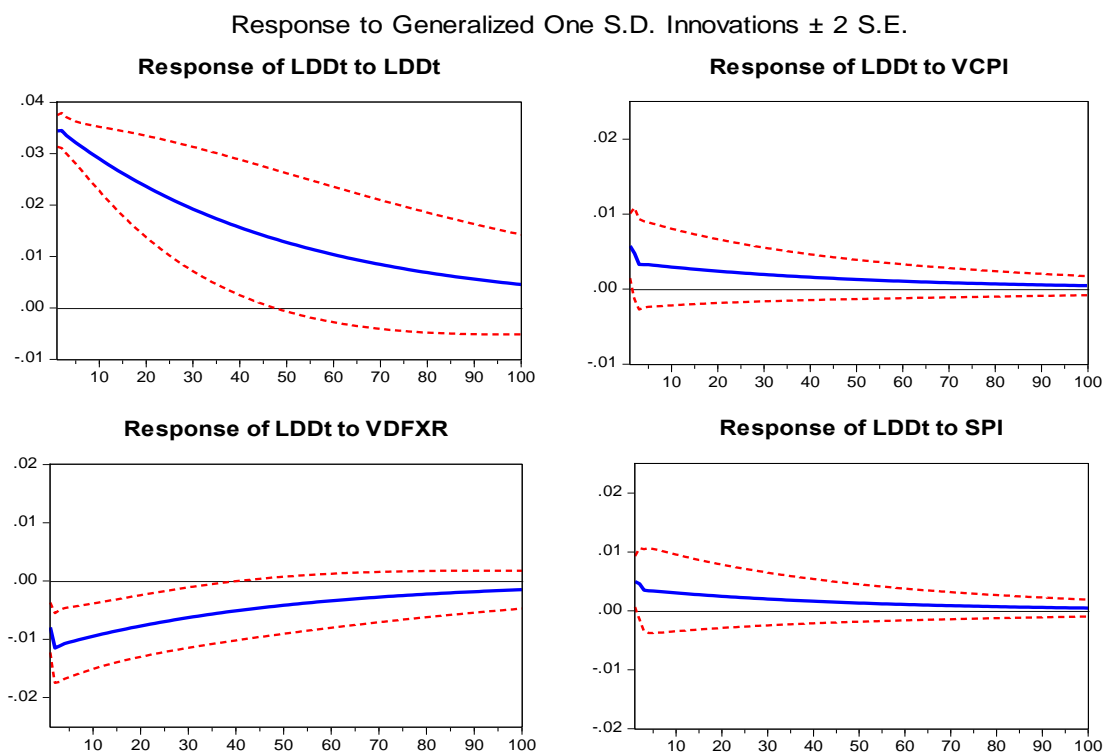


Figure 4. Impulse Responses of Model 4

However, if we have a look at the dynamic responses represented in figure 5 consisting from only spread and speculative pressure index for the broad sample, we are confident to state that the effects of shocks given to speculative pressures on deposit dollarization are already captured by the effects of spread in the same way. In this case, the generalized impulse response function results reveal cross-effects in deposit dollarization indicating that innovations transmit from one of the financial risk indicators to another. As can be seen in the figure below, a one unit shock given to speculative pressure index results in an immediate and positive effect on spread with a magnitude of approximately up to four times of the initial shock given.

Further, stabilization of the effect of SPI on spread continues for two years. Hence, although deposit dollarization does not seem to respond to shocks given to speculative pressure index, it is the spread as in the previous analysis that affects deposit dollarization positively and whose effect also reflect the speculative pressures at the same time. Finally, it is worth to note that own shock of spread is also significant to show persistence up to three years with a decelerating magnitude beginning from seven times of its initial shock. All in all, these analyses again provide evidence that spread is a reflection of macroeconomic risk and uncertainties.

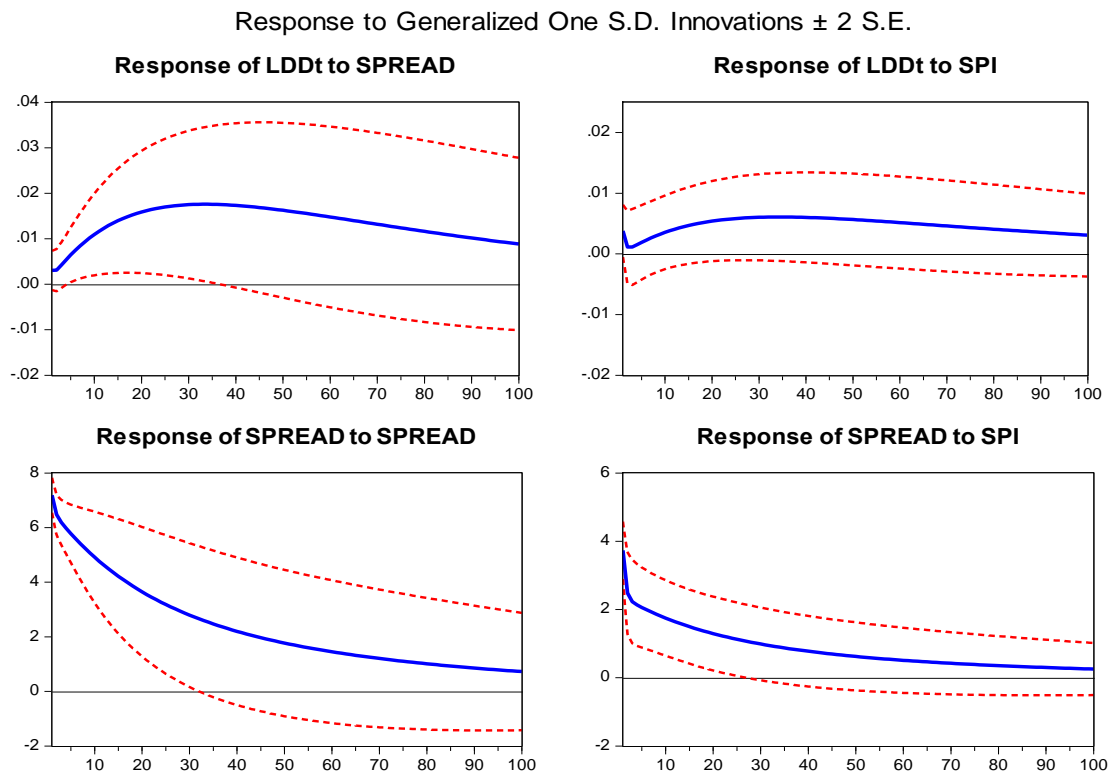


Figure 5. Impulse Responses of Model 5

In the next phase of our analyses, we take the pre and post inflation targeting policy periods separately into account. In model 6, we evaluate pre inflation targeting period covering the beginning of 1988 until the end of 2001 for the baseline model. One can realize from figure 6 that, in this period our baseline model consisting of only inflation and real exchange rate volatility displays similar results parallel to the full period model. One difference is that the impact of a shock given to inflation

volatility loses its influence rapidly after a few months. In spite of this, the immediate effect of this shock reaches to about 1 percent that causes an increase in deposit dollarization. Notwithstanding, an impulse given to real exchange rate volatility displays a robust impact in decreasing the ratio of deposit dollarization with a similar pattern as for the whole period. Last but not least, the greatest impact on deposit dollarization is coming from its own shock whose effect reaches to 4 percent and maintained significantly through 40 months period in the pre inflation targeting period. This is reasonable in the sense that the 1990's in the Turkish economy can be characterized by macroeconomic imbalances, financial instabilities and stabilization efforts which are reflected by perpetual rises in deposit dollarization ratios. Therefore, rather than only chronic inflation which had been taken for granted for many years, the effects of other macroeconomic risk indicators embedded in deposit dollarization can be argued to determine the path of dollarization in the pre inflation targeting period.

Response to Generalized One S.D. Innovations ± 2 S.E.

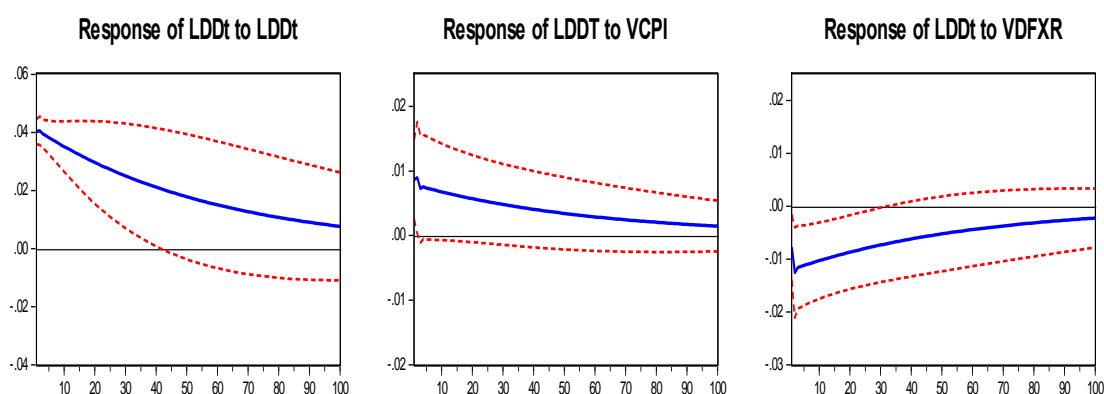


Figure 6. Impulse Responses of Model 6

In model 7, we use nominal exchange rate volatility and inflation volatility for pre-inflation targeting period. Results of the generalized impulse response analyses presented in figure 7 reveal the following: Except for the response of the deposit dollarization to innovation in inflation volatility, the impulse response for nominal exchange rate depreciation volatility is statistically significant. It can be

further recognized that following an initial hike of deposit dollarization up to 1.2 percent to an innovation in nominal exchange rate volatility, the effect on dollarization then starts to decline and stabilizes after about three years period. Under this period, deposit dollarization is exposed to a total effect of 36 percent.

Note that in this period, the monetary authority targeted the real exchange rate. Moreover, as shown in figure 7, the volatility of the nominal exchange rate is not as high as compared to the post IT period except the crisis periods of 1994 and 2001. This feature indicates that even the real exchange rate volatility is considerably lower; a shock given to it can be powerful enough to alter the course of dollarization. High nominal instabilities accompanied with gradual nominal exchange rate depreciations in this era can also be considered to pave way to increasing deposit dollarization. Additionally, it can be stated that weak macroeconomic fundamentals throughout the 1990's may induce the anticipation of further nominal depreciations and possibly an ultimate currency crisis among domestic and international financial investors which lead them to exhibit sensitivity to changes in the exchange rate.

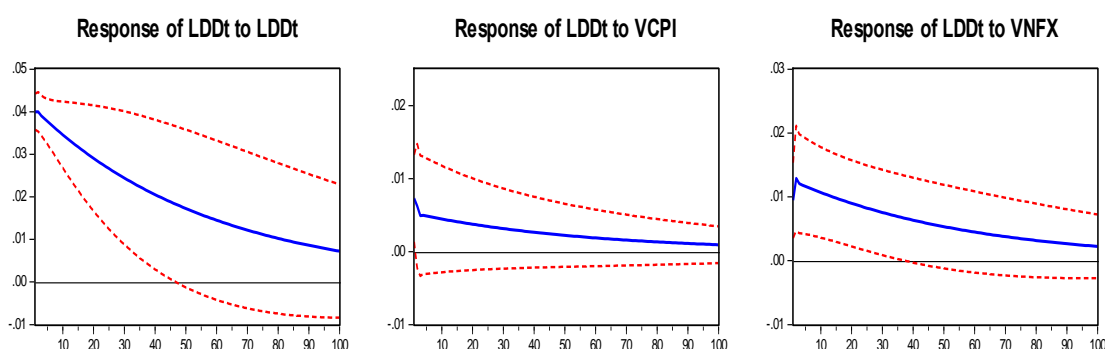


Figure 7. Impulse Responses of Model 7

Post inflation targeting period from January 2002 to February 2011 using the baseline model is evaluated in model 8. Impulse responses represented in figure 8 shows that the inflation volatility is insignificant and a shock given to it has no effect on dollarization at all in this period. This result is obvious in the sense that inflation volatility has considerably diminished by the beginning of the period where inflation was directly targeted as a nominal anchor. In other words, IT policy framework can

be regarded to be successful in not only bringing down high levels of inflation, but also its volatility which can also be observed in figure V.II.III. Furthermore, overcoming uncertainties about inflation under the IT policy regime undermines the hedging needs with a hard currency.

On the other hand, a shock given to the real exchange rate volatility affects the deposit dollarization with similar magnitude, persistence and significance compared to the full period model (Model 1). Rising volatility of the real exchange rate in this period also serves to discourage investors' appeal to foreign currency denominated financial instruments, since the real exchange rate volatility leads to increase the volatility of the real return of the portfolio comprised of financial assets with foreign currency denominations.

Finally, another remarkable observation from the results of generalized impulse response function of model 7 is that the effect of own shock of deposit dollarization is clearly reduced to 2.5 percent under IT policy framework though its stabilization takes significantly more time. Moreover, the total effect is subsided to 80 percent less than the case for the whole period. All in all; these effects together can be accounted for the changing course of dollarization to dedollarization.

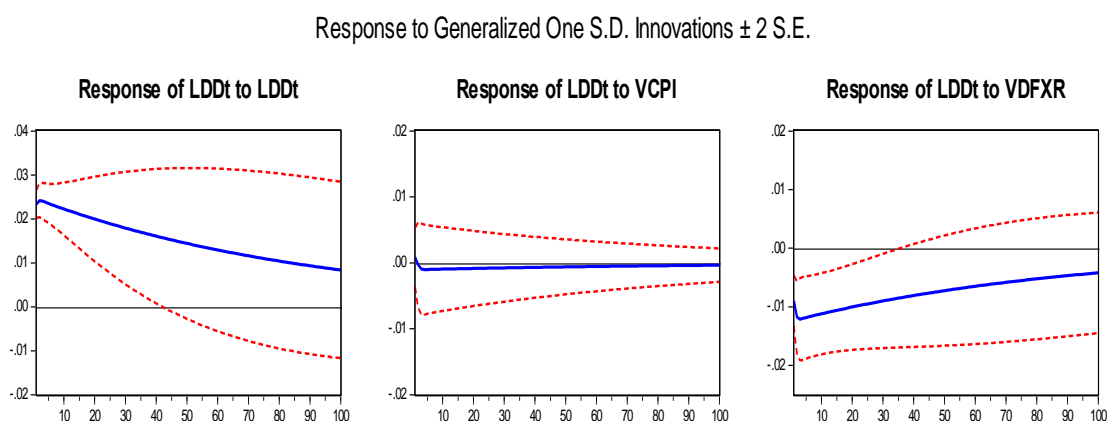


Figure 8. Impulse Responses of Model 8

In model 9, we replace real exchange rate volatility with nominal exchange rate volatility for the IT period. Impulse response results of this model are given in figure 9. Accordingly, one can observe that the fundamental response of dollarization

to a shock given to inflation volatility is not changed. On the other hand, one notable aspect from this analysis is that an innovation in nominal exchange rate depreciation does not have statistically significant effect in a way to give rise to deposit dollarization. What is more striking is that such a response is realized in increasingly volatile conditions of nominal exchange rate under the floating exchange rate system.

This case can be attributed to the fact that sustained confidence environment in the economy following macroeconomic stability and new dynamics experienced in the exchange rates with mostly nominal appreciations can avoid the investors' attempts to rely on hard currency to hedge their portfolio in this period. Therefore, the result from the generalized impulse response may provide evidence that dollarization has actually changed its course to dedollarization under IT regime. However, although dollarization has reversed its course, it is also observed that this trend has been rather slow with some interruptions for a while.

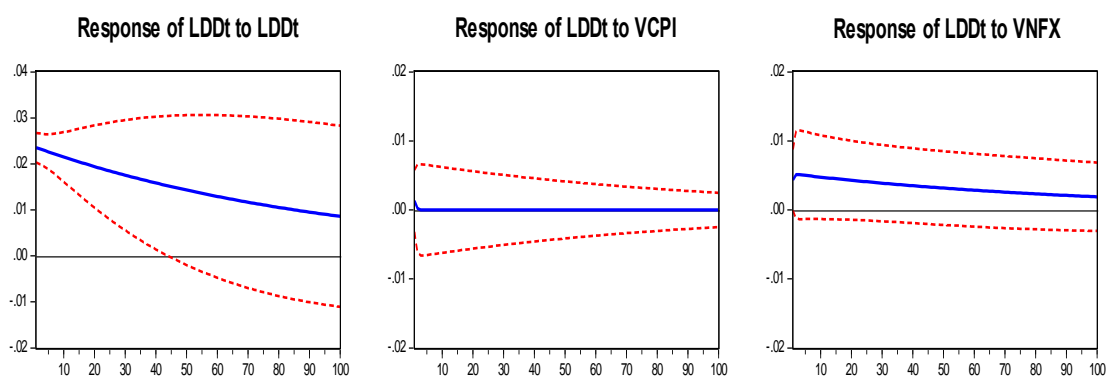


Figure 9. Impulse Responses of Model 9

In model 10, we include spread to our baseline model for the IT period. Impulse responses of this model presented in figure 10 reveals that the fundamental response of deposit dollarization under IT policy regime to impulses in respective volatilities does not change much. Although a shock given to inflation volatility is ineffective to influence deposit dollarization, an innovation in real exchange rate volatility has a significant effect to dampen the incentive towards deposit dollarization in terms of similar magnitude and persistence as in previous analyses. Furthermore, an innovation in spread again serves to give rise to deposit dollarization just as the case for the whole period.

One point is worth noting. Impulse response analyses indicate that the magnitude of the impact of an innovation in spread lessens by half of its previous effect and leads significantly to maximum 1.0 percent rise in deposit dollarization in this period. Further, stabilization of this effect takes somewhat longer with four years in contrast to the full term. However, the total effect is realized as about the same with an amount of 34 percent. Also, after an immediate response of about 0.5 percent increase in deposit dollarization to an impulse to spread, the maximum effect is realized after 20 months. The other salient feature in this analysis is the decreasing own effect of deposit dollarization in terms of both magnitude and persistence as is the case for the period under IT policy regime. The response of deposit dollarization to a shock to itself recedes to 2.5 percent and the duration of the significance of this effect continues only of about 2 years with a total effect of 39 percent.

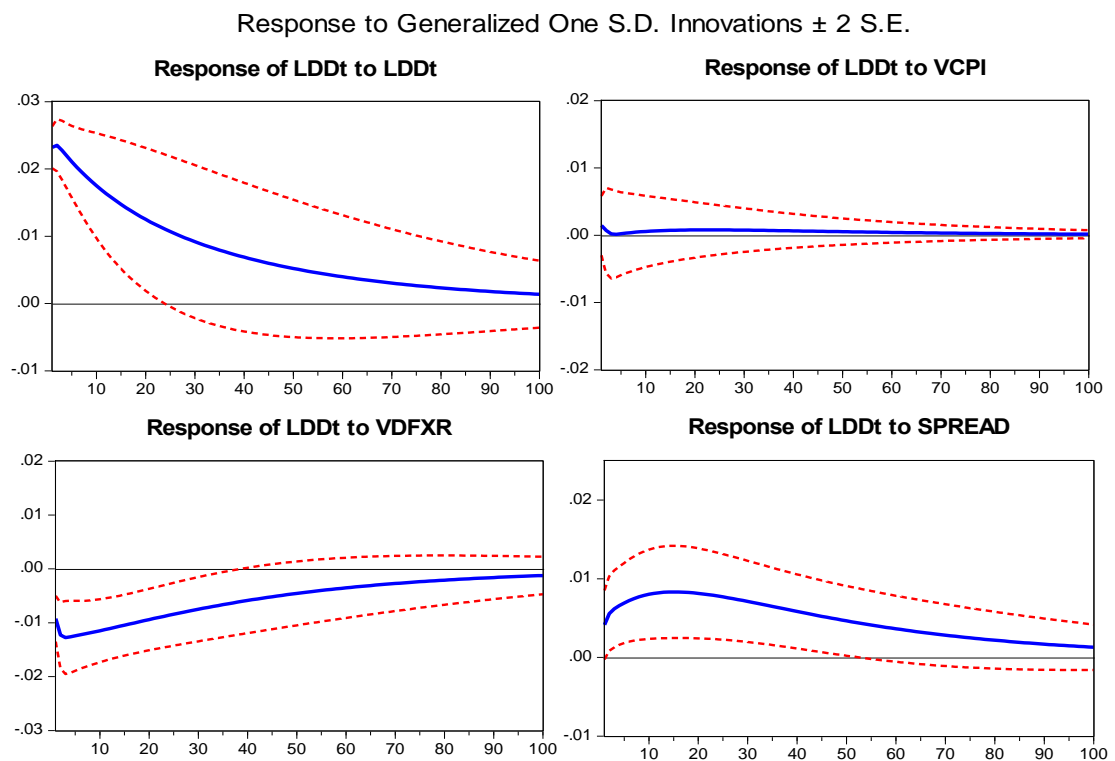


Figure 10. Impulse Responses of Model 10

Next in model 11, we include speculative pressure index rather than spread into our baseline model for the IT period. Results from the generalized impulse

functions are depicted in figure 11. Different from the case for the broad sample period, a shock to the speculative pressure index causes to an immediate 0.8 percent rise in deposit dollarization whose effect is peaked in a six months time. After the effect reaches to its maximum of 1.0 percent rise in deposit dollarization, its strength begins to decline though deposit dollarization continues to be affected for two and a half years with a total effect of 25 percent. So, speculative pressures in this case become to be significant in altering dollarization positively. This may be due to the fact that rising nominal exchange rate volatility in IT period turns out the effects of SPI positive. However, we do not observe any other important change in the dynamics of inflation volatility and real exchange rate volatility which provide another consistency check for our VAR models.

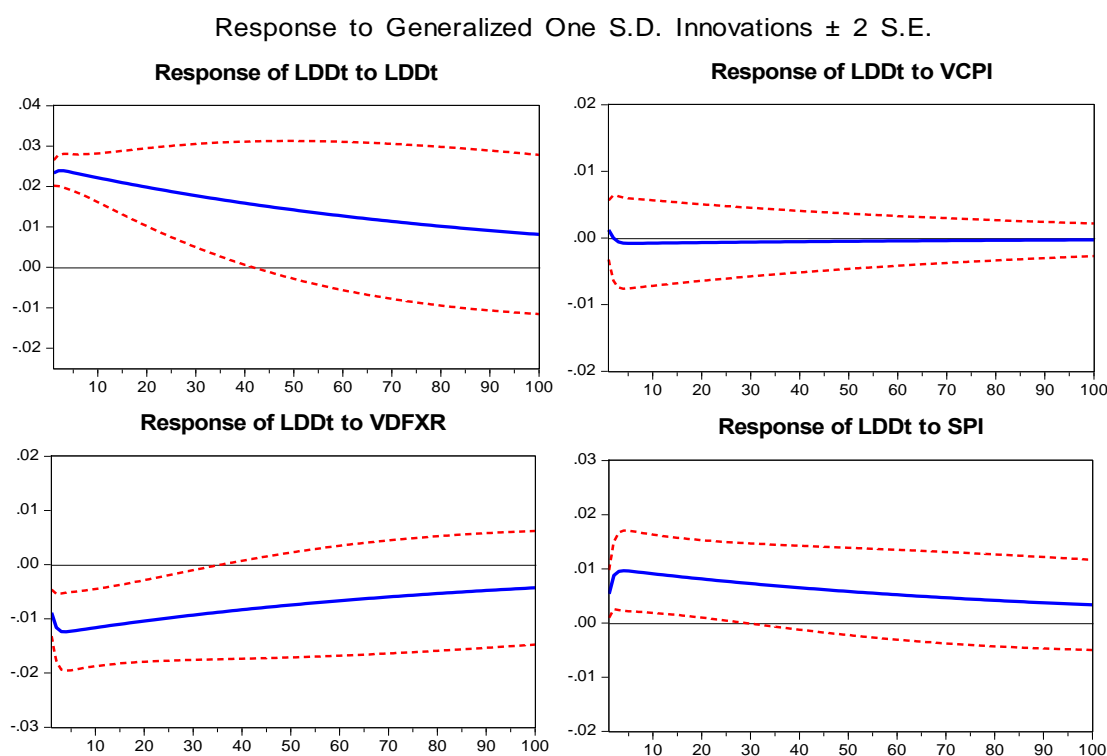


Figure 11. Impulse Responses of Model 11

In order to investigate the interlinkages between domestic financial risk indicators and to check whether their pattern has changed in affecting deposit dollarization under post IT policy regime, we build up a new model involving only

spread and speculative pressure index, which is model 12. According to the results of impulse responses demonstrated in figure 12, one can infer that deposit dollarization reacts positively to an innovation in speculative pressures as opposed to the case for the whole period which is consistent with results of model 11. Separately, we see that spread tends to influence dollarization in a decreasing way as it would be expected in the risk free economic environment. Nevertheless, such a response of deposit dollarization proves to be insignificant until the end of a year. However, a shock to spread then becomes significant in affecting dollarization to increase during three years period. Finally, as pointed out in figure 12, spread reacts positively to a one unit shock to speculative pressures from which we can once again draw the conclusion that the effects of speculative pressures are captured by the spread. Although spread continues to have a significant influence on deposit dollarization as pointed out in figure 10, its relative importance falls when we add speculative pressures to the model. This can be attributed to substantial falls in the risk premium after 2002. On the other hand, increasing financial awareness in this period is thought to make speculative pressures as a risk indicator to be more pronounced, since it is a composite indicator as described before.

Response to Generalized One S.D. Innovations ± 2 S.E.

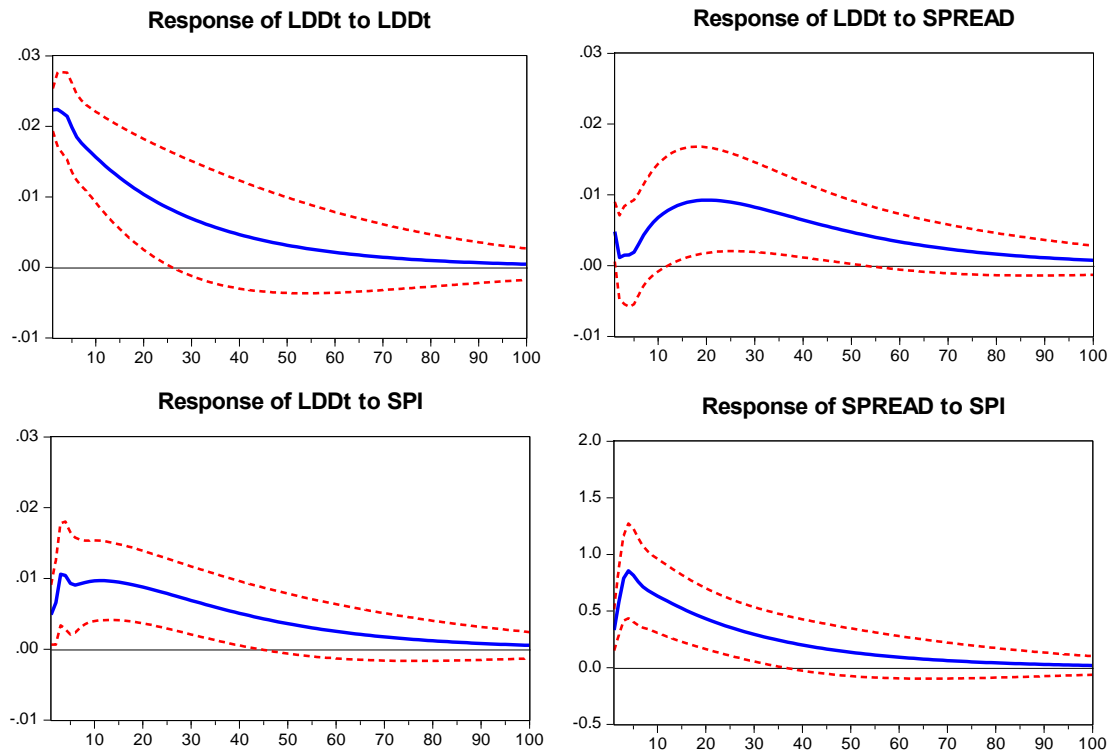


Figure 12. Impulse Responses of Model 12

In models 13 and 14, we try to analyse the responses of deposit dollarization to the international and sovereign risk indicators considering the data availability for the longest period possible. In model 13, volatility index (VIX) is used to measure global risk and in model 14 credit default swap (CDS) for Turkey is used to measure country specific risk. According to the results, while dollarization does not show a response to VIX, deposit dollarization responds positively with an immediate rise of about 0.8 percent to a one unit innovation in CDS. Moreover, deposit dollarization is exposed to a total effect of 15 percent. Furthermore, the peak response is realized at the end of the year with a magnitude of about 1.5 percent though stabilization takes a relatively short time vis a vis other financial indicators. This may be due to the fact that cds premiums reflect mainly the risk sentiments of international creditors towards a specific country. So, the market price of this risk premium can be affected by all kinds of events that are not solely related to the country's own economic conditions. For example, worries about debt sustainability of a major or peripheral economy can easily make way for an increase in the perceived risk regarding home

country in the international financial markets. Therefore, the effect of CDS on such a specific issue like dollarization can be expected to be limited as the analysis suggests.

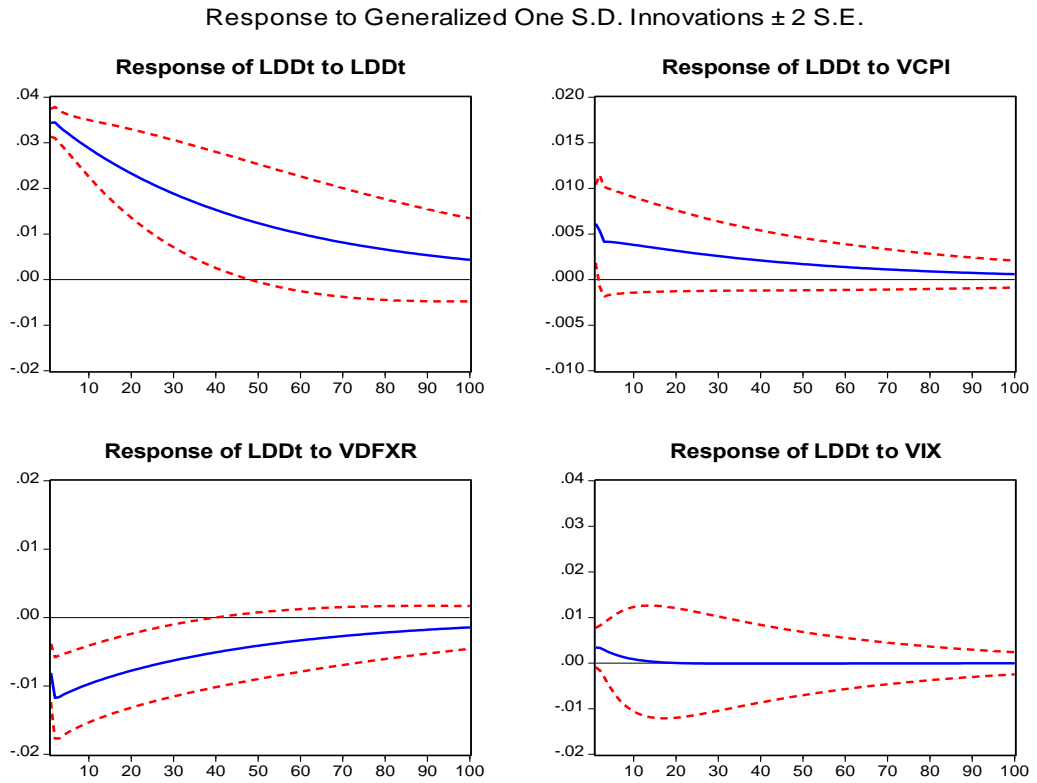


Figure 13. Impulse Responses of Model 13

Response to Generalized One S.D. Innovations ± 2 S.E.

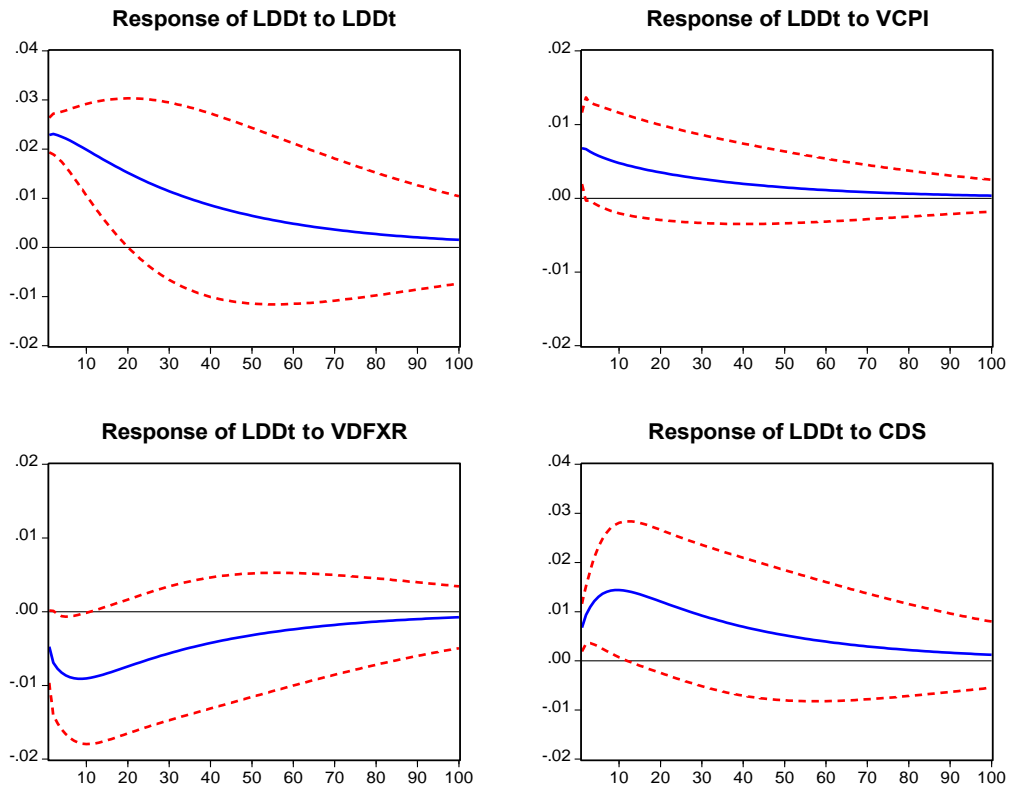


Figure 14. Impulse Responses of Model 14

Finally, in models 15 and 16, we also analyze the dynamic responses of offshore dollarization to innovations in not only the risk indicators, but also to a shock in the deposit dollarization. According to the results of the generalized impulse responses revealed in figures 15 and 16, it is not surprising to observe rising offshore dollarization ratios in the last decade. From these analyses, it is evident that offshore dollarization responds to risk negatively as expected. Actually, according to figure 15, effects of one unit shocks to speculative pressures and spread cause external dollarization to decrease up to its 0.3 percent. Moreover, the maximum effect is observed within 10 months. Afterwards, the effects of shocks on offshore dollarization decelerate continuously. However, the impulses of speculative pressures and spread continue to be significant for four and five years with a total effect of 9 percent and 11 percent, respectively. Moreover, if we associate deposit dollarization ratio with macroeconomic uncertainties as in the portfolio view, then it

is clear that an increase in domestic dollarization put a limit for the banking sector to raise new sources of funds from international intermediaries. Our results show that one innovation in deposit dollarization causes offshore dollarization to decline up to 0.3 percent where the effect endures significantly for two and a half years period with a total effect of 7.1 percent. Here, one can also realize that risk appetite in the international financial markets is insignificant in explaining offshore dollarization.

This indicates that the domestic banking sector can afford to raise funds in foreign currency when macroeconomic conditions are stable within the country. This tendency explains increasing pattern of offshore dollarization in the last decade. At the same time, benign risk perceptions among international creditors accompanied with global liquidity glut in the international financial markets especially between 2002 and 2007 facilitated borrowing conditions of domestic financial system. After a sharp fall in foreign credits used by domestic banking sector during global economic crisis in 2008-09, this tendency of domestic banking sector towards offshore dollarization continues accelerating, since it seems to be more profitable to support domestic lending.

However, the last analysis proves that risk perceptions specific to the country measured by CDS can be regarded as a determinant for external dollarization. To conclude, financial dollarization can be explained by the risk differences between currency denominations. In sum, a glance to the asymmetric movement of two features of dollarization phenomenon once again provided satisfying answer to this conundrum. Financial dollarization is a response to risk and uncertainty at both domestic and international levels. associated with the relevant When we refer to deposit dollarization, perceived risk differences among investors about the currency denomination of alternative financial instruments becomes influential in changing pattern of this phenomenon. In this case, this perceived risk differences are mainly influenced by domestic macroeconomic conditions. However, in the case of offshore dollarization, both sovereign risk and international risk sentiments determine the constraint on financing facilities and hence on offshore dollarization.

Response to Generalized One S.D. Innovations ± 2 S.E.

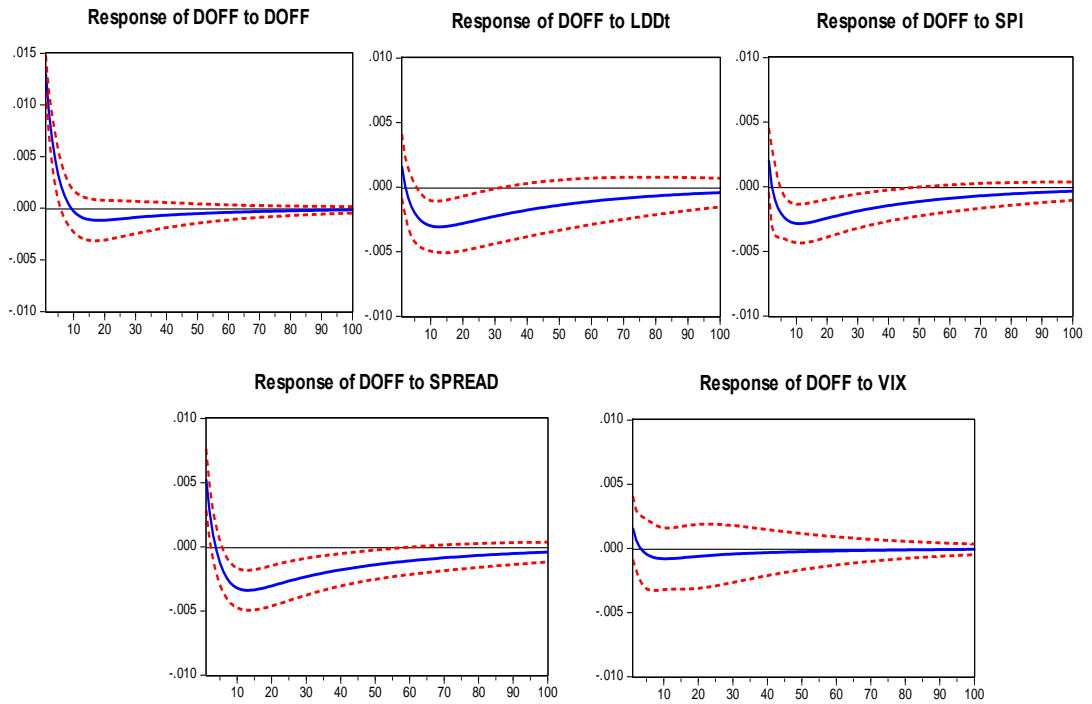


Figure 15. Impulse Responses of Model 15

Response to Generalized One S.D. Innovations ± 2 S.E.

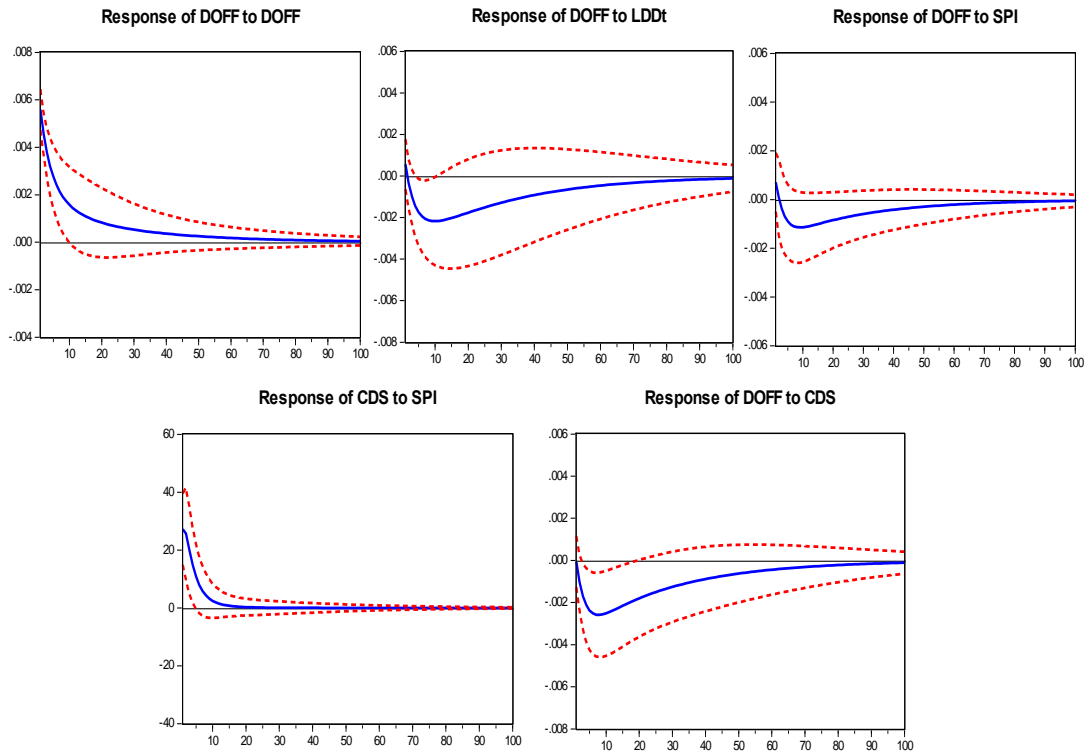


Figure 16. Impulse Responses of Model 16

CHAPTER VI

CONCLUSION

Dollarization has become an integral part of economic life among emerging market economies over the last three decades. Further, many emerging markets cope with the associated fragilities created by high levels of financial dollarization and the challenges related to international capital flows under this phenomenon. Therefore, dollarization bias is not desired by policy-makers as it is seen as a symptom of some underlying causes such as macroeconomic imbalances and associated risks towards the domestic economy. As for other countries, the dollarization experience of the Turkish economy has its roots in macroeconomic instabilities with high inflation uncertainty plus fixed or predictable exchange rate regimes and the lack of credibility of economic policies amid deteriorating risk perceptions.

The purpose of this study is to analyze financial dollarization (FD) phenomenon in the Turkish economy over the last two decades based on Ize and Levy Yeyati's (2003) MVP framework amid the signals of dedollarization. Taking both deposit and offshore dollarization into account, we consider this phenomenon in terms of the macroeconomic risk profile of the economy in general. Motivated by Ize and Levy Yeyati's (2003) MVP approach, we have investigated what the drivers of dollarization are, whether the trend in dedollarization can be taken for granted and also the role of the IT policy in attaining a reversal in the course of dollarization. Furthermore, we have also investigated the effects of other risk factors such as interest rate spread, speculative pressure index, credit default swap and volatility index on the course of deposit and offshore dollarization.

MVP approach is based on optimizing the currency composition of financial contracts depending on the risk and the return profile of agents' portfolios. Regarding this approach, financial dollarization is an increasing function of the inflation

volatility and a decreasing function of the real exchange rate volatility. Therefore, this framework carries an important macroeconomic policy implication. A monetary policy aimed at stabilizing high levels of inflation by fixing the exchange rate may reinforce the dollarization bias in the economy. In other words, the portfolio view suggest that if the expected volatility of inflation remains relatively higher than that of the real exchange rate, dollarization bias seems to be persistent even institutional and macroeconomic structures of a country have been improved in such a way that past macroeconomic imbalances has faded away.

One of the characteristics of dollarization process in Turkey is that Turkey has experienced the first stage of dollarization in which foreign currency is used mainly as a store of value but not as a means of payment. In this respect, the dollarization in Turkey can be referred to as financial dollarization (Yılmaz (2006)). Therefore, we can go on applying MVP framework to the Turkish economy. In order to apply this empirical framework to the Turkish case, we estimated firstly respective volatility series for inflation and real exchange rate by using the GARCH (1,1) method. As the empirical literature frequently use the nominal exchange rate changes on affecting dollarization, besides the real exchange rate we also took the volatility of the nominal exchange rate into account in our analyses. Then, we proceeded by VAR modelling to reveal which variables can be accounted for the dollarization and dedollarization trend in the course of time. We conducted generalized impulse response analyses which are invariant to the ordering of the variables. More specifically, we investigated how the pattern of dynamic responses changes in response to the innovations in these risk indicators over a horizon of 100 months.

Initially, we conducted our analyses for the period 1988 – 2010, and checked for the robustness of our results for pre and post IT period. The underlying rationale is that IT policy framework can be conducive for declining deposit dollarization ratios according to the inference of the portfolio view. Indeed, estimated volatility series show that inflation volatility is observed to be substantially reduced with the implementation of IT policy regime since the beginning of 2002. On the other hand, nominal and real exchange rates volatilities seem to have risen significantly in this

period. It is not surprising in that in IT policy strategy inflation is targeted while the exchange rates are allowed to float. So, the shift towards IT policy is important to consider in analyzing the changing course of dollarization.

According to the dynamic responses for the full period, our baseline model showed that the deposit dollarization ratio increases significantly in response to inflation volatility, while it decreases significantly as real exchange rate volatility rises. This result provides evidence that the portfolio view is valid for the Turkish case of financial dollarization. This means that investors care about real return of their portfolio and tend to diversify currency denomination of the portfolio when relative volatilities alter the currency risk. When we considered the nominal exchange rate volatility in our analysis, the evidence revealed that deposit dollarization responds positively to nominal exchange rate shocks for the full period. This finding can be explained that rising volatility of the nominal exchange rate is a reflection of increasing risk perception of investors due to certain imbalances in the economy. Further, since nominal exchange rate volatility captures the inflation volatility, the effect of inflation volatility turned to be insignificant in this case.

Next, we investigated the effects of other risk indicators on deposit dollarization for the full period. Accordingly, our finding shows that an innovation in spread causes an increase in deposit dollarization. This explains why dollarization displays persistence even with higher real returns of TL denominated financial assets. Although, the effect of an innovation in speculative pressures seems to be insignificant on deposit dollarization, one should be cautious about this result, since most of the effects of speculative pressures are captured by the spread.

According to the dynamic responses in the post IT period, we found that the inflation volatility is insignificant and a shock given to it has no effect on dollarization at all. This result is clear in the sense that inflation volatility has considerably diminished after targeting directly inflation as a nominal anchor. Furthermore, higher volatility of the real exchange rate than inflation volatility has reduced the hedging benefits of foreign currency financial assets in the post IT period. One notable aspect in post IT period is that effects of nominal exchange rate

depreciation volatility is found to be insignificant on deposit dollarization which can be attributed to confidence environment in the economy following macroeconomic stability for a considerable time. However, one should also consider the new dynamics experienced in exchange rates with mostly nominal appreciations in this sub-period which can avoid the investors' attempts to hedge their portfolio with foreign currency assets.

The effects of other risk indicators on deposit dollarization in the post-IT period reveal the same dynamics as for the dynamics in the full period. One exception is that the effect of one unit shock to speculative pressures becomes significant in increasing deposit dollarization. Moreover, the results indicate that the effects of a shock to volatility index is insignificant on deposit dollarization, while an innovation in credit default swap significantly leads to a rise in deposit dollarization. This outcome is reasonable, because the latter is directly correlated with international risk perceptions towards domestic economy.

All in all, two striking characteristics can be argued for deposit dollarization process in Turkey from our analyses. First of all, the effects of innovations in both nominal and real exchange rate volatilities on deposit dollarization are stronger and stabilization of respective effects take considerably longer period than that of the effects of inflation volatility. The other salient feature is that most of the effect on deposit dollarization comes from its own shock in both periods under consideration, though the response of deposit dollarization to a shock to itself recedes under the period of IT policy regime.

Furthermore, we investigated the dynamic responses of offshore dollarization to innovations in risk indicators. Here, we took deposit dollarization also as a risk indicator apart from spread, speculative pressures and credit default swap, because it is associated with macroeconomic uncertainties according to the portfolio view. Our results showed that offshore dollarization responds to risk negatively. This outcome is indicated by the activities of domestic banking sector as they can afford and/or have tendency to raise funds in foreign currency in cases of stable macroeconomic conditions. This explains recent increasing pattern of offshore dollarization in the Turkish economy.

To conclude, financial dollarization can be explained by the risk differences between currency denominations. High and volatile inflationary episodes, rising risk sentiments due to crises following macroeconomic instabilities in Turkey eroded the residents' real value of wealth and led them to hedge their portfolios by using a foreign currency. On the other hand, monetary policy shift towards implementing IT framework together with macroeconomic stability sustained for a considerable period can be regarded as milestones in reversing deposit dollarization in Turkey. Notwithstanding, dedollarization process has been advancing rather slowly considering the benign inflation rates. As a matter of fact, deposit dollarization increases when domestic economic conditions negatively dissociate from the rest of the world. Therefore, sustainability of macroeconomic stability is crucial in order to call this process as permanent dedollarization.

We can state that permanent dedollarization process can be sustained by adopting not only full-fledged IT strategy, but also implementing policy initiatives to support strengthening of the financial sector and overcoming market failures by promoting the use of domestic currency and developing hedging markets (Desormeaux (2006)). Therefore, a dedollarization strategy should embody these two pillars. Although, there is no direct policy initiatives in Turkey aimed at further decreasing the dollarization level as Metin-Özcan and Us (2007) indicate, the Turkish experience reveals how dedollarization process has emerged as a side benefit of sound macroeconomic fundamentals and a credible monetary policy.

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APPENDIX A: ESTIMATION RESULTS OF INFLATION VOLATILITY

Dependent Variable: DLCPI

Method: ML - ARCH

Sample (adjusted): 1987M02 2011M04

Included observations: 291 after adjustments

Convergence achieved after 23 iterations

Variance backcast: ON

GARCH = C(6) + C(7)*RESID(-1)^2 + C(8)*GARCH(-1)

	Coefficient	Std. Error	z-Statistic	Prob.
DLCPI(-1)	0.459072	0.037978	12.08779	0.0000
DLCPI(-5)	0.186866	0.032974	5.667111	0.0000
DLCPI(-12)	0.300230	0.030145	9.959658	0.0000
D1994	0.054901	0.003798	14.45389	0.0000
D2001	0.016819	0.003602	4.669220	0.0000

Variance Equation

C	5.04E-06	3.15E-06	1.601536	0.1093
RESID(-1)^2	0.297878	0.058982	5.050316	0.0000
GARCH(-1)	0.726966	0.045684	15.91302	0.0000
R-squared	0.596628	Mean dependent var		0.030780
Adjusted R-squared	0.586650	S.D. dependent var		0.026182
S.E. of regression	0.016833	Akaike info criterion		-5.780185
Sum squared resid	0.080187	Schwarz criterion		-5.679200
Log likelihood	849.0169	Durbin-Watson stat		2.111736

APPENDIX B: ESTIMATION RESULTS OF NOMINAL EXCHANGE RATE VOLATILITY

Dependent Variable: DLNFX

Method: ML - ARCH

Sample (adjusted): 1986M11 2011M04

Included observations: 294 after adjustments

Convergence achieved after 40 iterations

Variance backcast: ON

GARCH = C(8) + C(9)*RESID(-1)^2 + C(10)*GARCH(-1)

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.003292	0.001383	2.379870	0.0173
DLNFX(-1)	0.509712	0.039886	12.77917	0.0000
DLNFX(-3)	0.156557	0.039166	3.997218	0.0001
DLNFX(-7)	0.053984	0.015695	3.439682	0.0006
DLNFX(-9)	0.068489	0.027862	2.458206	0.0140
D1994	0.149027	0.016119	9.245210	0.0000
D2001	0.147766	0.008072	18.30649	0.0000
Variance Equation				
C	0.000259	4.22E-05	6.144611	0.0000
RESID(-1)^2	1.025345	0.167521	6.120690	0.0000
GARCH(-1)	0.050669	0.043678	1.160048	0.2460
R-squared	0.288706	Mean dependent var		0.026091
Adjusted R-squared	0.266165	S.D. dependent var		0.048304
S.E. of regression	0.041379	Akaike info criterion		-4.302778
Sum squared resid	0.486279	Schwarz criterion		-4.177486
Log likelihood	642.5084	F-statistic		12.80804
Durbin-Watson stat	2.083103	Prob(F-statistic)		0.000000

APPENDIX C: ESTIMATION RESULTS OF REAL EXCHANGE RATE VOLATILITY

Dependent Variable: DLFXR

Method: ML - ARCH

Sample (adjusted): 1987M12 2011M04

Included observations: 281 after adjustments

Convergence achieved after 63 iterations

Variance backcast: ON

GARCH = C(9) + C(10)*RESID(-1)^2 + C(11)*GARCH(-1)

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.007584	0.001594	4.757216	0.0000
DLFXR(-1)	0.202017	0.060070	3.363052	0.0008
DLFXR(-2)	-0.256082	0.062630	-4.088793	0.0000
DLFXR(-8)	-0.129690	0.038719	-3.349544	0.0008
DLFXR(-9)	0.115316	0.045010	2.561986	0.0104
DLFXR(-10)	-0.116061	0.051151	-2.268989	0.0233
D1994	-0.141879	0.007147	-19.85018	0.0000
D2001	-0.116293	0.006867	-16.93495	0.0000

Variance Equation				
C	0.000134	4.69E-05	2.862080	0.0042
RESID(-1)^2	0.467417	0.115244	4.055877	0.0000
GARCH(-1)	0.450616	0.099746	4.517650	0.0000

R-squared	0.292152	Mean dependent var	0.002513
Adjusted R-squared	0.265936	S.D. dependent var	0.037216
S.E. of regression	0.031886	Akaike info criterion	-4.327769
Sum squared resid	0.274513	Schwarz criterion	-4.185342
Log likelihood	619.0516	F-statistic	11.14379
Durbin-Watson stat	1.908150	Prob(F-statistic)	0.000000