FOREIGN CURRENCY LENDING AND BANKING SYSTEM STABILITY: NEW EVIDENCE FROM TURKEY

Emre Özsöz, Erick W. Rengifo, and Ali M. Kutan[*]

ABSTRACT This paper studies the drivers of foreign currency lending by Turkish banks along with its consequences for the banking system in particular and for the economy in general for the period between 2003 and 2009. Our sample ends in 2009 because foreign currency lending to households in Turkey is banned starting in the second quarter of 2009. We highlight possible risks to the Turkish banking system as a result of the system's heavy exposure to exchange rate and default risks. Our findings show that deposit dollarization seems to be the most important driver of loan dollarization in the case of Turkey. We also find evidence that larger banks in general tend to lend more in foreign currency. There is no evidence that bank cash holdings and their balances with the Central Bank affect bank lending behavior. We also evaluate whether the decision taken by the regulatory authorities in Turkey in 2009 to ban foreign currency lending to households had merits.
JEL F31, G21, 024
Keywords Dollarization, Foreign currency lending, Banking system stability

ÖZ Bu çalışma 2003-2009 yılları arasında Türk bankalarının döviz kredisi açmalarına neden olan değişkenleri ve bu kredilerin özelde bankacılık sistemine ve genelde Türk ekonomisine etkilerini incelemektedir. Örneklem, 2009 yılının ikinci çeyreğinde özel kişilere verilen döviz kredilerinin kanunen yasaklanmasından dolayı, bu tarihe kadar olan kısmı kapsamaktadır. Çalışmada, Türk bankacılık sisteminin kurdan ve geri ödemelerden kaynaklanan olası risklerine dikkat çekilmiştir. Bulgular, kredi dolarizasyonunun en önemli nedeninin mevduat dolarizasyonu olduğunu göstermektedir. Genel olarak büyük bankaların döviz cinsinden daha çok kredi verdikleri dikkat çekerken; bankaların likidite pozisyonlarının kredi verme üzerine etkisinin olmadığı görülmektedir. Ayrıca çalışma 2009 yılında kanun koyucu tarafından alınan kararın başarılı olup olmadığı konusuna da ışık tutmaktadır.
DÖVİZ KREDİ BORÇLARI VE BANKACILIK SİSTEMİ İSTİKRARI: TÜRKİYE ÖRNEĞİ
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[*] Center for Int'l Policy Studies (CIPS), Dept. of Economics, Fordham University 441 East Fordham Road, Bronx, NY 10458 ■ **ÖZSÖZ:** ozsoz@fordham.edu ■ **RENGIFO:** rengifomina@fordham.edu ■ Department of Economics and Finance Southern Illinois University Edwardsville, Edwardsville, Illinois 62026-1102 ■ **KUTAN:** akutan@siue.edu

1. Introduction

Saving and lending in foreign currency or dollarization is a wide-spread phenomenon in emerging markets and developing economies. Until recently, governments have embraced dollarization by allowing their citizens to open foreign currency savings accounts and by enabling them borrowing in foreign currency. However, the foreign currency (FC) lending trend has recently started to reverse itself. For example, regulators in Hungary, Latvia, and Poland have tightened eligibility requirements for borrowing in foreign currency and have encouraged banks to use moral suasion to deter retail level foreign currency borrowing. The authorities in these countries required banks to disclose the exchange rate risks of FC loans to their clients.

In countries like Croatia, Kazakhstan, and Romania stronger provisioning requirements were also imposed on FC lending (Brown and Haas, 2010). Ukraine completely banned FC lending to households in late 2008. Turkey followed by banning all foreign currency loans to households. On June 16, 2009, the Turkish government removed a provision from its existing laws that had allowed Turkish residents to borrow (for consumption needs) in FC from Turkish banks.[1] This ended the era of foreign currency lending in Turkey at least in the sense of consumer loans (corporations are still allowed to borrow in FC provided the maturity of the loan is more than a year and the amount announced is more than 5 million US dollars or its equivalent in other foreign currency).

More recently, in 2011, the Korean government banned banks and other financial institutions from investing in FC denominated bonds (Kimchi Bonds) that were used for conversion into local currency by Korean companies who needed foreign currency financing. Other countries that have taken measures to restrict the growth of FC loans in 2011 include Angola, Belarus, and Serbia.

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[1] A new provision was added to Decree No. 32, "the Law Regarding the Protection of Value of Turkish Currency" which enabled Turkish banks to provide foreign currency loans to Turkish residents provided that the average maturity of each loan is more than one year and the loan amount is more than USD5 mio. On the other hand, following these amendments Turkish residents were now only able to obtain foreign indexed loans from Turkish banks for commercial or professional purposes, which meant that Turkish banks could no longer provide foreign indexed consumer loans. The law was made effective immediately. For more information see Pekin and Pekin at www.pekin-pekin.com.

The reversal in policy in emerging market economies illustrated by the above examples is note-worthy. It points to a change in regulators' attitudes towards dollarization of deposits and loans in their countries. Understanding the motivation behind this regulatory shift is important for advancing the dollarization literature.

This paper aims to shed light on the dynamics of foreign currency borrowing and lending in Turkey over a span of seven years prior to the regulatory change (2003-2009). Our analysis ends in 2009 because foreign currency lending to households in Turkey is banned starting in the second quarter of 2009. Our goal is not to answer the question of why Turkish regulators adopted the policy change but rather to shed light on the dynamics of foreign currency lending behavior of Turkish banks in the run-up to this policy change. Our findings help to understand how the dynamics of borrowing and lending in FC and may provide insights into the shift in policy through an evaluation of the drivers of FC lending. Moreover, we highlight possible systemic risks that arise as a result of Turkey's heavy exposure to loan dollarization.

We believe that understanding the behavior of FC lending in Turkey is important for several reasons. As a highly dollarized economy, Turkish financial system is, by nature, very vulnerable to changes in foreign exchange rates. Sudden currency movements not only affect saving accounts but also have a potential impact on banks' balance sheets. This works through the transformation of exchange rate risk to default risk by the banking system. It is common in dollarized economies such as Turkey to lend and borrow in foreign currency. From a bank's perspective, when faced with an increase in foreign currency deposit, lending in foreign currency may seem as a hedging mechanism. However, this merely transforms one type of risk (exchange rate risk) to another (default risk) without eliminating it. Foreign currency lending may have higher default rates during financial crises compared to local currency ones. Unhedged foreign currency borrowing in that sense is a threat not only to financial but also to social stability.

Previous literature has tried to answer the question of why in many economies households and firms borrow and make deposits in FC. There are several answers that have emerged over time: The oldest theory in literature, the Currency Substitution Hypothesis, links the erosion of money's function as a store of value to increased rates of saving and credit dollarization.[2] In

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[2] For more on Currency Substitution Hypothesis, see the surveys by Calvo and Vegh (1997), Savastano (1996) and by Giovannini and Turtelboom (1994).

fact, it has been common for countries with high inflation rates to also have high dollarization ratios. However, this theory fails to explain the non-occurrence of de-dollarization in the wake of stabilization of inflation rates in the countries where dollarization has been widespread.[3]

Another explanation is the so-called Minimum Variance Portfolio (MVP) Hypothesis set forth by Ize and Levy-Yeyati (2003) and Levy-Yeyati (2006). The authors focused on the relative volatility of returns to financial assets in local and foreign currency.[4] Recently Basso, Calvo-Gonzalez, and Jurgilas (2011) used the MVP framework and showed that interest rate differentials matter for the dollarization of both loans and deposits in the case of 24 transition economies.

The third and the final view on the persistence of deposit and credit dollarization is centered on the quality of institutions in the dollarized economy, also known as the institutional view. This approach suggests that the lack of credibility in the institutional framework can lead depositors to continue saving in foreign currency or to banks to continue lending in foreign currency even after price level has been stabilized (Levy-Yeyati, 2006). There is evidence to the validity of this theory as recently highlighted by Neanidis and Savva (2009) who showed that institutional quality influences short-run dollarization decisions taken by banks.

Besides the reasons behind dollarization of savings and credit in a banking system, the impact of the heavy exposure to liability dollarization for banking systems in these economies is also important. De Nicolo, Honohan, and Ize (2005) are the first to empirically assess the effect of dollarization of bank deposits on the financial deepening of a country.[5] Their findings suggest that mainly for higher inflation economies, dollarization strengthens the financial system through the moderating effect of dollarization on the adverse effects of inflation on monetary depth. However, the authors also recognize that the more dollarized the system, the

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[3] Savastano (1996) attributes this persistence to the past experiences of high inflation among savers which foster high-inflation expectations even after stabilization has been achieved.

[4] In this model, dollarization is driven by volatility of inflation and real exchange rate depreciation rather than the expected inflation and nominal depreciation. The domestic interest rate is determined according to an interest parity condition that is not related to the degree of financial dollarization in the country. Thus, for a given variance of inflation, an increase in the variance of the rate of depreciation reduces dollarization by limiting the hedging benefits of dollar assets. One important implication of this model is that it suggests that financial dollarization will persist as long as inflation volatility remains high in relation to exchange rate volatility even under low inflation.

[5] De Nicolo, Honohan, and Ize (2005) also point out the lack of a theoretical framework or empirical literature on this issue.

riskier it becomes. As explained earlier, the increase in risk comes from the transformation of the exchange rate risk into higher default risk in dollarized economies. Dollarization literature has drawn attention to this phenomenon (i.e. Calvo, 2002). More recently Luca and Petrova (2008) used an optimal portfolio allocation model to analyze the practice of foreign-currency denominated lending by banks in transition economies and showed that banks once exposed to foreign currency risk through accumulation of dollar liabilities shift this risk onto their corporate customers by lending in foreign currency, a practice which increases the exposure of the economy to currency and financial crisis even in the presence of deep and liquid forward foreign exchange markets. Ozsoz (2009) and Kutan, Ozsoz, and Rengifo (2012) in the meantime have shown that banks in dollarized economies have lower profitability and behave more risk-averse probably as a consequence of this risk.

We know from existing literature and from recent crises experienced by emerging market economies that financial difficulties arising in the banking sector can lead to a general recession or might have negative spillover effects in non- financial sectors as well (Setser, Allen, Keller, Rosenberg, and Roubini, 2002). Understanding the Turkish banking system and its exposure to foreign currency saving and lending has universal applicability. The fact that other emerging market economies (e.g. Korea) restricted their FC lending also suggests that the findings of our study may have implications beyond the scope of one country.

The plan of this paper is as follows: In the next section we provide a brief summary of macroeconomic developments in Turkey within the last decade that can provide us economic intuition of the balance-approach analysis that we present later. In Sections 3 we describe our methodology and introduce our dataset used in the paper. Section 4 summarizes our findings and a discussion on the implications of our findings. We conclude in Section 5.

2. Macroeconomic Developments in Turkey

In this section we present a brief analysis of the most relevant and recent macroeconomic developments in Turkey. Our goal is to clearly show the significant relationships that are observed between economic variables that influenced the evolution of dollarization in Turkey and that serve as the basis of our analysis in the following sections.

Figure 1. FC Loans to Total Loan Portfolio in the Turkish Banking System
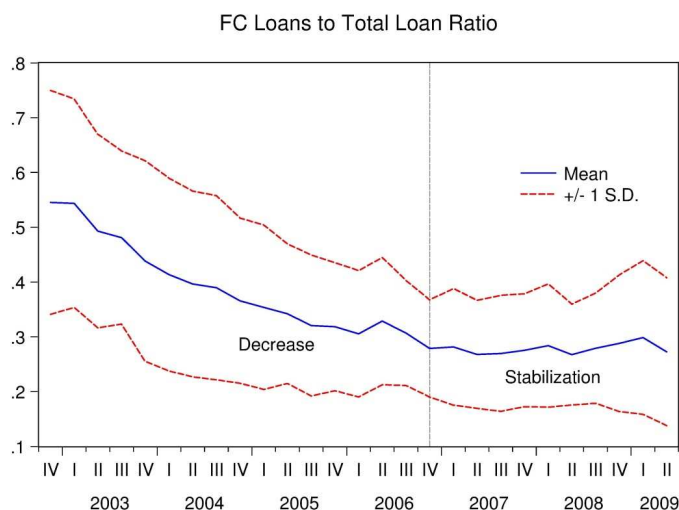
The figure shows the average ratio of foreign currency denominated loans to banks' overall loan portfolio in our sample with +1/-1 standard deviation bounds. The figure covers the 2002-Q4 until 2009-Q2.

Until recently foreign currency loans have constituted a sizable portion of banks' loan portfolios in Turkey. Figure 1 presents the ratio of FC loans to total loans. FC loans accounted for 54% of the total money lent in Turkey at the end of 2002 and for 27% in 2009.[6] It is important to note that there is a sharp decrease in this ratio during 2002 and 2006 and it stabilizes at around 28% afterwards. Despite the drop, by the end of 2006, approximately a quarter of all loans in the banking system were still denominated in foreign currency.

Figure 2 shows the same ratios for the largest (in terms of assets) non-state owned banks in our sample as of second quarter of 2009.[7] As the figure makes it perfectly clear, all non-state owned banks at the end of the sample period have had foreign currency loans close to 28% of their total loan portfolios. Such heavy exposure to foreign currency lending must have obviously been a cause for concern to regulators.

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[6] The minimum value of this ratio was 3% for Ziraat Bank in the second quarter of 2009 and the maximum was 85% for Finansbank in the first quarter of 2003.

[7] As of 2009, these banks represented over 56% of all assets in the Turkish banking system.

Figure 2. FC Loans to Total Loan Portfolio for the Largest Non-state Banks
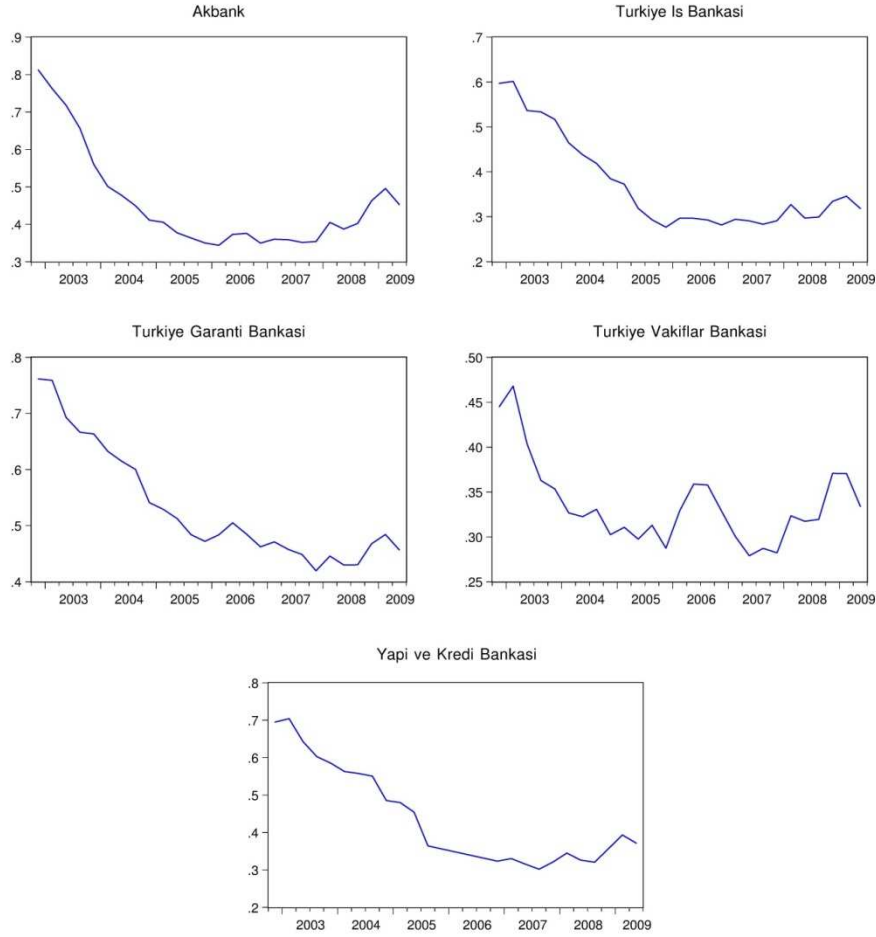
The figure shows the ratio of foreign currency denominated loans to overall loan portfolios of the five largest non-state owned banks in our sample. The figure covers 2002-Q4 until 2009-Q2.

Figure 3 presents the time series of the aggregated loans in FC and Turkish lira. It can be seen that loans denominated in local currency grew at a faster pace than those in foreign currency. This growth difference is clearer starting at around 2004. Prior to this date we observe that FC loans were predominant. The figure also illustrates the rapid growth of loans regardless of the currency denomination.

**Figure 3. Foreign Currency and Turkish Lira Loans Adjusted for Inflation**
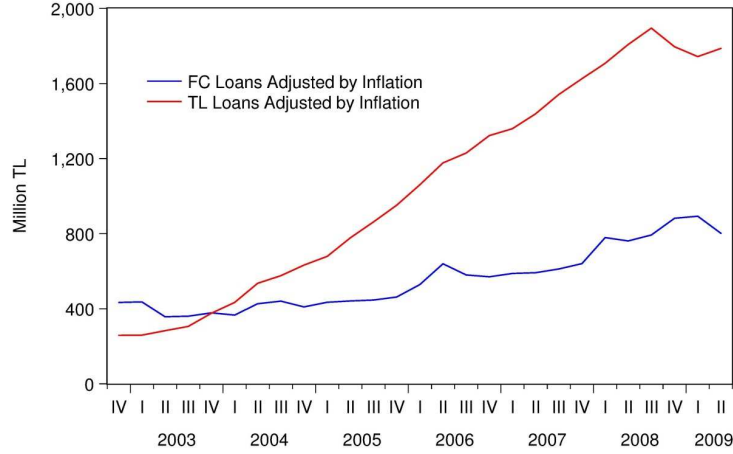
The figure shows the level of foreign currency and Turkish lira denominated loans extended by the banks in our sample during the study period. Both series are in terms of million Turkish liras and are adjusted for inflation. The figure covers the period from 2002-Q4 until 2009-Q2.

2.1. Falling Inflation and Credit Dollarization

Turkish monetary authorities have been following an implicit inflation targeting (IT) regime since 2002 and a full blown IT regime since 2006.[8] During this period the inflation rate decreased from 45% to 10%.

Figure 4 shows the ratio of foreign currency loans to loans in local currency and the inflation rate for our study period. The figure suggests that inflation is highly correlated with the ratio of foreign currency loans to domestic currency loans. Considering that FC loans were steadily decreasing during this period (see Figure 1) as a consequence of falling inflation, the Turkish lira denominated loan growth increased at a higher pace than that of foreign currency loans. This observation reaffirms the currency substitution hypothesis which suggests the main cause of dollarization in an economy is the high inflation rate. For our sample period, the correlation coefficient between inflation and the ratio of foreign currency deposits to total deposits is 58.3% and the correlation between inflation and loans in foreign currency is 62%.

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[8] According to the Monetary and Exchange Rate Policy report for 2007, Turkey adopted the inflation targeting regime formally at the turn of 2006.

Figure 4. Inflation vs FC to TL Loan Ratio
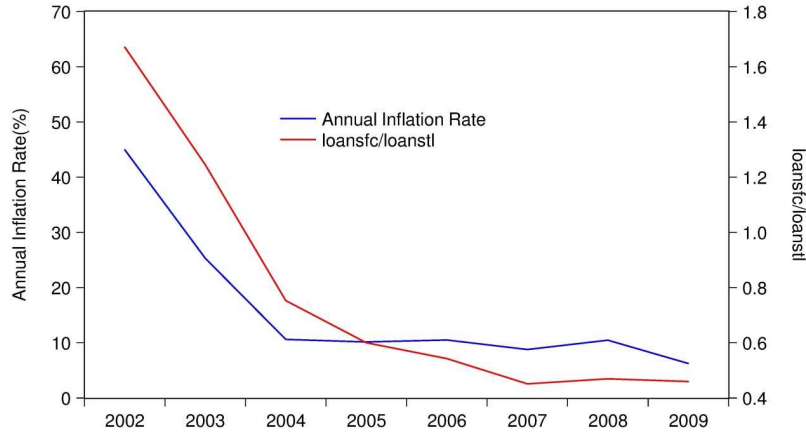
This figure presents Turkey's annual inflation rate (left scale) and the ratio of loans in FC to loans Turkish lira (right scale) for the period 2002-Q4 to 2009-Q2.
Source: Turkish Banks Association & Central Bank of Rep. of Turkey (CBRT).

2.2. A Growing Economy

During our sample period, Turkey has maintained an annual average real GDP growth rate of 4.57%, ranking among the fastest growing economies in the world. Turkish export volume increased 60% between January 2003 and June 2009. The foreign direct investment (FDI) flows into the country increased from less than 1 billion US dollars in 2002 (0.46% of GDP) to over 6.8 billion US dollars (1.2% of GDP) in 2009.

The average growth in manufacturing for the 2002-2009 period was 4.7% and the gross capital formation grew at an average of 7.6% for the same period despite the Global Financial Crisis. Although the unemployment rate has hovered around 10-11% and the labor force participation rate has not changed significantly (around 49%) during our sample period, Turkey has achieved a phenomenal growth in its income levels. The GNI per capita has increased from $3460 in 2002 to over $9000 in 2009, while the percentage of population earning less than $2/day has decreased by half from 9.57% in 2002 to 4.16% in 2009. We provide additional information regarding these economic variables in Table 1.

Figure 5. Turkish Banks' Borrowing and Securitization Activity
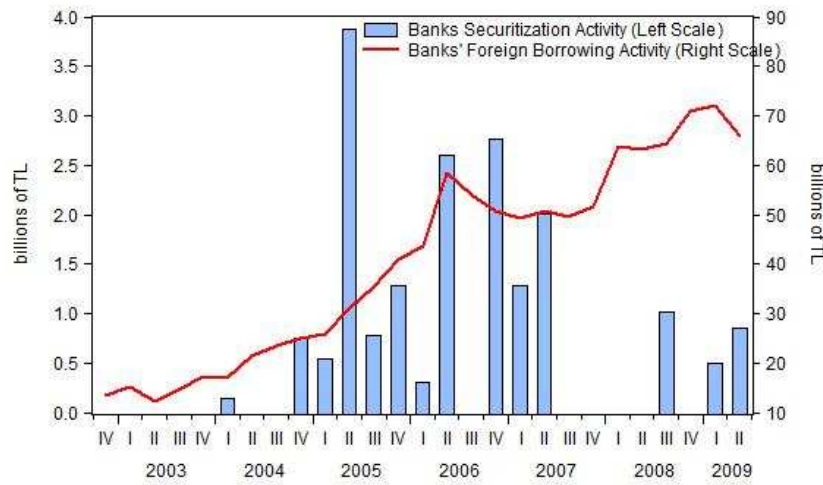
The figure shows the securitization activity by Turkish banks during the study period and foreign currency borrowed from foreign banks by Turkish banks during our study period. All figures are in billions of Turkish liras.
Source: Turkish Banks Association, Aysan et. al (2012).

An evaluation of balance sheets (and off -balance accounts) of the 20 banks in our dataset provides evidence that Turkish banks engaged in these three methods to fund their liquidity needs. First, we observe that securitization activity by Turkish banks have increased dramatically during this period.[9] The total securitization activity by Turkish banks increased from 887 million TL (624 million USD) in 2004 to over 6.4 billion TL (4.7 billion USD) in 2005 and to 5.6 billion TL (3.9 billion USD) in 2006 as illustrated in Figure 8. We can also see the progression of Turkish banks' foreign borrowing activity against the FX rate in this figure.

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[9] During the study period, of the 20 banks in our sample, 14 have successfully issued securities mostly for trade receivables in international markets.

Table 1. Turkish Economic Indicators

	Unemployment, total (% of total labor force)	GNI per capita, Atlas method (current US$)	Market capitalization of listed companies (current Billions of USD)	Borrowers from commercial banks (per 1,000 adults)	Povertyhead-count ratio at $2 a day (PPP) (% of population)	Unemployment, total (% of total labor force)	Foreign Direct Investment, net (current Billions of USD)	Private Capital Flows, total (current Billions of USD)	Current Account Balance (BoP, current millions of USD)	GDP per capita growth (annual %)	Manufacturing, Value Added Growth (annual %)
2002	10.4	$3,460.00	$33.958			9.57	$939	$346	-626	4.7	2.9
2003	10.5	$3,790.00	$68,379			9.96	$1,222	$3,687	-7515.00	3.85	8.4
2004	10.8	$5,040.00	$98,298	504		9.18	$2,005	$10,028	-14431.00	7.9	11.92
2005	10.6	$6,480.00	$161,537	573		6.87	$8,967	$22,404	-22197.00	6.96	8.17
2006	10.2	$7,470.00	$162,398	534		5.71	$19,261	$26,676	-32249.00	5.47	8.39
2007	10.3	$8,440.00	$286,572	647		4.54	$19,941	$20,774	-38434.00	3.28	5.62
2008	11	$9,260.00	$117,929	709		4.16	$16,955	$11,941	-41959.00	-0.66	-0.15
2009	14	$9,060.00	$225,735	719			$6,856	$7,083	-13991.00	-6.05	-7.21

This table presents time series information about key economic indicators in Turkey. Unemployment rate is in % of total labor force; GNI per capita is calculated using Atlas method and is in current USD; Market capitalization of listed companies, Current Account Balance, Foreign direct investment and Private capital flows are in terms of current USD, Source: World Bank.

It is worth noting that during our study period the demand for loans increased regardless of the currency denomination. This period also corresponds to a monetary easing by the Turkish Central Bank where there was a consistent decrease not only of the levels but also of the spread between the borrowing and lending rates. At the end of 2002 the Central Bank's benchmark borrowing (lending) rate was 44% (51%) and by the end of 2008 the same rates were 15% (17.5%), which implies that the spread decreased from 7% to 2.5% (a 64% decrease). These developments show the commitment of the Turkish monetary authorities to provide the liquidity that was required by its growing economy and their mandate to keep the inflation target in line. Figure 10 illustrates the rate changes.

Figure 6. TL Deposits and TL Loans
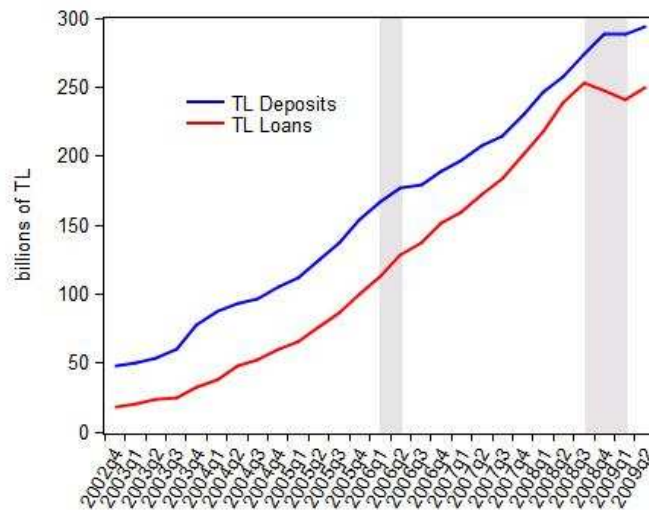
The figure shows the level of banks' deposits in Turkish liras vs. their loans in Turkish liras. All figures are in billions of Turkish liras. The shaded areas represent the following periods: the 2006 Emerging Markets Sell-off (3/1/2006 - 6/30/2006) and the 2008 Global Financial Crisis (9/15/2008-3/10/2009). Source: Turkish Banks Association.

In Figure 9, we can also observe that the deposits in Turkish liras did not catch up with the demand for loans in local currency (observe that the distance between TL deposits and TL loans decreases arriving to its minimum at around 2008). This was not the case for the relationship between FC deposits and FC loans that maintained a ratio of (*loansfc/depfc*) of around 0.7 during the same period as illustrated in Figure 7. This decrease

in the ratio of TL loans to TL deposits should have exerted additional pressure to find liquidity to cover the loan demand.

Figure 7. CBRT's Monetary Policy Rates
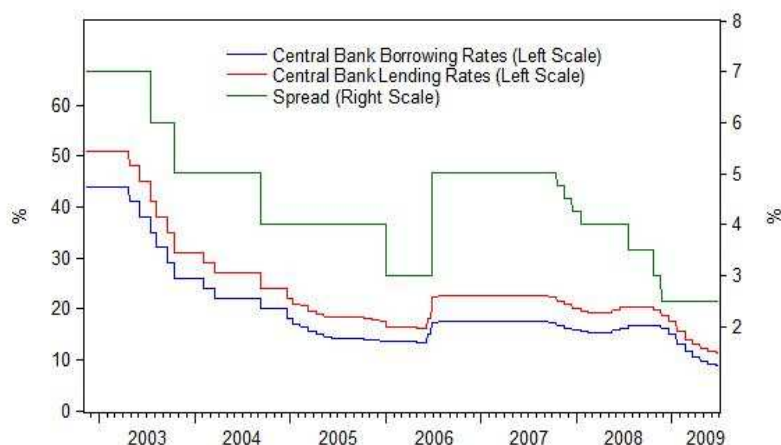
The figure shows the lending and borrowing rates by the Central Bank of Republic of Turkey (CBRT) as well as the spread between the lending and borrowing rates between 2002Q4 and 2009Q2. All figures are in terms of percentages. Source: CBRT.

3. Methodology and Data

In this section we present our empirical estimation and the data used to analyze the drivers of foreign currency lending in Turkey.

3.1. Empirical Estimation

As a part of a highly dollarized economy Turkish banking system exhibits high correlation between the levels of FC lending and FC deposits as illustrated by Figure 11. These observations are plotted using a quadratic equation.[10] The coefficients of determination are 0.89 and 0.97, respectively. Given the relationship in Figure 11, the growth in FC loans appears to be faster than the growth in FC deposits.[11] As shown by the plotted regression polynomials, this positive relationship is a strong one which leads us to evaluate whether it is also a causal one. Therefore we start our analysis by

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[10] The linear t of the data provided an R^2 of 0.86 and 0.95 for the information at the bank level and at the aggregate one.

[11] The coefficient estimates using the quadratic t are: $212,546+0.33 depfc+1.52E-8 depfc^2$

evaluating banks' balance sheet information to understand the dollarization in Turkish banking system.

Figure 8. Foreign Currency Deposits vs Loans -Bank Specific with Quadratic Fit
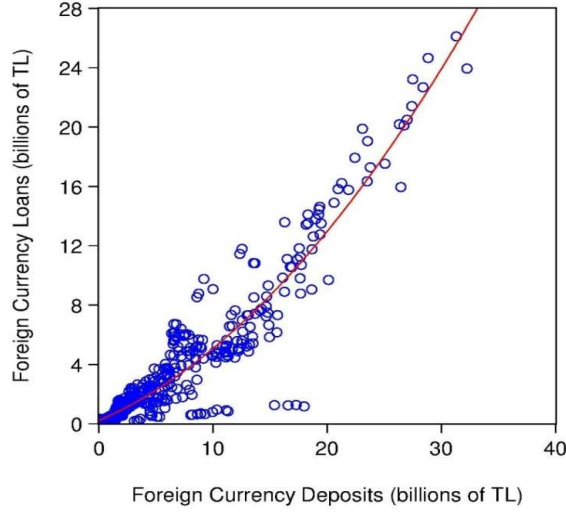
The trend line represents the locus of the fitted values of a 2nd degree polynomial regression of the Foreign Currency Deposits on the Foreign Currency Loans in the banking system of the country for the same period. All figures are in terms of billions of Turkish liras.

Analyzing banks' balance sheet information tries to exploit the information content in the banks' balance accounts. This approach tries to determine the causal relationships that can allow us to make some inferences about the causes of deposit and credit dollarization in Turkey.

The balance sheet statement holds an identity represented by:

$$A = L + E \tag{1}$$

where A represents assets, L liabilities, and E equity. We can rewrite the previous accounting identity as:

(loansfc+loanstl+otherassetsssets)=(depfc+deptl+otherliabilities)+equity (2)

where *loansfc* and *loanstl* represent the loans in foreign currencies and in Turkish lira, respectively. Other assets on the banks' balance sheet are represented by *otherassets*. The variables *depfc* and *deptl* represent the deposits in FC and TL, respectively and *otherliabilities* represents other liabilities and, equity stands for banks' equity. To this specification we also add two important macroeconomic variables: the volatility of inflation

(*infvol*) which has been shown in literature to have an effect on liability dollarization and change in the growth of the GDP (*d(gdpgrowth)*)) to capture changes in the business cycles. Accordingly, we can express the loans in foreign currency (*loansfc*) as:

$$
\begin{aligned}
loansfc_{i,t} = &\propto + \beta_1 loanstl_{i,t} + \beta_2 otherassets_{i,t} + \beta_3 depfc_{i,t} \\
&+ \beta_4 deptl_{i,t} + \beta_5 otherliabilities_{i,t} + \beta_6 equity_{i,t} \\
&+ \beta_7 D_1 \times depfc_{i,t} + \beta_8 D_2 \times depfc_{i,t} + \beta_9 infvol_t \\
&+ \beta_{10} d(gdpgrowth) + \mu_i
\end{aligned} \tag{3}
$$

where *loansfc*$_{i,t}$ and *depfc*$_{i,t}$ represent the loans and deposits in foreign currency for bank *i* at time *t*, respectively. The error term is represented by μ_i. We divide the banks in our sample into three groups, namely large banks (group1), medium banks (group 2) and small sized banks (group 3) with regards to the size of their assets for each quarter. D_1 and D_2 are dummies to model the size effect to capture possible differences in the slope denoted by:

$$
D_1 = \begin{cases} 1, for\ banks\ in\ 1st\ group \\ 0, Otherwise \end{cases} \tag{4}
$$

and,

$$
D_2 = \begin{cases} 1, for\ banks\ in\ 2nd\ group \\ 0, Otherwise \end{cases} \tag{5}
$$

Since we are interested in ratios rather than levels, we compute the ratio of these variables to total loans or to total deposits depending on which side of the balance sheet they are on. As a result Equation 3 takes the following form:

$$
\begin{aligned}
\left(\frac{loansfc}{loanstotal}\right)_{i,t} = &\propto + \beta_1\left(\frac{loanstl}{loanstotal}\right)_{i,t} + \beta_2\left(\frac{otherassets}{loanstotal}\right)_{i,t} \\
&+ \beta_3\left(\frac{depfc}{deptotal}\right)_{i,t} + \beta_4\left(\frac{deptl}{deptotal}\right)_{i,t} + \beta_5\left(\frac{otherliabilities}{deptotal}\right)_{i,t} \\
&+ \beta_6\left(\frac{equity}{assets}\right)_{i,t} + \beta_7 D_1 \times \left(\frac{depfc}{deptotal}\right)_{i,t} + \beta_8 D_2 \times d\left(\frac{depfc}{deptotal}\right)_{i,t} \\
&+ \beta_9 infvol_t + \beta_{10} d(gdpgrowth)_t + \mu_i
\end{aligned} \tag{6}
$$

In addition to the balance sheet identity, literature has shown that liquidity is an important determinant of banks' lending. However, liquidity is an endogenous variable; it improves in a growing economy, with trade openness and in low inflation. Therefore appropriate techniques need to be used to address this issue.

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As a result we rewrite Equation 6 to account for banks' liquidity in local currency (Turkish lira). We define bank's liquidity in Turkish liras (*liquiditytl*) as the sum of bank's Turkish lira cash holdings and its Turkish lira (TL) balance with the Central Bank. Similarly, liquidity in foreign currency (*liquidityfc)* is the sum of bank's foreign currency cash holdings and its foreign currency balance with the Central Bank. We expect a negative relationship between FC lending and TL liquidity mainly because banks would prefer to lend in the currency that they have more liquidity in. This means that during periods of low TL liquidity, banks would prefer to lend in foreign currency and during period of high TL liquidity they should prefer to lend in TL. To test this hypothesis we adjust Equation 6 to include the liquidity measure described before. We also subtract banks' cash holdings in foreign currency (*cashfc*) and in Turkish liras (*cashtl*) from *otherassets* to avoid problems that could arise from double counting, since banks' cash holdings, which are part of the liquidity variable, are also included in the *otherassets* variable. The resulting equation is:

$$\left(\frac{loansfc}{loanstotal}\right)_{i,t} = \propto$$
$$+\beta_1 \left(\frac{loanstl}{loanstotal}\right)_{i,t} +$$
$$\beta_2 \left(\frac{otherassets - cashfc - cashtl}{loanstotal}\right)_{i,t} + \beta_3 \left(\frac{depfc}{deptotal}\right)_{i,t} + \beta_4 \left(\frac{deptl}{deptotal}\right)_{i,t} +$$
$$\beta_5 \left(\frac{otherliabilities}{deptotal}\right)_{i,t} + \beta_6 \left(\left(\frac{equity}{assets}\right)_{i,t} + \beta_7 D_1 \times \left(\frac{depfc}{deptotal}\right)_{i,t} +$$
$$\beta_8 D_2 \times d \left(\frac{depfc}{deptotal}\right)_{i,t} + \beta_9 infvol_t + \beta_{10} dlog(liquidityfc) +$$
$$\beta_{11} dlog(liquiditytl) + \beta_{12} d(gdpgrowth)_t + \mu_i \qquad (7)$$

3.2. Data

To test our empirical specification in Equation 7 we use a dataset compiled from the financial statements of Turkish banks which is available through the Bank Association of Turkey. Our dataset includes an unbalanced panel of quarterly income statements and balance sheets of 20 commercial and deposit banks between the fourth quarter of 2002 and the second quarter of 2009.[12] These banks represent over 94% of the Turkish banking system in terms of their total assets and over 98% in terms of total deposits as of 2010.

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[12] Table A.1, in the Appendix, provides a list of these banks in our sample as well as their ownership structure and their total assets as of second quarter of 2009.

Table 2 provides the descriptive statistics of the data used in this paper and Table 3 provides the unit root tests for the stationarity our variables. As can be seen some, but not all, of our series are stationary. As a result we use the first differences of our series. The correlation matrix for the variables used can be seen in Table 4. Definitions of the variables and abbreviations used throughout the paper can be found in the appendix in Table A.2.

We divide the banks in our sample into three groups (large, medium and small-size banks) based on the rankings of their average assets for each quarter. We adopt this categorization in order to see the importance of banks' size in terms of access to foreign funding and FC lending. According to this classification we have seven banks in the first two categories and six banks in the last category. We observe that the banks do not often shift between categories, meaning the banks in each group stay almost the same throughout the study period.

We analyze the Turkish banking system starting in 2002 and not earlier for two main reasons: First, Turkey switches to inflation targeting (IT) regime in 2002. Though implicit at the beginning, IT regime becomes full-fledged in 2006. It is also important to note that during this period inflation decreased from over 70% in 2002 to below 10% in 2009. (For more information see Akyurek, Kutan, and Yilmazkuday, 2011). Second, there have been significant banking reforms beginning in mid-2001 following the Turkish financial crisis that can introduce noise to our estimates.[13] Thus; we concentrate on the post-reform period. Our sample ends in 2009 because as of the second quarter of 2009, foreign currency lending to households in Turkey is banned.

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[13] The inability of the largest Turkish banks to cover their over-night positions in the repo and reverse-repo markets triggered the crisis on February 19 2001. The TL was devalued by 40% against the USD in one week and the interbank interest rate hit highs of 6,200%. The Savings Deposit Insurance Fund (TMSF) closed down eleven banks from October 2000 to November 2001.

Table 2. Descriptive Statistics

	loansfc / loanstotal	depfc / deptotal	deptl / deptotal	loanstl / loanstotal	equity / assets	infvol	(otherassets - cashfc - cashtl) / loanstotal	otherliabilities / deptotal	log(liquidityfc)	log(liquiditytl)	gdpgrowth
Mean	0.37	0.59	0.50	0.69	0.13	0.57	1.66	0.89	12.43	11.54	4.47
Median	0.36	0.58	0.51	0.69	0.12	0.54	1.00	0.61	12.51	11.68	5.80
Maximum	0.88	1.32	0.81	0.96	0.41	1.38	25.23	9.08	15.69	16.02	11.52
Minimum	0.04	0.20	0.01	0.29	0.06	0.17	0.16	0.16	6.85	4.49	-13.09
Std. Dev.	0.16	0.19	0.16	0.13	0.04	0.29	2.26	1.29	1.81	2.46	6.05
Skewness	0.34	0.66	-0.68	-0.36	2.01	0.76	5.39	4.55	-0.56	-0.68	-1.41
Kurtosis	2.75	3.82	3.82	2.80	9.67	3.35	43.77	24.01	2.95	3.15	4.36
Jarque-Bera	10.33	47.91	50.83	10.87	1211.23	48.78	42817.47	11338.82	25.39	37.15	196.46

The table provides the descriptive statistics for the 20 banks used in our regressions. Banks are divided into three groups based on their asset sizes. **loansfc/loanstotal** represents the share of foreign currency loans in respective bank's loan portfolio (adjusted according to the USD-TL exchange rate on October 1, 2002) to the banks' total loan portfolio; **depfc/deptotal** is the ratio of foreign currency deposits adjusted according to the USD-TL exchange rate on October 1, 2002 to total deposits; **deptl/deptotal** is the ratio of Turkish lira deposits to the total deposits; **loanstl/loanstotal** is the ratio of Turkish lira loans to the bank's total loan portfolio; **equity/assets** is the ratio of the bank's equity to its assets; **infvol** is the volatility of annual inflation calculated as the three-month standard deviation of annual inflation calculated in a 12 month rolling window; (**otherassetsssets-cashfc-cashtl)/loanstotal** is the ratio of bank's assets other than loans and cash holdings in foreign currency and in Turkish liras to its loan portfolio; **otherliabilities/deptotal** is the ratio of bank's liabilities other than deposits to bank's total deposits; **liquidityfc** is the cash holdings of a bank in foreign currency plus foreign currency balances with the Central Bank; **liquiditytl** represents the Turkish lira cash holdings of a bank plus its balance with the Central Bank in Turkish liras and **gdpgrowth** is the percent change in the seasonally adjusted quarterly GDP growth rate calculated at constant prices. All figures are in terms of thousands of Turkish lira. For a description of the variables see the Appendix.

Table 3. Unit Root Tests for Variables

	In levels			First Differences	
Variable	**Im, Pesaran and Shin W-stat Test Statistic**	**Probability**	**Variable**	**Im, Pesaran and Shin W-stat Test Statistic**	**Probability**
loansfc/loanstotal	0.48592	0.6865	d(loansfc/loanstotal)	-20.5189	0.0000
depfc/deptotal	-0.20813	0.4176	d(depfc/deptotal)	-19.0604	0.0000
			D1*d(depfc/deptotal)	-9.35670	0.0000
			D2*d(depfc/deptotal)	-12.9992	0.0000
liquidityfc	2.42841	0.9924	dlog(liquidityfc)	-24.4241	0.0000
liquiditytl	-1.16872	0.1213	dlog(liquiditytl)	-31.8678	0.0000
equity/assets	-0.17732	0.4296	d(equity/assets)	-17.7823	0.0000
gdpgrowth	3.81085	0.9999	d(gdpgrowth)	-17.6946	0.0000
otherliabilities/ deptotal	-3.30066	0.0005	d(otherliabilities/ deptotal)	-20.1553	0.0000
deptl/deptotal	-2.94585	0.0016	d(deptl/deptotal)	-19.7287	0.0000
loanstl/loanstotal	-3.03175	0.0012	d(loanstl/loanstotal)	-17.5448	0.0000
(otherassetsssets-cashfc-cashtl)/ loanstotal	-5.65148	0.0000	d(otherassetsssets-cashfc-cashtl)/ loanstotal)	-20.0051	0.0000
infvol	-8.12765	0.0000			

The table provides the Im Pesaran and Shin W-Test Statistics and the related p-values for the variables used in our analysis. The null hypothesis is that variable is non-stationary (unit root). The variables on the left are in levels while those on the right are in first differences (denoted by "d"). **loansfc/loanstotal** represents the share of foreign currency loans in respective bank's loan portfolio (adjusted according to the USD-TL exchange rate on October 1, 2002) to the banks' total loan portfolio; **depfc/deptotal** is the ratio of foreign currency deposits adjusted according to the USD-TL exchange rate on October 1, 2002 to total deposits; **D1** and **D2** are dummies to capture the effect of the size of the bank based on its assets; **D1** represents banks in the first tertile and **D2** represents banks in the second tertile; **liquidityfc** is the cash holdings of a bank in foreign currency plus foreign currency balances with the Central Bank; **liquiditytl** represents the Turkish lira cash holdings of a bank plus its balance with the Central Bank in Turkish liras; equity/assets is the ratio of the bank's equity to its assets; **gdpgrowth** is the percent change in the seasonally adjusted quarterly GDP growth rate calculated at constant prices; deptl/deptotal is the ratio of Turkish lira deposits to the total deposits; **loanstl/loanstotal** is the ratio of Turkish lira loans to the bank's total loan portfolio;(**otherassetsssets-cashfc-cashtl)/loanstotal** is the ratio of bank's assets other than loans and cash holdings in foreign currency and in Turkish liras to its loan portfolio; **otherliabilities/deptotal** shows the ratio of bank's liabilities other than deposits to its total deposits and **infvol** is the volatility of annual inflation calculated as the three-month standard deviation of annual inflation calculated in a 12 month rolling window.

Table 4. Correlation Matrix

	d(loansfc / loanstotal)	d(depfc / deptotal)	D1*d(depfc / deptotal)	D2*d(depfc / deptotal)	d(deptl / deptotal)	d(loanstl / loanstotal)	d(equity/assets)	infvol	d((otherassets-cashfc-cashtl) / loanstotal)	d(otherliabilities / deptotal)	dlog(liquidityfc)	dlog(liquiditytl)	d(gdpgrowth)
d(loansfc/loanstotal)	**1.00**	0.32	0.26	0.26	-0.03	-0.82	-0.02	-0.06	0.11	0.09	-0.08	-0.07	0.15
d(depfc/deptotal)	0.32	**1.00**	0.33	0.55	-0.72	0.00	0.30	0.01	-0.05	0.21	0.02	-0.02	0.25
d1*d(depfc/deptotal)	0.26	0.33	**1.00**	-0.02	-0.16	-0.04	0.07	0.00	0.01	0.01	0.06	-0.01	0.14
d2*d(depfc/deptotal)	0.26	0.55	-0.02	**1.00**	-0.33	-0.05	0.12	0.00	-0.04	0.01	0.06	-0.07	0.22
d(deptl/deptotal)	-0.03	-0.72	-0.16	-0.33	**1.00**	0.12	-0.16	-0.09	0.01	-0.17	-0.01	0.02	0.05
d(loanstl/loanstotal)	-0.82	0.00	-0.04	-0.05	0.12	**1.00**	0.17	0.03	-0.15	-0.05	0.09	0.06	0.09
d(equity/assets)	-0.02	0.30	0.07	0.12	-0.16	0.17	**1.00**	0.17	-0.12	0.23	-0.08	-0.04	-0.04
infvol	-0.06	0.01	0.00	0.00	-0.09	0.03	0.17	**1.00**	0.02	0.06	-0.11	-0.11	0.02
d((otherassets-cashfc-cashtl)/loanstotal)	0.11	-0.05	0.01	-0.04	0.01	-0.15	-0.12	0.02	**1.00**	0.10	-0.06	-0.07	-0.12
d(otherliabilities /deptotal)	0.09	0.21	0.01	0.01	-0.17	-0.05	0.23	0.06	0.10	**1.00**	-0.08	-0.05	-0.01
dlog(liquidityfc)	-0.08	0.02	0.06	0.06	-0.01	0.09	-0.08	-0.11	-0.06	-0.08	**1.00**	0.40	0.12
dlog(liquiditytl)	-0.07	-0.02	-0.01	-0.07	0.02	0.06	-0.04	-0.11	-0.07	-0.05	0.40	**1.00**	0.04
d(gdpgrowth)	0.15	0.25	0.14	0.22	0.05	0.09	-0.04	0.02	-0.12	-0.01	0.12	0.04	**1.00**

The table provides the correlation matrix for the variables used in our estimations, after making all of them stationary.

4. Findings

In this section we present the results of our estimations based on our empirical specification in Equation 7 to analyze the determinants of foreign currency lending in Turkey and to see whether there is a direct linkage between foreign currency deposit accounts and foreign currency loans in order to clearly understand the banking risks mentioned before.

As mentioned in the data section, some of our variables are non-stationary, we revised Equation 7 to reflect the use of first differences in our estimations and obtain the following specification:

$$d\left(\frac{loansfc}{loanstotal}\right)_{i,t} = \propto$$
$$+\beta_1 d\left(\frac{loanstl}{loanstotal}\right)_{i,t} + \beta_2 d\frac{(otherassets-cashfc-cashtl)}{loanstotal}_{i,t} +$$
$$\beta_3 d\left(\frac{depfc}{deptotal}\right)_{i,t} + \beta_4 d\left(\frac{deptl}{deptotal}\right)_{i,t} + \beta_5 d\left(\frac{otherliabilities}{deptotal}\right)_{i,t} +$$
$$\beta_6 d\left(\frac{equity}{assets}\right)_{i,t} + \beta_7 D_1 \times d\left(\frac{depfc}{deptotal}\right)_{i,t} + \beta_8 D_2 \times d\left(\frac{depfc}{deptotal}\right)_{i,t} +$$
$$\beta_9 infvol_t + \beta_{10} dlog(liquidityfc) + \beta_{11} dlog(liquiditytl) +$$
$$\beta_{12} d(gdpgrowth)_t + +\mu_i \qquad\qquad (8)$$

To overcome possible endogeneity problems in our model, we estimated Equation 8 using the Generalized Methods of Moments technique following the strategy of Arellano and Bond (1991). We use all possible lags of our dependent variable plus lagged values of first difference of FC loans to total loan ratio (*d(loansfc/loanstotal)*), Turkish lira deposits to total deposit ratio (*d(deptl/deptotal)*), Turkish lira loans to total loans ratio (*d(loanstl/loanstotal)*), equity to assets ratio (*d(equity/assets))*, volatility of inflation (*infvol*), the ratio of bank's non-deposit liabilities to its deposits, (*d(otherliabilities/deptotal)*), natural log of liquidity in foreign currency *(dlog(liquidityfc))* and in Turkish liras *(dlog(cashtl))*, and the change in the GDP growth rate *(d(gdpgrowth))* as instruments. By doing so we obtain parameter estimates that are consistent and efficient. We have 18 banks that we can use in our dynamic panel GMM model; this increases our confidence in the consistency and efficiency of our estimates. We ran the Wald test for coefficient restrictions with the null that all instruments are irrelevant. Our F value is well above 10, and the p value is 0.00 so we reject the null hypothesis suggesting the validity of our instruments.

Results are presented in Table 5. It is clearly observed that the change in the share of foreign currency deposits to total deposits has a significant and positive impact on Turkish banks' lending in foreign currency. In column 2, the estimated coefficient is 0.256, which suggests that a 1% change in the share of foreign currency deposits to total deposits raises the ratio of foreign currency loans to total loans ratio by about a quarter percent. The average magnitude of this variable ranges between 0.12 and 0.66 indicating that a 1% increase in foreign currency deposit ratio could increase the foreign currency loan ratio by as high 0.66%. This suggests that as banks accept more foreign currency deposits, they tend to lend more in foreign currency. By doing so, Turkish banks are simply transforming their currency risk into a default risk that could arise in case of sudden and large devaluations. In other words, instead of facing a mismatch of assets and liabilities during

devaluation, banks potentially face an increasing loan default ratio for their FC denominated loans.[14]

This suggests that hedging in the Turkish banking system is almost non-existent and a systemic shock due to default risk facing currency depreciation is really high. This effect seems to be more valid for larger banks as opposed to smaller ones. The coefficient of the interaction term between size dummy (*D1*) and the change in the share of foreign currency deposits in the overall deposit portfolio is significant in nine of the ten specifications of Equation 7. In the meantime, the interaction term between medium sized banks and the change in the share of foreign currency deposits to total deposits ratio is insignificant in all the specifications. The average magnitude of the coefficient of *D1*d(depfc/deptotal)* variable across 10 estimations is 0.42. This means for large banks a 1% change in the share of foreign currency deposits to total deposits raises the loan dollarization ratio by about 0.42%.

The sign and significance of the d(*loanstl/loanstotal*) variable which measures the change in the ratio of banks' Turkish lira loans to their total loan portfolio is meaningful and expected as reported in our estimations. The estimated coefficient is negative (ranges between -1.14 and -1.23) and is larger than 1 in absolute terms, suggesting that as banks increase their share of TL denominated loans in their loan portfolio by 1% the share of foreign currency denominated loans to the overall loan portfolio decreases by more than 1%.

Changes in the ratio of banks' equity to total assets, volatility of inflation have no significant impact on banks' lending in foreign currency.

We also find no significance of changes in banks' non-deposit liabilities to their deposits ratio *(d(otherliabilities/deptotal))* and the change in the ratio of banks assets other than loan and cash to their total loans *(d((otherassets-cashtl-cashfc) / loanstotal)).*

Among the two liquidity measures we used *liquiditytl* which measures as the ratio of the sum of bank's Turkish lira cash holdings and balances with the Central Bank and *liquidityfc* which measures the bank's USD cash holdings and balances with the Central Bank, neither has a significant impact on the ratio of banks' foreign currency to total loan ratio. In fact, if we consider the ratio of foreign currency deposits to bank's overall deposit portfolio (*depfc/deptotal*) as a measure of foreign currency liquidity , in that

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[14] It is important to note that the impact of devaluations depend not only on the magnitude of the devaluation but also on its duration, the larger the duration, the higher the probability of observing increasing defaults.

case it is possible to argue that there is a liquidity impact for foreign currency.

Another important aspect of dollarization behavior is the presence of foreign banks in the economy that can influence the FC lending dynamics. Basso, Calvo-Gonzalez, and Jurgilas (2011) have shown that access to foreign funds increases credit dollarization although it decreases the dollarization of deposits. To test the impact of foreign presence in the Turkish banking system, we have also run the above estimations using domestic vs foreign dummies to see if there are any differences in terms of banks' lending behavior. However, our results were not significantly different and therefore are not reported here.[15]

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[15] Results are available upon request.

Table 1. Determinants of Loan Dollarization

		Dependent Variable: First Difference of the Ratio of Foreign Currency Loans to Total Loans (d(loansfc/loanstotal))										
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Method	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM
Time Period	2003Q3-2009Q2	2003Q3-2009Q2	2003Q3-2009Q2	2003Q3-2009Q2	2003Q3-2009Q2	2003Q3-2009Q2	2004Q2-2009Q2	2004Q2-2009Q2	2004Q2-2009Q2	2004Q2-2009Q2	2004Q2-2009Q2	2004Q2-2009Q2
					Tstatistics (in bold) and Standard Errors (below)							
d(loansfc(-1)/loanstotal(-1))	**-0.236***	**-0.213***	**-0.125**	**-0.129***	**-0.018**	**-0.018**	**-0.010**	**-0.013**	**-0.022**	**-0.026**	**-0.013**	**-0.047**
	0.0111240	0.0249	0.0490	0.0486	0.0163	0.0144	0.0385	0.0538	0.0466	0.0424	0.0569	0.0772
d(depfc/deptotal)		**0.256***	**0.127***	**0.330***	**0.665***	**0.663***	**0.511***	**0.498***	**0.473***	**0.480***	**0.522***	**0.630***
		0.0097	0.0325	0.1275	0.0613	0.0653	0.0910	0.1365	0.1268	0.1141	0.1604	0.2386
d1*d(depfc/deptotal)			**0.957**	**1.158**	**0.207***	**0.198**	**0.257**	**0.260**	**0.269**	**0.251**	**0.242**	**0.228***
			0.3910	0.4741	0.1240	0.1311	0.1165	0.1196	0.1281	0.1136	0.1155	0.1408
d2*d(depfc/deptotal)			**0.321**	**-0.083**	**-0.02**	**-0.002**	**0.004**	**0.004**	**0.008**	**0.053**	**0.031**	**0.028**
			0.2389	0.3138	0.0448	0.0646	0.0634	0.0638	0.0584	0.0654	0.0865	0.0961
d(deptl/deptotal)				**0.455***	**0.825***	**0.860***	**0.677***	**0.657***	**0.621***	**0.637***	**0.699***	**0.775***
				0.1615	0.0605	0.0646	0.1367	0.2140	0.2019	0.1816	0.2412	0.2943
d(loanstl/loanstotal)					**-1.140***	**-1.141***	**-1.230***	**-1.231***	**-1.217***	**-1.144***	**-1.177***	**-1.125***
					0.0179	0.0162	0.0461	0.0475	0.0610	0.0812	0.1157	0.1356
d(equity/assets)						**0.141***	**0.124**	**0.132**	**0.181**	**0.086**	**0.093**	**0.205**
						0.0824	0.1895	0.1961	0.1998	0.2053	0.2072	0.3277
infvol							**0.017**	**0.020**	**0.026**	**0.022**	**0.015**	**-0.024**
							0.0182	0.0310	0.0281	0.0259	0.0307	0.0708
d((otherassets-cashtl-cashfc) / loanstotal)								**0.001**	**0.003**	**0.004**	**0.002**	**0.011**
								0.0081	0.0077	0.0068	0.0093	0.0158
d(otherliabilities/deptotal)									**-0.012**	**-0.012**	**-0.013**	**-0.025**
									0.0199	0.0178	0.0188	0.0279
dlog(liquidityfc)										**-0.002**	**-0.0008**	**-0.0008**
										0.0011	0.0023	0.0027
dlog(liquiditytl)											**0.002**	**0.0007**
											0.0039	0.0039
d(gdpgrowth)												**0.003**
												0.0048
Instruments	d(loansfc/loanstotal), d(deptl/deptotal),d(loanstl/loanstotal),d(equity/assets),infvol,d(otherliabilities/deptotal), dlog(liquidityfc),dlog(cashtl), d(gdpgrowth)											
S.E. of Regression	0.07	0.07	0.08	0.08	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
No of banks	20	20	20	20	20	20	20	20	20	20	20	20
J Statistic	19.5758	19.06656	15.06224	13.82312	14.16504	11.96152	14.06995	14.13916	13.75596	12.57796	12.43495	11.52393
p value for AR (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
p value for AR (2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	454	454	454	454	454	454	397	397	397	397	397	397

This table presents the results of GMM estimations on the determinants of foreign currency lending. d represents first differences. *loanfc/loanstotal* represents the share of foreign currency loans in respective bank's loan portfolio (adjusted according to the USD-TL exchange rate on October 1, 2002) to the banks' total loan portfolio; *depfc/deptotal* is the ratio of foreign currency deposits adjusted according to the USD-TL exchange rate on October 1, 2002 to total deposits; d1 and d2 are dummies to capture the effect of the size of the bank based on its assets; d1 represents banks in the first group (large banks) and d2 represents banks in the second group (medium sized banks); *liquidityfc* is the cash holdings of a bank in foreign currency plus foreign currency balances with the central bank; *liquiditytl* represents the Turkish lira cash holdings of a bank plus its balance with the central bank in Turkish liras; equity/assets is the ratio of the bank's equity to its assets; *gdpgrowth* is the percent change in the seasonally adjusted quarterly GDP growth rate calculated at constant prices; *deptl/deptotal* is the ratio of Turkish lira deposits to the total deposits; *loanstl/loanstotal* is the ratio of Turkish lira loans to the bank's total loan portfolio; *(otherassets-cashtl-cashfc)/loanstotal* is the ratio of bank's assets other than loans and its cash holdings in Turkish liras and other currencies to the bank's loan portfolio and *infvol* is the volatility of annual inflation calculated as the three-month standard deviation of annual inflation calculated in a 12 month rolling window. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

5. Conclusion and Policy Implications

In this paper we have contributed to the literature on the dynamics of foreign currency lending by focusing on an emerging market economy, namely, Turkey. Turkey is of particular interest since it has enjoyed high rates of economic growth coupled with an expansion of credit both in local and foreign currencies. Additionally, the regulatory authorities in Turkey have recently tightened FC credit to households by ending the practice of foreign currency lending by the country's banks. This interesting development has definitely played an important role in our motivation for this research.

In our analysis we focused on the balance sheets analysis of individual banks in Turkey and their respective liquidity positions in both foreign and local currencies as a main driver of foreign currency lending. As control variables we also used two macro variables: the changes in real GDP growth and inflation volatility.

Our results corroborate those in existing literature regarding the role of the FC deposits in the banking system as the most important driver of FC lending by banks. This behavior as shown in our study is common throughout the Turkish banking system but is more evident for larger banks. This finding enhances our knowledge about the dynamics of foreign currency lending in emerging market economies. We also show that increases in the bank's Turkish lira lending will lower its foreign currency lending portfolio, but this finding is an outcome of the balance sheet approach we used and thus is not surprising.

Another important research question we address is the role of bank's liquidity in local and foreign currency and their lending. This linkage has never been explored in literature to the best of our knowledge. Our findings suggest that despite our expectations there seems to be no apparent relationship between Turkish lira and foreign currency liquidity and banks' foreign currency lending.

The findings of this research can help us understand the decision taken by the regulatory authorities in Turkey in 2009. An unhedged banking system is vulnerable to sudden exchange rate movements and we believe this is what the regulators saw as they made their policy change. As seen in earlier emerging market crises (i.e. the East Asian Financial Crisis) mismatch on banks' and financial institutions' balance sheets can have devastating contagious effects during sudden exchange rate movements. In that sense, the decision to end the practice of foreign currency lending in Turkey is an understandable one and indeed it is a policy decision taken at the right time

for the right reasons. The developments in Turkey have greater implications beyond this country and on highly dollarized economies in general.

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A. Appendix

Table A.1. Banks in the sample (Alphabetical)

Bank Name	Ownership Group	Total Assets as of 2009Q2 (billions of TL)
Akbank	Non-state owned - Domestic	91.872
Alternatif Bank	Non-state owned - Domestic	3.503
Anadolubank	Non-state owned - Domestic	4.173
Arap Turk Bankasi	Non-state owned - Foreign	0.933
Denizbank	Non-state owned - Domestic	25.257
Eurobank Tekfen	Non-state owned - Foreign	3.589
Finans Bank	Non-state owned - Foreign	26.495
Fortis Bank	Non-state owned - Foreign	11.859
HSBC bank	Non-state owned - Foreign	14.044
ING Bank	Non-state owned - Foreign	16.422
Sekerbank	Non-state owned - Domestic	8.787
Tekstil Bankasi	Non-state owned - Domestic	2.048
Turk Ekonomi Bankasi	Non-state owned - Domestic	15.126
Turkish Bank	Non-state owned - Domestic	0.869
Turkiye Is Bankasi	Non-state owned - Domestic	118.986
Turkiye Garanti Bankasi	Non-state owned - Domestic	103.878
Turkiye Halk Bankasi	State owned - Domestic	55.715
Turkiye Vakiflar Bankasi	State owned - Domestic	61.099
Yapi ve Kredi Bankasi	Non-state owned - Domestic	69.954
Ziraat Bank	State owned - Domestic	116.609

Source: The Banks Association of Turkey.

Table A.2. Variable Definitions

Symbol	Definition	Source
assets	Bank's Total Assets (both in Turkish liras and in foreign currency	Turkish Bank Association (TBB)
cashfc	Bank's holding of foreign currency cash and foreign currency balance with the Central Bank	
cashtl	Bank's TL holdings and balance with the Central Bank	
depfc	Bank Deposits in Foreign Currency(denominated in Turkish lira terms)	
deptl	Bank Deposits in Turkish Liras	
deptotal	Bank's total deposits	
loansfc	Bank's foreign currency loans	
loanstl	Bank's Turkish lira loans	
loanstotal	Bank's total loans	
equity	Bank's total equity in Turkish Liras	
liquidityfc	Bank's liquidity position in terms of foreign currency measured by sum of bank's foreign currency cash holdings and foreign currency balance with the Central Bank.	
liquiditytl	Bank's liquidity position in Turkish liras measured by the sum of bank's Turkish lira cash holdings and Turkish lira balance with the Central Bank.	
otherassets	Bank's assets other than loans and cash.	
infvol	the volatility of annual inflation calculated as the three-month standard deviation of annual inflation calculated in a 12 month rolling window	Turkish Statistical Institute (TURKSAT)
gdpgrowth	the percent change in the seasonally adjusted quarterly GDP growth rate calculated at constant prices.	OECD, Main Economic Indicators Database
MktShare	Bank's market share in terms of deposits	Author's Calculation
ForeignBorrow	Bank's Total Outstanding Loans from Foreign Sources	