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Abstract

On June 16 2009, in what authorities called "a surprise development" the Turkish Government removed a provision from its existing laws that had allowed Turkish residents to borrow in foreign currency from banks operating in Turkey. The development ended a long era of foreign currency lending in Turkey at least in the sense of consumer loans. This paper studies the determinants and consequences of foreign currency lending for banks in Turkey in the run-up to this significant policy change. Our analysis uses detailed foreign and Turkish currency composition bank data for 21 commercial banks in Turkey between 2002 and 2010. We evaluate drivers of saving and lending in foreign currency(FX) in Turkey along with consequences for the banking system in particular and for the economy in general. We highlight possible risks to the Turkish banking system as a result of system's heavy exposure to both channels. In doing so, we show that the policy change was not necessarily a surprise but a cautionary step in the right direction to help keep Turkish banking system stable.

JEL Classification codes: F31, G21, 024

Keywords: Dollarization, bank performance, bank profitability

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1 Introduction

On June 16 2009, the Turkish Government removed a provision from its existing laws that had allowed Turkish residents to borrow in foreign currency from Turkish banks.[1] The development ended the era of foreign currency lending in Turkey at least in the sense of consumer loans.(Corporations were still allowed to borrow in foreign currency provided the maturity of the loan is more than a year and the amount financed is more than 5 million US dollars). The most obvious questions to ask regarding this development are why and why in 2009? This paper aims to answer these questions by shedding light on the dynamics of foreign currency(FX) borrowing and lending in Turkey over a span of 8 years prior to the regulatory change(2002-2009). We start our analysis in 2002 as opposed to earlier for two main reasons:

1. Turkey switches to an inflation targeting(IT) regime in 2002.[2]

2. There have been significant banking reforms beginning in mid 2001 following the financial crisis. We want to concentrate on the post-reform period.

We evaluate drivers of FX saving as well as lending in Turkey along with their consequences. We highlight possible risks to the system as a result of Turkey's heavy exposure to both channels. We believe analysis of FX lending and saving is important in the case of Turkey for several reasons. Firstly, as a highly "dollarized" economy, Turkish financial system by nature is more vulnerable to changes in the FX rate as opposed to not so heavily dollarized economies. Sudden currency movements not only effect depositors in terms of the value of their savings but also they have an impact on banks via defaults on their foreign currency denominated loans and hence lower profitability. Unhedged foreign currency borrowing is a threat to financial stability. Previous literature[3] has highlighted the impact of heavy exposure to liability dollarization for banking systems. In that sense, Turkish regulators move is not necessarily a surprise. Other countries in Europe have taken similar steps in recent years to curb foreign currency exposure of their banking systems.[4]

Figure 1 shows that the foreign currency loans constituted a sizable portion of banks' loan portfolios until recently ranging from as high as 55% at the end of 2002 to a low of 27% in 2009.[5] Even though, there is a decreasing tendency the average ratio remains 27.9% for the 2008-2010 period. Figure 2 shows the same ratios for the five largest(in terms of assets) non-state owned banks in our sample as of second quarter of 2009.[6] As can be seen, all non-state owned banks at the end of the sample period have had foreign currency loans more than or close to 30% of their total loan portfolios. Such heavy exposure to

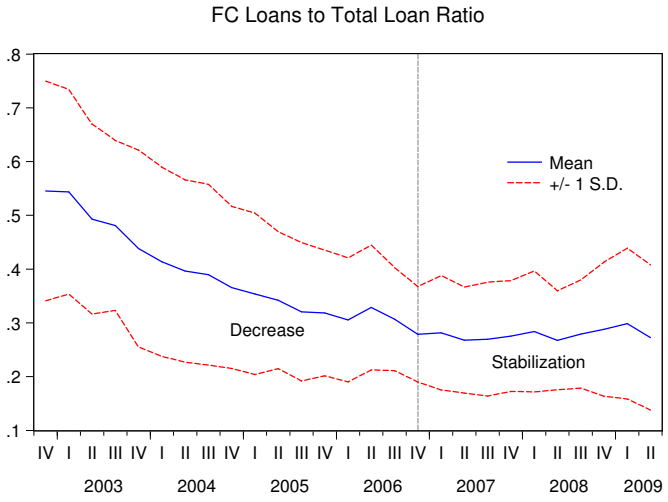


Figure 1: FC Loans to Total Loan Portfolio in the Turkish Banking System

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.

foreign currency lending is obviously a cause for concern to regulators and may shed light on the reasons behind the policy change.

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 largest non-state owned banks in our sample

2 The Link Between Deposit And Loan Dollarization

Previous research[7] has argued that in economies with high deposit dollarization, there is a tendency for banks to increase their dollar denominated assets in an effort to hedge themselves against exchange rate risk. However, literature has also showed that such a strategy by banks is not necessarily hedging but merely a transfer from one form of risk into another, namely foreign exchange risk into default risk. In this section we investigate whether the Turkish Banking System exhibits a similar pattern where deposit dollarization

causes loan dollarization. Our preliminary analysis (as exhibited by Figure 3) of the liabilities and assets in the Turkish Banking system reveal to us that there is a clear and positive relationship between the two, yet we need to provide further analysis on the direction of the causality. In the following sections, we analyze the link between loan and deposit dollarization in the Turkish Banking system: in section 2.2 we perform an OLS analysis.

2.1 Data

Our dataset comes from the Bank Association of Turkey website and includes an unbalanced panel of quarterly income statements and balance sheets of 21 commercial and deposit banks between the fourth quarter of 2002 and first quarter of 2010. These banks represent over 94 percent of the Turkish banking system in terms of their total assets and over 98 percent in terms of total deposits as of 2010. 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 in terms of US Dollars as of 2010. Table 1 provides the descriptive statistics of our sample. Table A.2 in the Appendix presents definitions of the variables and abbreviations used throughout the paper.

2.2 OLS Analysis

Figures 3 (below) and A.1 (in the Appendix) show the correlation of foreign currency deposits to the overall level of foreign currency loans in the sample studied. Figure 3 is at the bank level and Figure A.1 is at the aggregate level[8] As shown by the fitted regression line, there is a very strong, linear and positive relationship between foreign currency deposits and loans.

As a first exploratory analysis of the findings presented in these two figures, we estimate the following regression:

$$loansfc_{i,t} = \alpha + \beta depfc_{i,t} + \mu_i \tag{2.1}$$

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 also run a couple of additional regressions to control for banks' size (based on total assets). Note that the baseline case corresponds to small banks. We classify banks according to the rankings of average assets for each quarter.[9] We divide the banks in three tertiles. According to this classification we have 7 banks in each category. We slightly modify equation 2.1 to

Table 1: Descriptive Statistics For Variables

	Mean	*Median*	*Maximum*	*Minimum*	*Std.Dev.*	*Skewness*	*Kurtosis*	*Observations*
AllBanks								
assets	19,368,332	8,142,176	119,000,000	1,169	25,270,818	2	6	543
depfc	5,526,799	2,828,870	32,232,370	518	6,438,746	2	5	526
deptl	7,085,502	2,345,450	71,984,962	-	10,431,434	2	11	526
equity	2,119,087	863,737	13,521,400	-	2,878,367	2	6	567
foreignborrow	2,008,454	558,756	13,929,506	148	3,030,951	2	6	543
loansfc	3,051,468	1,246,553	26,119,169	131	4,507,135	2	9	543
loanstl	5,646,491	2,300,562	34,400,164	263	7,624,862	2	6	543
$Tertile1(BigBanks)$								
assets	45,925,199	39,288,108	118,986,392	8,423,408	26,309,253	1	3	189
depfc	12,226,635	11,137,247	32,232,370	3,099,945	6,266,297	1	3	189
deptl	16,929,532	16,045,124	71,984,962	752,488	12,067,715	2	8	189
equity	5,237,770	4,663,000	13,521,400	548,895	3,074,300	1	3	189
foreignborrow	4,576,906	3,741,556	13,929,506	1,258	3,814,786	1	2	189
loansfc	7,029,670	5,385,987	26,119,169	197,848	5,601,828	1	4	189
loanstl	12,370,210	9,444,857	34,400,164	594,883	9,182,661	1	2	189
$Tertile2(Medium-sizeBanks)$								
assets	8,626,396	7,403,696	30,090,644	1,224,730	5,910,392	1	5	189
depfc	2,857,009	2,415,641	8,474,535	526,826	1,809,680	1	3	189
deptl	2,531,336	2,013,259	11,057,236	252,713	1,987,065	1	5	189
equity	966,038	883,145	3,733,897	43,416	688,389	1	5	189
foreignborrow	992,331	597,548	6,549,007	1,729	1,201,231	2	10	189
loansfc	1,592,497	1,336,789	6,421,149	101,252	1,344,091	2	6	189
loanstl	3,433,971	2,386,855	14,824,478	191,189	3,033,666	1	4	189
$Tertile3(Small-sizeBanks)$								
assets	1,253,047	863,854	4,173,421	1,169	1,051,411	1	3	165
depfc	380,321	213,984	1,626,800	518	334,707	1	4	148
deptl	330,204	200,647	1,463,733	-	352,548	1	4	148
equity	175,775	114,113	608,903	107	134,172	1	3	165
foreignborrow	230,331	164,239	1,111,378	148	225,757	2	6	165
loansfc	165,803	113,468	676,608	131	151,460	1	3	165
loanstl	479,118	200,203	2,030,440	263	569,089	1	4	165

Descriptive statistics for the 21 banks used in our regressions. All figures are in terms of thousands of Turkish Lira. For a description of the variables see Table A.2 in the Appendix.

capture possible differences in intercept (Eq. 2.2) and, intercept and slope (Eq. 2.3). The resulting models are:

$$loansfc_{i,t} = \alpha + \beta depfc_{i,t} + \delta_1 D_1 + \delta_2 D_2 + \mu_i \tag{2.2}$$

$$loansfc_{i,t} = \alpha + \beta depfc_{i,t} + \gamma_1 D_1 depfc_{i,t} + \gamma_2 D_2 depfc_{i,t} + \mu_i \tag{2.3}$$

where,

$$D_1 = \begin{cases} 1 & \text{, for banks in 1st tertile} \\ 0 & \text{, Otherwise} \end{cases} \tag{2.4}$$

and,

$$D_2 = \begin{cases} 1 & \text{, for banks in 2nd tertile} \\ 0 & \text{, Otherwise} \end{cases} \tag{2.5}$$

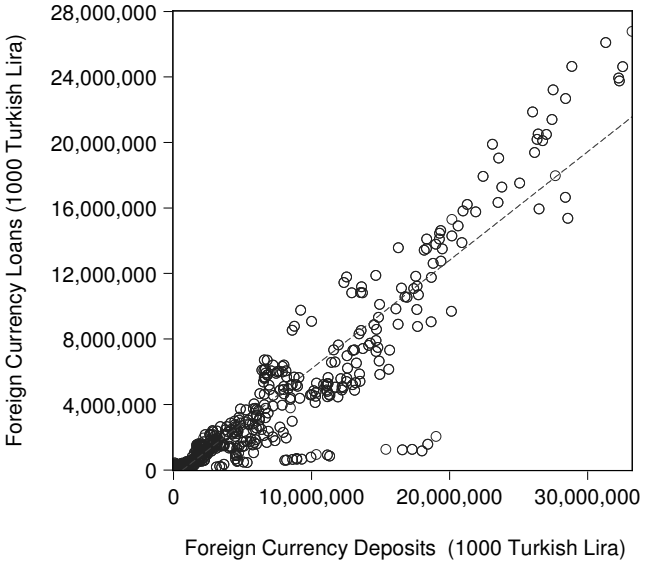


Figure 3: Foreign Curr. Dep. vs Loans in the Turkish Banking System-Bank Specific

Before proceeding to estimating these equations, we first checked for the stationarity of the data using a unit root test for the unbalanced panels (Fisher test). The results suggest that our dependent variable $loansfc$ and explanatory variable $depfc$ which measures the level of foreign currency accounts in the banking system are both non-stationary in levels but not necessarily so in differences.[10]

The econometric technique used for the panel is the fixed effects model. In order to test the validity of the use of this model, we use the Hausmann test. The $\chi^2(3) = 31.38$ and the $p = 0.00$ show that the differences in the coefficient estimates using Random Effects and Fixed Effects is systemic,thus supporting the use of the Fixed Effects model.

Results are presented in Table 2. Estimation of Equation 2.1 shows the high, positive relationship between both variables ($R^2 = 0.96$[11].) The F-test for goodness of fit of the model is significative at the 5% significance level. One can observe that the value of β is equal to 0.863427 and is positive and significant. This coefficient tells us that per each Turkish lira equivalent of foreign currency deposited, an average 0.86 Turkish Lira equivalent is lent out by the banks. This is more evident in the aggregate case suggesting that the Turkish banking system as a whole is uncovered against the currency risk and that there is a direct transference of currency risk to default risk.The results of introducing dummies to control for changes in the intercept due to banks' size are presented in the third column (Eq 2.2) and the results for the regression with dummies to control for changes in slope[12] are presented in the fourth column (Eq 2.3).

Analyzing the three estimations, one can appreciate that all the coefficients of $depfc$ are significant at 1% meaning that dollar deposits have a positive and significant influence on dollar loans. In this table we can also observe that there is a significant difference in the intercept between large and medium sized banks and there is no significant difference in slope.This implies that even though the average loan in foreign currency is bigger in big banks, the dollars lent per dollar received(deposits) is the same disregarding the size of the banks. i.e. the lending behavior is common across all banks.

Another source of variability of the loans in foreign currency can be given by the banks' liquidity in Turkish Lira. We define liquidity($liqtl$) as the difference in local currency deposits ($deptl$) minus local currency loans ($loantl$). We expect a negative relationship between loans in foreign currency and this liquidity measure implies that when banks have more local currency they prefer to lend in this currency more than using their foreign currency holdings. To test this idea we include in Equation 2.1 the liquidity measure ($liqtl = deptl - loanstl$):

$$loansfc_{i,t} = \alpha + \gamma(liqtl_{i,t}) + \beta depfc_{i,t} + \mu_i \tag{2.6}$$

To control for changes in banks' liquidity behavior due to their size in terms of assets we also modify this equation:

$$\begin{aligned} loansfc_{i,t} =& \alpha + \beta depfc_{i,t} + \delta d1 * depfc_{i,t} + \zeta d2 * depfc_{i,t} + \gamma(liqtl_{i,t}) \\ &+ \vartheta d1 * (liqtl_{i,t}) + \iota d2 * (liqtl_{i,t}) + \mu_i \end{aligned} \tag{2.7}$$

The results of these estimations are also presented in Table 2 and they show that as expected the liquidity in local currency has a negative and significant impact on the levels of loans in foreign currency.

We also estimated equations (2.2) to (2.7) with series in differences(i.e. we made the series stationary. The results are presented in Table 3. [13]

From these findings, we find support that changes in foreign currency loans are positively related to changes in foreign currency deposits. From both equations it is clear that this relationship is positive and strongly significant. On the other hand, judging from the results in Eq. 2.6 we can see that the effect of changes in liquidity in Turkish Liras($liqtl$) do not have an effect on the changes in the amount of foreign currency loans($loansfc$).

Given these preliminary results and following Honig (2009) we can argue that as soon as the loans and deposits stay inside the Turkish economy (no international hedge), banks are simply transforming their currency risk into a default risk. As it is apparent from the data, hedge in the Turkish banking system is almost not existent and a systemic shock due

Table 2: Determinants of Loan Dollarization

Dependent Variable:	Level of Foreign Currency Loans				
Method	Eq.(2.1)	Eq.(2.2)	Eq.(2.3)	Eq.2.6	Eq. 2.7
Time Period	$2002q4 - 2010q1$	$2002q4 - 2010q1$	$2002q4 - 2010q1$	$2002q4 - 2010q1$	$2002q4 - 2009q2$
C	$-1,661,249^{***}$	$-1,848,563^{***}$	$-1,541,604^{***}$	$-1,445,992^{***}$	$1,459,762$
	(92,081.72)	(256,601.5)	(101,684.7)	(148,777.4)	(161,861.7)
$depfc$	0.863427^{***}	0.863531^{***}	0.632428^{***}	0.913248^{***}	0.662426^{***}
	(0.013847)	(0.013848)	(0.250084)	(0.027704)	(0.045132)
$D1 * depfc$			0.236486		0.236111^{***}
			(0.250212)		(0.046275)
$D2 * depfc$			0.119936		0.278592^{***}
			(0.249803)		(0.029628)
$liqtl$				-0.137541^{***}	-0.065660^{*}
				(0.027523)	(0.040325)
$D1 * liqtl$					-0.116968^{***}
					(0.047973)
$D2 * liqtl$					0.313101^{***}
					(0.048172)
$D1$		$483,287.4^{***}$			
		(434,145.3)			
$D2$		$39,485.47^{***}$			
		(293,952.5)			
$Adj.R^2$	0.96	0.96	0.96	0.96	0.95
F Test	0.00	0.00	0.00	0.00	0.00
Number of banks	21	21	21	21	21
Number of observations	588	588	588	588	588

This table presents the results of Equations (2.1), (2.2),(2.3) and (2.6). $depfc$ is the level of foreign currency deposits for each bank. $liqtl$ is the liquidity in local currency measured by the difference in local currency deposits ($deptl$) and local currency loans ($loantl$).$D1$ is the big bank dummy which takes the value of 1 if the bank's average rank in terms of total assets for the years for which it reports data falls in the first tertile.$D2$ is the medium size bank dummy which takes the value of 1 if the bank's average rank in terms of total assets for the years for which it reports data falls in the second tertile. Estimations include cross-section fixed effects. * significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 3: Determinants of Loan Dollarization - First Differences

Dependent Variable:	Level of Foreign Currency Loans- First Differences			
	Eq.(2.1)	Eq.(2.6)		Eq.(2.1)-log difference
Time Period	$2003q1 - 2009q2$	$2003q1 - 2009q2$		$2003q1 - 2009q2$
C	63,137.27	64,917.09	C	0.027695^{*}
	(46241.02)	(45,300.22)		(0.015481)
$d(depfc)$	0.507075^{***}	0.499636^{***}	$dlog(depfc)$	0.942759^{***}
	(0.085132)	(0.087171)		(0.015481)
$d(liqtl)$		0.047118		
		(0.067176)		
$Adj.R^2$	0.39	0.39		0.80
F Test	0.00	0.00		0.00
Number of banks	21	21		21
Number of observations	502	502		502

This table presents the results of Equations (2.1), (2.2),(2.3) and (2.6). $depfc$ is the level of foreign currency deposits for each bank.$liqtl$ is the liquidity in local currency measured by the difference in local currency deposits ($deptl$) and local currency loans ($loantl$). Estimations include cross-section fixed effects. * significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

to default risk facing a currency depreciation is really high. This leads us to investigate further the conditions and incentives that have led banks to behave this way.

3 Granger Causality Test & Vector Error Correction Model Analysis

To be more certain of the relationship between the loan and deposit dollarization, we have also run the Engle-Granger causality test on the variables in levels, using 4 lags. Table 4 show the results of these tests. We see that there is a two-way causality between the two variables, not only deposit dollarization causes loan dollarization but also loan dollarization causes deposit dollarization. We also run the same test using the variables in differences and the results remained unchanged.

Table 4: Granger Causality Test Results

Null Hypothesis	*Observations*	*F-Statistic*	*Probability*
depfc does not Granger Cause loansfc	434	7.964	0.000
loansfc does not Granger Cause depfc	434	8.813	0.000
d(depfc) does not Granger Cause d(loansfc)	412	4.0730	0.003
d(loansfc) does not Granger Cause d(depfc)	412	16.705	0.000

This Table shows the results of the pairwise Granger Causality Tests between foreign currency loans(loansfc) and foreign currency deposits(depfc) as well as between difference in foreign currency loans(dloansfc) and the difference in foreign currency deposits(ddepfc) in the Turkish banking system.The number of lags included in both tests is 4.

As a next step we test for cointegration among our variables since we also know that our series are non-stationary. As Engle and Granger (1987) pointed out a linear combination of two or more non-stationary series may be stationary and if such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. We decide to use the VEC model instead of the VAR one because we wanted to exploit the non-stationarity of our data to see the existence of a long run relationship. In principle if there is a 1-to-1 relationship we should have:

$$loanfc - depfc = 0 \tag{3.1}$$

if we measure loans as a negative variable and deposits as a positive one, Eq. 3.1 there must exist a linear combination (a cointegrating vector) that satisfies that identity. When we perform the Johansen cointegration test, we find that there is one cointegrating vector at the 5% significance level using either the Trace or the Maximum Eigenvalue tests. The results are presented in Table 5.

Accordingly to our results, the normalized cointegrating vector is given by [1, 0.944]. In terms of equation (3.1) this result implies that we have not only a long term relationship but also that the identity almost holds, meaning that indeed Turkish banks per dollar lent have a dollar deposited. Again, this tells us about the risk transformation in the system.

Table 5: Johansen Cointegration Test Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 C.V.*	*Prob.***
*None**	0.1693	88.7956	15.4947	0.000
At Most 1	0.0091	4.1995	3.8414	0.0404
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
*None**	0.1693	84.5959	14.2646	0.0295
At Most 1	0.0091	4.1995	3.8414	0.0404

This Table shows the results of the Johansen Cointegration Tests. Trace test indicates 1 cointegrating eqn(s) at the 0.05 level. Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level.* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.

As soon as we have a cointegrating vector, we can thus use the VEC model to see the impulse responses of our variables. When we use a VEC model to see impulse responses to shocks for the two variables, we see that a unit-shock in foreign currency loans increases deposits and, more interestingly this effect stays for a long period. This is not the case of loans responding to unit-changes in deposits. We present these results in Figure 4.

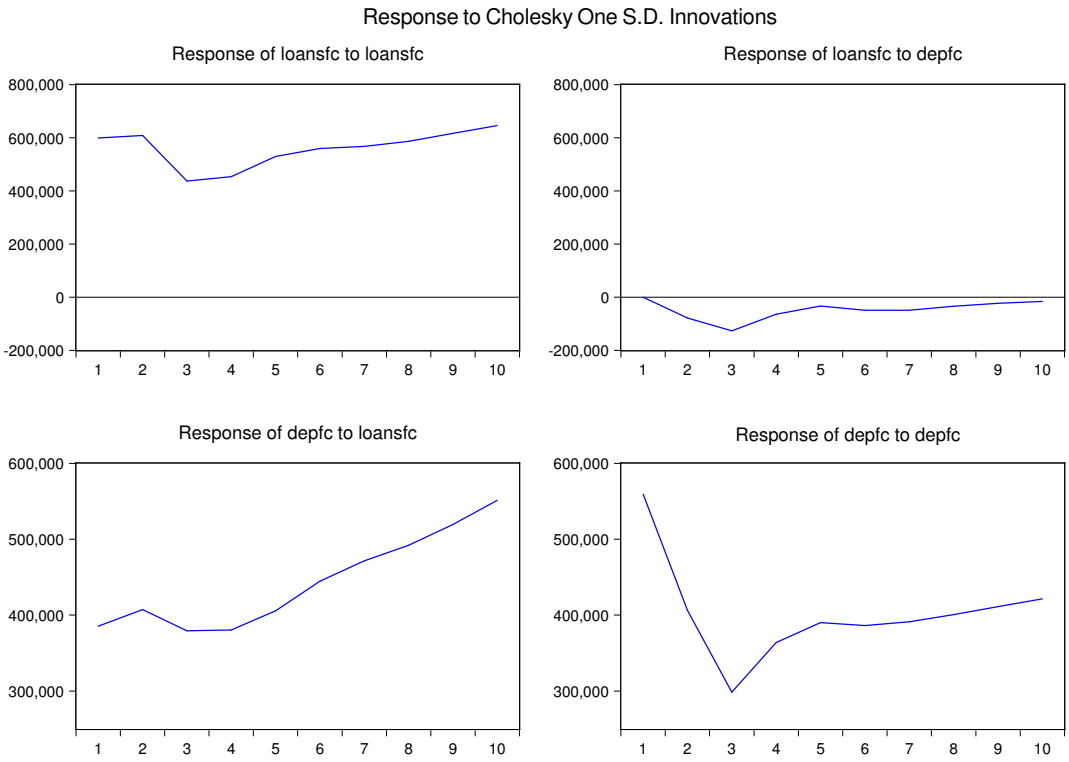


Figure 4: Impulse Shock Responses for Foreign Currency Loans and Deposits

3.1 The Macroeconomic Developments in Turkey

We can explain the relationship between the growth of foreign currency deposits and foreign currency loans to a great degree by evaluating the developments in the Turkish economy and in the value of Turkish lira in recent years: As mentioned earlier, Turkish monetary authorities have been following an implicit inflation targeting (IT) regime since 2002 and a full blown IT regime since 2006. During this period the inflation rate has decreased from 45% to 10% in 2009. Following the 2001-2002 crisis, the country has also switched to a floating exchange rate system. Figure 5 shows the ratio of foreign currency loans to loans in local currency versus the inflation rate for our study period. The figure suggests inflation is highly correlated with the ratio of foreign currency loans to domestic currency loans. As inflation declined, it suggests loans are made more in domestic currency or the loan growth in terms of Turkish Lira denomination increased at a higher pace than that of foreign currency loans.

In addition, Turkey has maintained an average gdp growth rate of 5.72% during our study period. It is natural to expect that demand for loans to increase in a growing economy regardless of currency denomination.Figure 6 shows the time series representation of real gdp versus loans in foreign currency and Turkish liras. The correlation between the real gdp growth and the growth in Turkish Lira denominated loans for the whole study period is 0.98 while the same ratio is equal to 0.96 with respect to loans in foreign currency. As can be seen there is a clear relationship between the two variables. The figure also shows the same correlation figures at different intervals within the study period.

During our study period we observe an appreciation of the lira versus other hard currencies such as the dollar until the Global Financial Crisis.[14] The Turkish lira appreciated 27% against the US dollar between the first quarter of 2003 and the end of 2007. During this period Turkish banks saw an increase in the number and volume of applications for loans not only in local but also in foreign currency. The level of foreign currency loans held by the 21 banks in our study stood at 31.2 billion Turkish liras at the end of 2002. This number tripled to over 100 billion TL by mid 2008 ,reaching 1.12 billion TL in the second quarter of 2009. This increase shows borrowers' preference to borrow in foreign currency as the local currency appreciates. One can argue when local currency is stable and forecast of future exchange rate is to appreciate, borrowers will prefer to take loans in foreign currencies due to the fact that their loan commitments in terms of local currency decreases with an appreciating local currency.[15]

Figure 7 which shows the ratio of aggregate loans in foreign currency to aggregate deposits in foreign currency for our sample presents a clear increasing trend during the

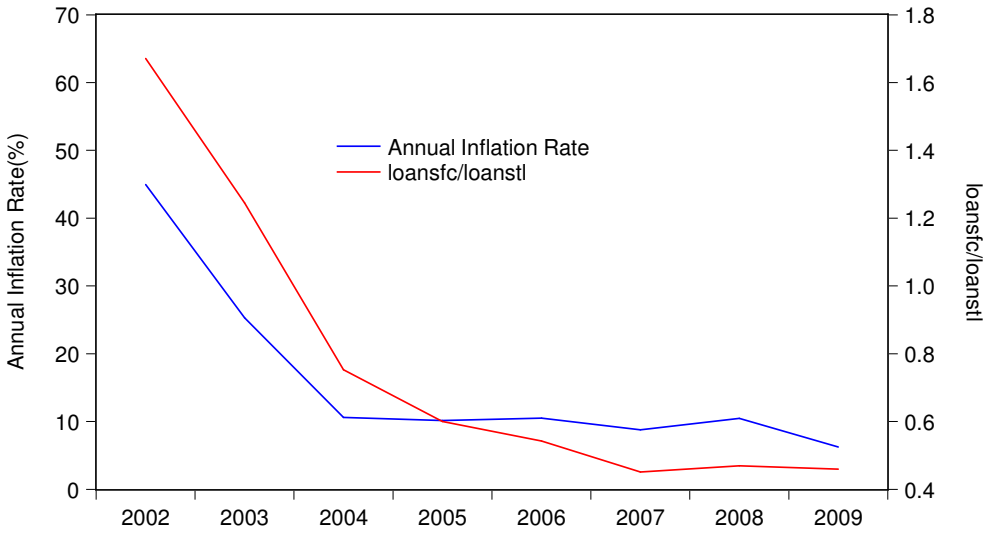


Figure 5: Inflation vs FC to TL Loan Ratio

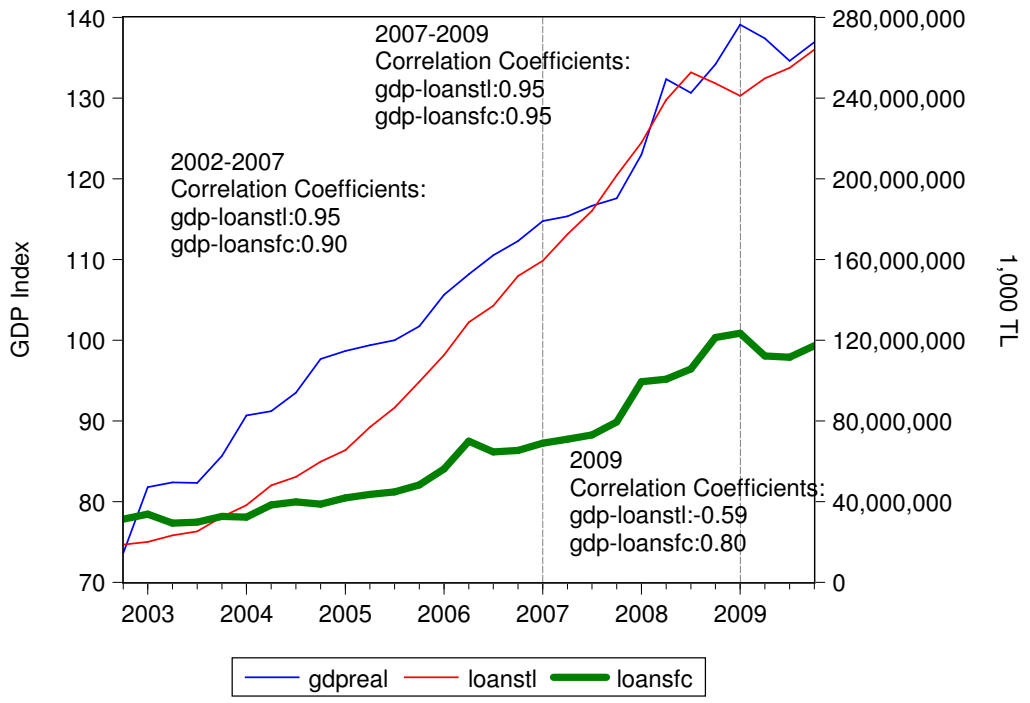


Figure 6: GDP vs Loans in TL and Foreign Currency

The figure above represents the level of Turkish real gdp($gdpreal$) against total Turkish lira($loanstl$) and the foreign currency($loansfc$) denominated loans extended by the banks in our sample during our study period.All values are in terms of thousand Turkish Liras.

same period. This ratio goes from around 0.39 in 2002 to almost 0.83 in the first quarter of 2009. There is an implication of this finding: The increasing demand for loans in foreign currency should have increased banks' efforts to supply foreign currency through various means. During this period, Turkish banks engaged in all or any combination of the following strategies aimed at sourcing foreign currency:

- Issue dollar denominated securities,[16]
- Borrow from foreign banks
- attract more foreign currency deposits.

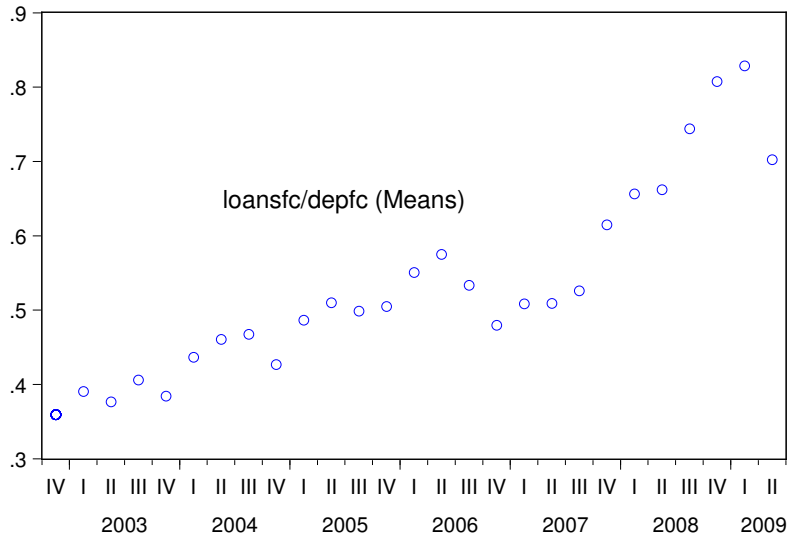
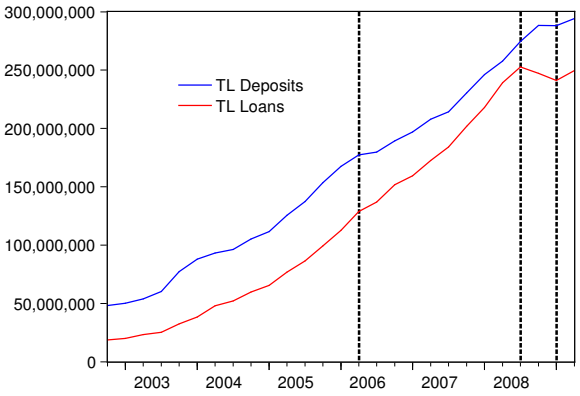
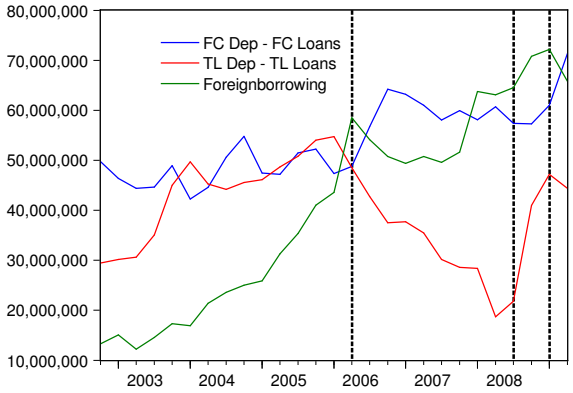


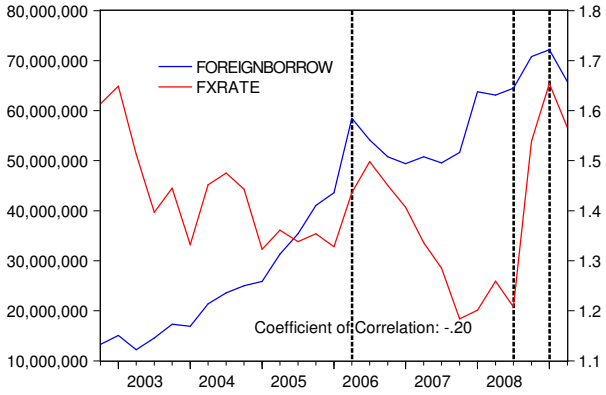
Figure 7: FX Loans to Deposits Ratio-Means

The figure shows the means of the ratio of foreign currency loans($loansfc$) to foreign currency deposits(d$depfc$) extended by the banks in our sample.

Moreover, as explained before, demand for loans increased regardless of the currency denomination. This can be seen in panels 1 and 4 of Figure 8. However, as we can also observe the deposits in Turkish liras did not catch up with the demand for loans in local currency(observe in panel 1 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 maintain a ratio of ($loansfc/depfc$) of around 0.7 during the same period. This decrease in the ratio of TL loans to TL deposits exerted additional pressure to find liquidity to cover the loan demand. An evaluation of balance sheets of the 21 banks in our dataset reveals some evidence that indeed Turkish banks engaged in these three methods.







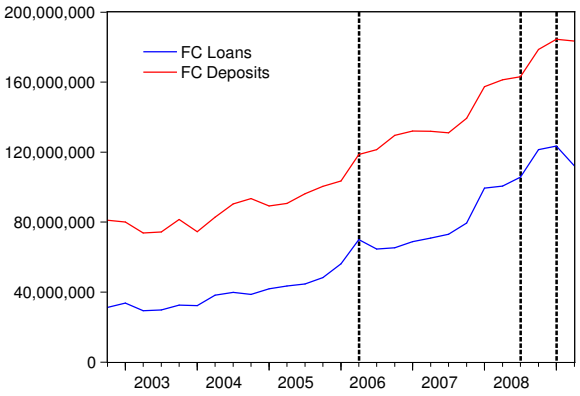


Figure 8: FC and TL Liquidity,Banks' Foreign Borrowing and the Exchange Rate

In the figure above, Panel 1 shows the level of banks' deposits in Turkish liras vs. their loans in Turkish liras(a measure we call as their "tl liquidity"); Panel 2 illustrates banks' foreign borrowing versus their liquidity in Turkish liras(tl liquidity) and in foreign currency(measured by the difference between FC deposits and FC loans); Panel 3 shows the level of foreign borrowing by banks in the sample versus the TL-USD exchange rate; Panel 4 illustrates banks' liquidity in foreign currency.

Firstly, foreign borrowing by Turkish banks accelerates significantly especially after 2003 as can be seen in the third panel in Figure 8. Also in the second panel of Figure 8 we show banks' liquidity positions (measured by difference between deposits and loans) in foreign currency as well as in Turkish liras. As can be seen especially after 2006 the difference between Turkish lira deposits and Turkish lira loans falls significantly and the amount of borrowing from foreign banks increase. This could suggest that the latter constituted a source of funding for the increase in Turkish currency loans.

Secondly, we also observe that securitization activity by Turkish banks have increased dramatically during this period.[17] The total securitization activity by the banks in our sample increased from 887 million Tl(624 mil USD) in 2004 to over 6.4 billion TL(4.7 bill USD) in 2005 and to 5.6 billion TL(3.9 bil USD) in 2006.With the gradual improvement of their liquidity in Turkish lira terms and the worsening of the conditions in the international capital markets we see banks' foreign borrowing volume tapering off to 3.2 billion TL in 2007 and finally to around 1 billion TL in 2008. In the third panel of Figure 8 we present the fx rate compared with foreign borrowing of Turkish banks. We can clearly observe that foreign borrowing and the changes in the exchange rates(TL per USD) are related. During 2007 the coefficient of correlation is -0.98 and during 2008 the same figure becomes +0.91. It is also important to note that the Turkish lira has appreciated during this period of heavy foreign borrowing by Turkish banks.

To further understand the relationship between these variables we perform a regression analysis on changes of foreign currency borrowing by Turkish banks.

$$d(foreignborrow_t) = \alpha + \gamma d(deptl + depfc)_t + \rho d(loantl + loanfc)_t + \mu_i \qquad (3.2)$$

Our aim is to see if the banks use some of the foreign borrowing to increase their Turkish Lira loans. We cannot find strong evidence that banks use foreign currency borrowing to cover their loans in Turkish liras. It appears the banks in our sample borrow from foreign sources but use it mostly to cover the difference between foreign currency deposits and foreign currency lending, they do not convert the foreign currency loans to Turkish currency and lend this money. Thus the mechanism of exchange rate should be related to consumers' (firms, governments, people) preference with regards to their loans. They must have preferred to exchange their loans into the local currency, thus appreciating the Turkish lira. Note also that this transition mechanism can explain why in 2008-2009 the Turkish lira depreciates even though the foreign currency deposits in the banking sector were still growing. This could be related to the sudden depreciation of the lira from mid 2008 to mid 2009(the last panel in Figure 8). It looks as if this movement

was created by short-term capital moving back to the US or to other developed markets out of Turkey. What is also interesting is that during this period there is a decrease in Turkish lira loans that improved Turkish lira liquidity for banks and that foreign currency operations (deposits and loans) continued in their increasing trend. This tells us that banks as well as their customers saw this sudden depreciation as a temporal break (indeed this period corresponds to financial meltdown of global financial markets) and not as a structural one. The results can be seen in the Table 6.We can appreciate that only the total loans exert a positive and significant effect on foreign borrowing. It appears the change in the level of foreign currency loans have a significant and positive explanatory power over the changes in banks' foreign borrowing and the changes in the level of loans in Turkish Lira has a small positive but not significant impact. This suggests that the banks separate the two sources of funds and treat them independently of each other.

We perform a second estimation by using the disaggregated level of loans and deposits irregardless of their denomination. The results suggest that it is the loans that are the most important drivers of Turkish Banks' decision to seek funding from foreign banks.

$$d(foreignborrow_t) = \alpha + \beta d(loantl_t) + \delta d(loanfc_t) + \mu_i \tag{3.3}$$

Previous literature such as Allen and Saunders (1986) and Cocco, Gomes, and Martins (2009) have shown that other bank-specific variables such as the size of borrower bank's assets, its market share, size of its non-performing loan ratio and the amount of its surplus deposits have a significant effect on the amount borrowed in the inter-bank market. To be more through in our methodology, of these variables, we include the change in the bank's overall equity ($d(equity)$), changes in total assets($d(assets)$) and changes in the bank's market share($d(mktshare)$) as measured by the share of bank's deposits to the overall deposits in the sample at time t. As we can see in Table 6 equity and market share have a negative and significant effect on the foreign funding banks can secure; the larger the equity and the market share of the bank(a measure of bank's size), the lower the need for loans from external sources. The larger the changes in bank's assets are the more need it has for foreign loans.

Table 6: Determinants of Turkish Banks' Foreign Currency Borrowing

Dependent Variable:	d(foreignborrow) - Change in the Level of Foreign Currency Borrowing				
Method	OLS Cross-Section Fixed Effects				
Equation	Eq.3.3			Eq. 3.2	
Time Period	$2003q1 - 2009q2$	$2003q1 - 2009q2$		$2003q1 - 2009q2$	$2003q1 - 2009q2$
C	$-463,861.2$	24,284.46	C	-19,387.94	4,932.367
	-91,6176.3	-25,333.99		-21,920.8	22,163.84
$d(loantl)$	0.062^{***}	0.033035	$d(deptl + depfc)$	-0.02	-0.197^{***}
	-0.027	(0.038728)		-0.019	(0.028)
$d(loanfc)$	0.379^{***}	0.160333^{***}	$d(loantl + loanfc)$	0.231^{***}	0.090^{***}
	-0.029	(0.0414)		(0.0245)	(0.028)
$d(equity)$		-0.421332^{***}	$d(equity)$		-0.463^{***}
		-0.063333			(0.060)
$d(assets)$		0.0842^{***}	$d(assets)$		0.215^{***}
		(0.0183)			(0.023)
$d(mktshare)$		$-8,185,055^{***}$	$d(mktshare)$		$-4,373,210^{*}$
		-2,975,604			(2,827,221)
$Adj.R^2$	0.278	0.408		0.209	0.459
$No.ofobservations$	519	502		502	502

This table presents the results of estimations on the changes in the foreign borrowing by Turkish banks estimated by Equation 3.3and over sources and uses of funds estimated by using Equation 3.2. All estimations include country and fixed effects. Standard errors are presented in parenthesis. * significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

4 Conclusion

In this paper we have contributed to the literature on the dynamics of foreign currency lending and saving by focusing on an emerging market setting, the case of Turkey. Turkey is particularly interesting to study for this topic as the country has enjoyed high rates of economic growth recently coupled with an expansion of credit both in local and foreign currency terms. Additionally, the regulatory authorities in Turkey has recently tightened credit to households by ending the practice of foreign currency lending by the country's banks. This is an interesting development and has definitely played an important role in our motivation for this paper.

By using a dataset which includes an unbalanced panel of quarterly income statements and balance sheets of 21 commercial and deposit banks between the fourth quarter of 2002 and first quarter of 2010, we first showed that dollar deposits have a positive and significant influence on dollar loans in Turkey. Our results also point out to a significant difference between large and medium sized banks in terms of their foreign currency lending meaning that bigger banks do more lending in foreign currency. Yet despite the average loan in foreign currency is bigger in big banks, the ratio of dollars lent per dollar received(deposits) is the same for all banks irregardless of their size. This finding suggests that the lending behavior is common across all banks in our sample. Then we proceeded to see whether the liquidity in local currency has a negative and significant impact on the levels of loans in foreign currency. And as expected our estimations did show that the effect of changes in liquidity in Turkish Liras($liqtl$) do not have an effect on the changes in the amount

of foreign currency loans($loansfc$). Given these results and following Honig (2009) one can argue that Turkish banks are simply transforming their currency risk into a default risk. As it is apparent from the data, hedge in the Turkish banking system is almost not existent and a systemic shock due to default risk facing a currency depreciation is really high. This leads us to investigate further the conditions and incentives that have led banks to behave this way. In doing so, we believe the following explanations explain the relationship between growth of foreign currency deposits and foreign currency loans in the Turkish case:

- The falling inflation rate as a result of the IT regime in Turkey;
- The increased demand for loans in general not only in Turkish liras but also in foreign currency as a result of high growth rates experienced in the country during the study period;
- An appreciation of the lira versus other currencies during the study period.

To overcome the increasing demand for loans in foreign currency, our analysis reveals that Turkish banks have responded by issuing dollar denominated securities in international markets, by borrowing from other banks(the most common form) and by attracting more currency deposits. Yet our analysis also shows that banks separate the Turkish lira and the foreign currency sources of their funds and treat them independently.

The findings of this research 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 on an economy 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 policy decision taken at the right time for the right reasons.

A Appendix

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

Bank Name	Ownership Group (as of 2010)	Total Assets as of 2010Q3(mil USD)
Akbank	Non-state owned - Domestic	72,460.13
Alternatif Bank	Non-state owned - Domestic	2,820.70
Anadolubank	Non-state owned - Domestic	3,126.23
Arap Turk Bankasi	Non-state owned - Foreign	694.08
BankPozitif Kredi ve Kalkinma Bankasi	Non-state owned - Domestic	1,031.36
Denizbank	Non-state owned - Domestic	17,204.37
Eurobank Tekfen	Non-state owned - Foreign	2,838
Finans Bank	Non-state owned - Foreign	23,454.34
Fortis Bank	Non-state owned - Foreign	7,759.88
HSBC bank	Non-state owned - Foreign	10,597.03
ING Bank	Non-state owned - Foreign	11,470.28
Sekerbank	Non-state owned - Domestic	7,382.60
Tekstil Bankasi	Non-state owned - Domestic	1,498.26
Turk Ekonomi Bankasi	Non-state owned - Domestic	11,620.37
Turkish Bank	Non-state owned - Domestic	631.32
Turkiye Is Bankasi	Non-state owned - Domestic	86,482.10
Turkiye Garanti Bankasi	Non-state owned - Domestic	78,635.06
Turkiye Halk Bankasi	State owned - Domestic	48,206.47
Turkiye Vakiflar Bankasi	State owned - Domestic	49,958.55
Yapi ve Kredi Bankasi	Non-state owned - Domestic	51,405.33
Ziraat Bank	Non-state owned - Domestic	95,244.34

Source: The Banks Association of Turkey

Table A.2: Variable Definitions

Symbol	*Definition*
assets	Bank's Total Assets (both in Turkish liras and in foreign currency)
depfc	Bank Deposits in Foreign Currency(denominated in Turkish lira terms)
deptl	Bank Deposits in Turkish Liras
equity	Bank's total equity in Turkish Liras
foreignborrow	Bank's Total Outstanding Loans from Foreign Sources
gdpreal	Gross Domestic Product in millions of Turkish Liras
mktshare	Bank's market share in terms of deposits
liqtl	Bank's liquidity position in terms of Turkish Liras measured by the difference in local currency deposits (*deptl*) minus local currency loans (*loantl*)
loansfc	Bank Loans in Foreign Currency
loanstl	Bank Loans in Turkish Liras

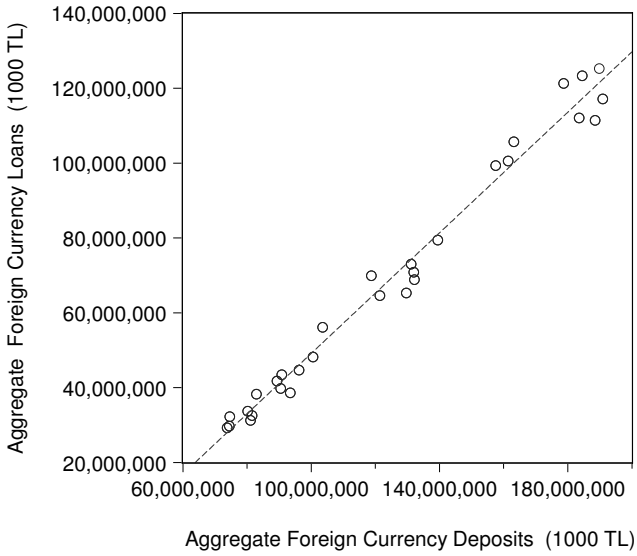


Figure A.1: FC Deposits vs Loans in the Turkish Banking System-Aggregate

Notes

[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 mil.

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.

[2]Though implicitly at first, the IT regime becomes full-fledged in 2006. During the period inflation has decreased from over 70% to below 10%. For more information on Turkey's IT Regime see (Akyurek, Kutan, and Yilmazkuday 2011).

[3]such as (Kutan, Ozsoz, and Rengifo 2010) have shown that banks in dollarized economies have lower profitability and are more risk averse.

[4]In Hungary, Latvia and Poland banks are required to disclose the exchange rate risks of FX loans to clients and regulators have tightened the eligibility criteria for such loans. In countries like Croatia, Kazakhstan and Romania stronger provisioning requirements were also imposed on FX compared to local currency loans. Ukraine even completely banned FX lending to households in late 2008.(Brown and Haas 2010)

[5]The range of this ratio was 3%(Ziraat Bank 2009Q2) - 85%(Finansbank 2003Q1) during our sample period.

[6]For a definition of what constitutes a "big-bank" see Section 2.2 Equation 2.1.

[7]such as Kutan, Ozsoz, and Rengifo (2010)and De Nicolo, Honohan, and Ize (2005).

[8]In both figures, the amount of foreign currency loans and deposits are denoted in their Turkish Lira equivalent amounts. We understand this might inflate the level of the loans when Turkish Lira appreciates and vice versa. This might also be a factor in the high correlation between the two variables. However, we cannot use the foreign currency amounts of the two variables since the data from the Banks Association of Turkey is in Turkish Liras.

[9]We observe that banks do not shift between categories often.

[10]We acknowledge that the data is non-stationary, but we also perform the analysis in levels because there is a clear relationship between both variables and what we intend is to determine tendencies. The Levin, Lin & Chu t-values for $loansfc$ and $depfc$ are 5.27 (100% probability) and 3.73 (99% probability)respectively.

[11]Such a high R^2 is natural because our series are non-stationary and they comove. However, this co-movement is not spurious and has intuitive and economic meaning.

[12]We also tested for changes in the slope and intercept and none of the parameters were significant.

[13]We are only reporting the difference equations for eq 2.1 and eq 2.6 since the dummy variables are not relevant anymore when we use differences.We also cannot estimate eq 2.6 using log differences since the liquidity measure has negative values for almost half of our sample.

[14]As the effects of the crisis fade we can see the appreciation trend of the lira returns.

[15]Honig (2009) also supports this notion and argues that with stable fx rates borrowers will choose to borrow in USD terms rather than in local currency.

[16]Since 2004 Turkish banks have successfully sold USD or Euro denominated trade finance or credit card based securities in international markets.

[17]Of the 21 banks in our sample, 14 have successfully issued securities mostly for trade receivables in international markets during the study period.

References

Akyurek, C., A. M. Kutan, and H. Yilmazkuday (2011): "Can Inflation Targeting Regimes be Effective in Developing Countries? The Turkish Experience," *Journal of Asian Economics*, In Press, Accepted Manuscript, –.

Allen, L., and A. Saunders (1986): "The large-small bank dichotomy in the federal funds market," *Journal of Banking & Finance*, 10(2), 219–230.

Brown, M., and R. D. Haas (2010): "Foreign currency lending in emerging Europe: bank-level evidence," Working Papers 122, European Bank for Reconstruction and Development, Office of the Chief Economist.

Cocco, J. F., F. J. Gomes, and N. C. Martins (2009): "Lending relationships in the interbank market," *Journal of Financial Intermediation*, 18(1), 24 – 48.

De Nicolo, G., P. Honohan, and A. Ize (2005): "Dollarization of bank deposits:Causes and consequences," *Journal of Banking and Finance*, 29, 1697–1727.

Engle, R. F., and C. W. J. Granger (1987): "Co-integration and Error Correction: Representation, Estimation, and Testing," *Econometrica*, 55(2), 251–76.

Honig, A. (2009): "Dollarization, exchange rate regimes and government quality," *Journal of International Money and Finance*, 28(2), 198 – 214.

Kutan, A. M., E. Ozsoz, and E. W. Rengifo (2010): "Evaluating the Effects of Deposit Dollarization in Bank Profitability," *Fordham University Department of Economics Discussion Paper No. 2010-07*.