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# Securitization in Turkish Banking System \*

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## Abstract

By using data from 8 depository institutions in Turkey we evaluate the drivers of securitization between 2004 and 2009. Our analysis shows that previous period securitization as well as bank equity, level of profits and asset size are important factors in a bank's decision to securitize its loan portfolio. Banks' on-balance sheet liquidity on the other hand is not a significant factor. We also use a binary probit model and predict with good certainty the timing of a bank's securitization in capital markets. Again, bank size, profitability and equity are also explanatory variables in making these accurate predictions.

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# 1 Introduction

Securitization refers to the process of transforming illiquid assets with predictable cash flows into marketable securities. The most common forms of assets used in securitization are mortgage loans, consumer loans, credit card receipts and trade receivables. Although asset securitization has been widespread in developed capital markets especially prior to the Global Financial Crisis, it has constituted an unknown frontier for emerging market banks until recently. The first Turkish bank successfully sold its trade receivables portfolio in international capital markets in 1999.<sup>1</sup> However due to interruption by the 2001-2002 banking crisis securitization did not catch on in the Turkish banking system well until 2003-2004.

In this paper we study the securitization activity in the Turkish banking system between 2004 and 2009 using a dataset of eight Turkish banks which have successfully sold their loan portfolios in international markets during this time frame. We estimate the drivers of their securitization activity by using a GMM specification and find that previous period securitization activity, bank's profit and equity holdings are the key determinants in terms of their decision to securitize or not. Surprisingly, liquidity does not appear to be a driver of securitization. We also run probit estimations for each bank to see if we can predict the probability of securitization. Our estimation results suggest the factors we have found to be influential in our GMM estimation also predict the probability of securitization activity by each bank.

The rest of this paper is organized as follows: in the next section we provide a brief overview of literature on determinants of securitization; in Section 3 we present our methodology; in Section 4 we describe our dataset; Section 5 provides the results of our estimations and Section 6 concludes.

## 2 Literature Review

To our knowledge there is no prior study that studies securitization by the Turkish banking system in the growing securitization literature. Yet studies on emerging markets have been done before, some of which may also include Turkey. For instance Jobst (2010) provides a good critical survey of sovereign securitization in emerging markets but this study does not cover bank-level securitization.

There are many reasons for banks to engage in securitization and a vast literature that

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<sup>1</sup>Garanti Bank raised approximately \$200 million in a securitization deal led by Bank of America's securitization team in London.

discusses these. The obvious first reason is to increase liquidity: Securitization creates a funding opportunity for banks without having to attract more retail deposits and being subject to deposit insurance and reserve requirements ((Parlour and Plantin 2008)). A second benefit is it enables a transfer of credit risk. As argued by Dell’Ariccia, Igan, and Laeven (2008) banks with riskier loans may securitize more than others as a result. A third determinant refers to accounting gains(e.g. (DeMarzo 2005)).

When market value of loans exceed their book values, banks may have more of an incentive to recognize these gains. And a final incentive for banks to securitize their loan portfolios may be the opportunity to adjust their capital ratios and decrease their regulatory requirements as Berger, Herring, and Szego (1995) and Jones (2000) have suggested.

as argued by Affinito and Tagliaferri (2010) these effects could also be linked to each other . For instance, if the goal of securitization for a bank is to release capital and use the proceeds to engage in more profitable investments, the causal effect will be significant for both capital and profits. However, the effects could also be completely independent of each other. In that regard, we observe that it is mostly well-capitalized banks in Turkey rather than the smaller ones that securitize but at the same time banks can increase capital even if they have high profits too.

### 3 Methodology

Our aim is to identify the drivers of securitization activity for Turkish banks, in other words the factors which prompt them to securitize their loan portfolios in international markets. We set up our empirical specification for estimation as follows:

$$S_{i,t} = \alpha_i + \beta_1 S_{i,t-1} + \beta_2 equity_{i,t} + \beta_3 profit_{i,t} + \beta_4 ta_{i,t} + \beta_5 b_{i,t} + \varepsilon \quad (3.1)$$

where  $S_{i,t}$  represents securitized loans for bank  $i$  at time  $t$ ;  $equity$  represents bank equity;  $profit$  is bank profits before taxes and  $ta$  is our size measure which represents total assets;  $b_{it}$  is a measure of balance sheet liquidity calculated by the sum of *due from other banks*, *marketable securities* and *cash* on a bank’s balance sheet and finally  $\varepsilon$  is the error term. All our variables are in real terms.

We estimate equation (3.1) using a dynamic GMM model to control for potential endogeneity of the regressors as some factors influencing securitization can also be influencing profitability and total assets.

As a second level of our analysis, we also evaluate the prediction capability of the

variables in Eq.(3.1) in determining the securitization decision made by individual banks in our sample. To do so we estimated a probit model for the individual banks in our sample. Our probit estimation takes the following form:

$$D_{i,t} = \alpha_i + \beta_1 equity_{i,t} + \beta_2 profit_{i,t} + \beta_3 ta_{i,t} + \beta_4 b_{i,t} + \varepsilon_{it} \quad (3.2)$$

where  $D_{i,t}$  takes the value of 1 if bank  $i$  securitized in quarter  $t$  and 0 otherwise; the other variables are the same as defined before and finally  $\varepsilon_{it}$  is a mean zero, constant variance disturbance term, assumed to be normally distributed.

The probit model is defined as:

$$Pr(Y_i = 1|x_i, \beta) = 1 - \Phi(-x_i'\beta) = \Phi(x_i'\beta), \quad (3.3)$$

where  $\Phi$  is the standard normal cumulative distribution function. The basic idea is to relate this equation to the existence of an underlying latent variable  $y^*$  that is linearly related to  $x$ :

$$y_i^* = x_i'\beta + u_i, \quad (3.4)$$

where  $u$  is a normally distributed random term. The dependent variable is determined by whether  $y_i^*$  exceeds a threshold value:<sup>2</sup>

$$y_i = \begin{cases} 1, & \text{if } y_i^* > 0 \\ 0, & \text{if } y_i^* \leq 0. \end{cases} \quad (3.5)$$

## 4 Data

Our banking and securitization data for the Turkish banking system is obtained from Turkish Banks Association. It includes 8 depository institutions that have successfully issued securities in international markets during the five and a half year period of quarterly data that covers 2004 to the second quarter of 2009. These banks represent the biggest banking institutions in Turkey with assets totaling over 80% of the overall assets of the system. The banks in the sample also have a loan portfolio of 14.5 billion TL and a total asset average of 29.7 billion TL. Table 1 provides the descriptive statistics of our sample.

The average securitization level per bank per quarter is around 468 million TL or 312 mil USD adjusted for inflation and only constitutes about 3% of average loan holdings by

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<sup>2</sup>For example, in this paper we will call  $y = 1$  if there was securitization activity and,  $y = 0$  if there was no securitization.

Table 1: Descriptive Statistics

|              | b             | S         | equity       | loans         | profit        | ta         |
|--------------|---------------|-----------|--------------|---------------|---------------|------------|
| Mean         | 5,154,020.00  | 468,000.1 | 3,586,080.00 | 14,557,726.00 | 403,930.80    | 29,678,026 |
| Median       | 3,404,195.00  | 384,496.1 | 3,212,354.00 | 11,802,515.00 | 308,857.10    | 28,038,141 |
| Maximum      | 21,283,921.00 | 1,206,879 | 8,755,292.00 | 33,492,278.00 | 1,674,449.00  | 73,041,103 |
| Minimum      | 248,156.00    | 28,770.44 | 567,982.30   | 2,016,517.00  | -2,213,927.00 | 3,134,899  |
| Std. Dev.    | 4,520,063.00  | 289,913.2 | 2,391,983.00 | 8,608,049.00  | 408,914.90    | 19,322,469 |
| Skewness     | 1.43          | 0.85      | 0.57         | 0.62          | -0.74         | 0.37       |
| Kurtosis     | 4.38          | 3.12      | 2.02         | 2.17          | 12.34         | 1.94       |
| Observations | 168           | 31        | 168          | 168           | 168           | 168        |

Descriptive statistics for the variables used in the study. All variables are in terms of thousand Turkish Liras and are adjusted for inflation by deflating each series by the cpi. The number of banks in the study is 8. *S* is the total securitization amount by the bank in each quarter in terms of Turkish Liras. *b* represents on-balance sheet liquidity, and is measured by summing up bank's cash, due from other banks and total marketable securities; *equity* represents shareholders' equity; *loans* represents banks' overall loan portfolio; *profit* is banks' profit before taxes; *ta* represents bank's total assets

banks during the period. This ratio is number is much below the same for more developed economies(In the US at the end of 2007, the ratio of securitized loans to outstanding loans stood at around 27% for consumer credit, and at 2.6% for loans to business (Loutskina 2010).)

Figure 1 shows the level of securitization activity versus the real gdp for the years under analysis. As can be seen there is a direct and strong correlation between the two variables(with a correlation coefficient of .....). We do not observe the same high type of strong correlation when we evaluate securitization with respect to liquidity in the system. Figure 2 shows the banks' on-balance sheet liquidity versus their securitization activity during the study period. We can observe that until 2007 both variables increased at the same time while after 2007 there is an inverse relationship between the two variables.

It is also evident from Figure 3 that bank size is closely correlated with securitization activity. This figure shows the level of securitization during the sample period versus the size of the bank measured in terms of total assets. As can be observed on the figure, banks that rank higher in terms of their assets in the sample(bank rankings are listed next to the alphabetical code assigned to each bank in the sample) also have higher securitization activity during the sample period suggesting that bigger banks have the necessary means and resources to take on securitization activity in international markets.

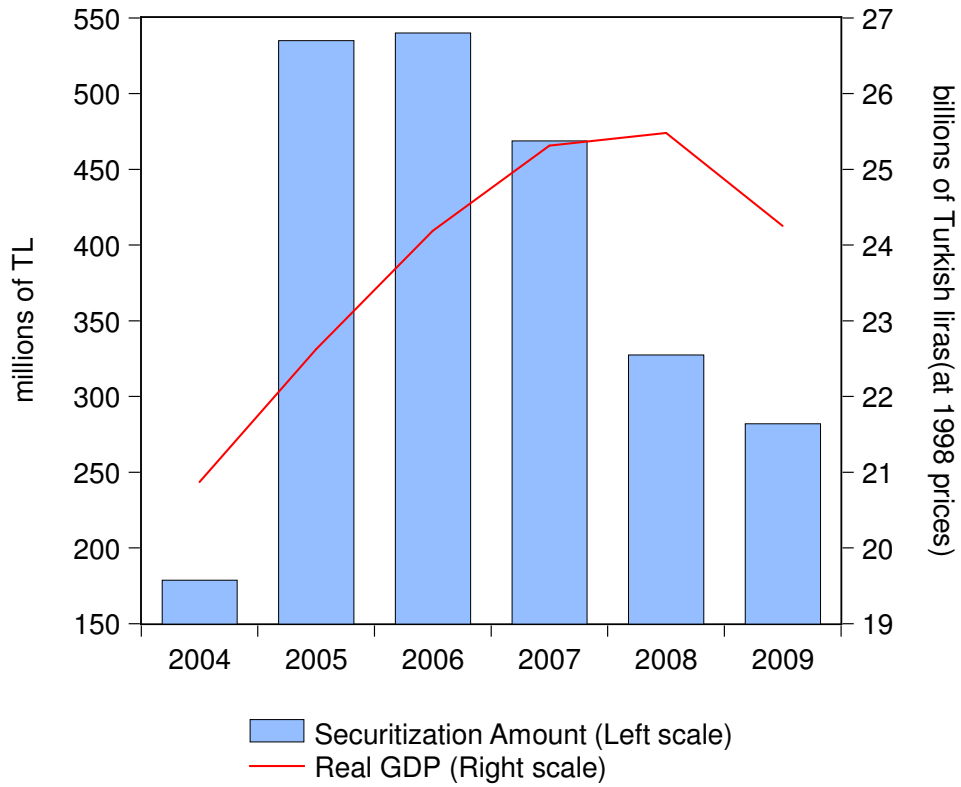


Figure 1: Securitization Activity versus Real GDP

The figure shows the total securitization activity for the group of 8 banks in our sample that have securitized during the study period versus the Turkish real GDP. Securitization amounts are adjusted for inflation. Source: CBRT and Turkish Banks Association

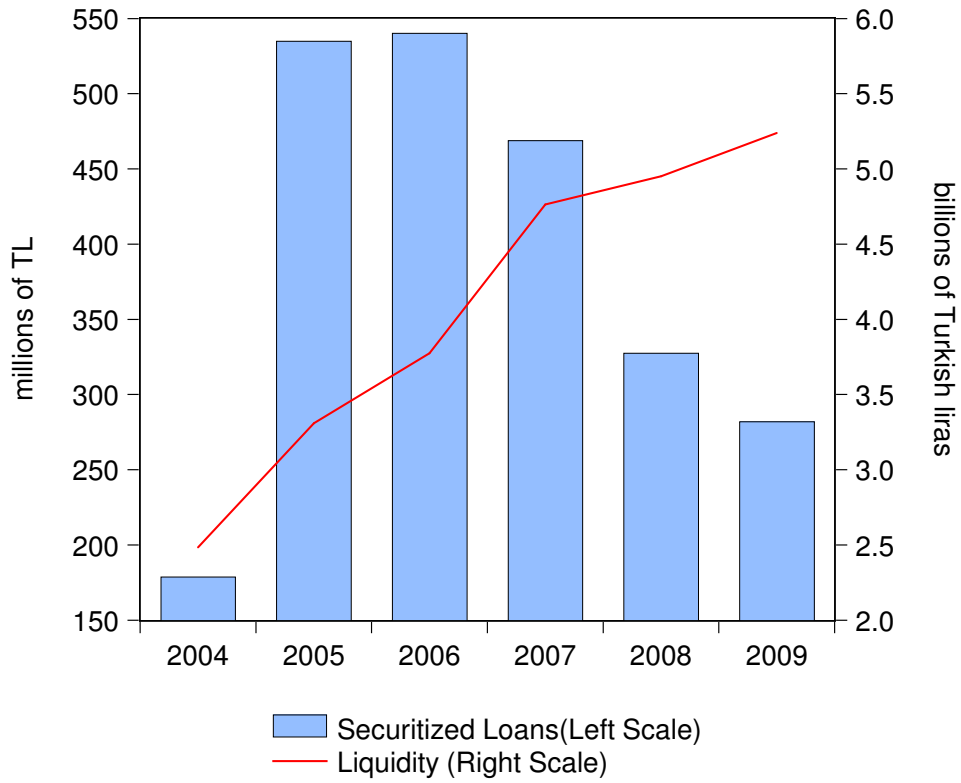


Figure 2: Securitization Activity versus Liquidity

The figure shows the total securitization activity for the group of 8 banks in our sample that have securitized during the study period versus the liquidity in the system. All figures are adjusted for inflation. Source: CBRT and Turkish Banks Association



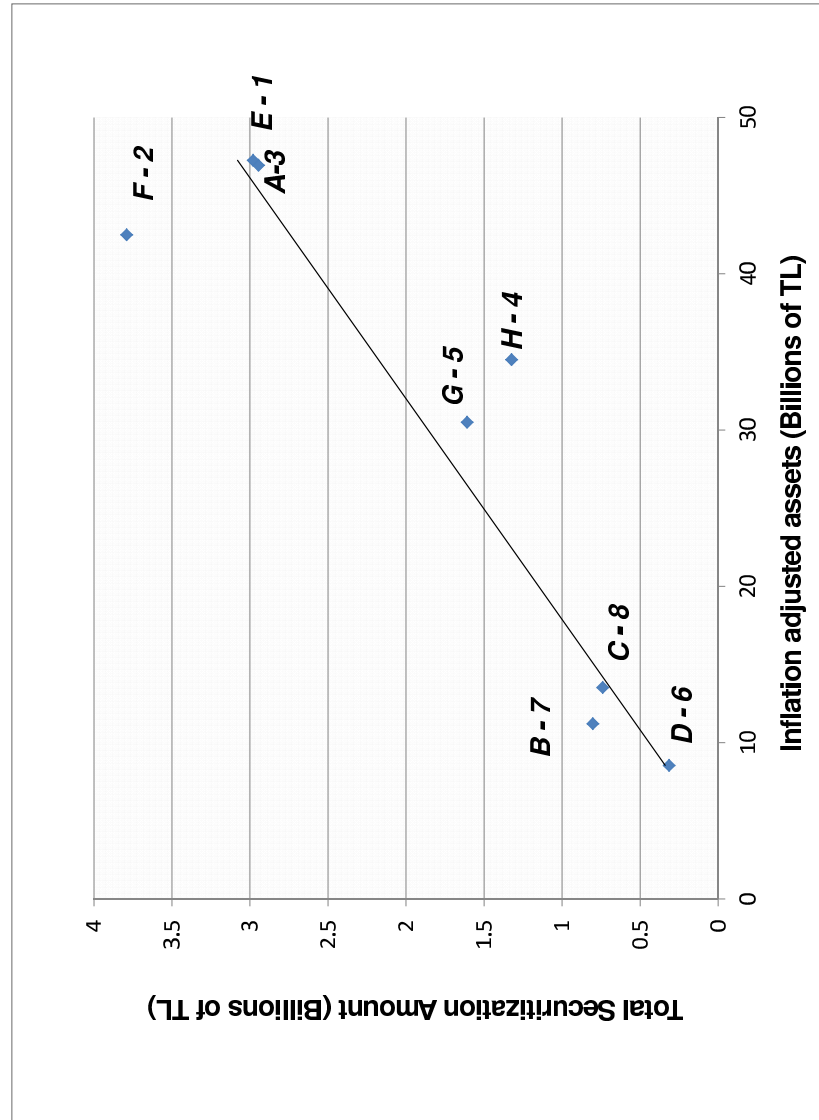


Figure 3: Securitization Activity versus Liquidity

The figure shows the total securitization activity for the group of 8 banks in our sample that have securitized during the study period versus the size of the banks. The values in paranthesis indicate the letter assigned to the bank as well as the rank of the bank in terms of assets. All figures are adjusted for inflation. Source: CBRT and Turkish Banks Association

Table 2: Unit Root Tests

|         | Level Series | First Difference Series |
|---------|--------------|-------------------------|
|         | t-ADF        | t-ADF                   |
| S       | 72.7537***   | 174.858***              |
| b       | 27.4485**    | 142.253***              |
| equity  | 6.29631      | 92.1601***              |
| profit  | 83.8328***   | 127.417***              |
| ta      | 11.2350      | 102.154***              |
| trlibor | 7.60862      | 134.294***              |

This table presents the ADF test results foer all variables in our dataset. The variables are in real terms. *S* is the total securitization amount by the bank in each quarter in terms of Turkish Liras. *b* represents liquidity, and is measured by summing up bank's cash, due from other banks and total marketable securities; *equity* represents shareholders' equity; *profit* is bank's profit before taxes; *ta* represents bank's total assets and *trlibor* is the quarterly average of the Turkish lira interbank lending rate. \*, \*\* and \*\*\* denote rejection of the null hypothesis of unit root at, 10%, 5% and 1% significance level, respectively. Lags are chosen using Schwarz criterion.

## 5 Estimation Results

### 5.1 GMM Estimation

First, we checked for the stationarity of our dataset and find that profit, liquidity and securitization are non-stationary in levels. However, all the non-stationary variables are stationary in first difference. The results of the ADF-Fisher unit root tests for stationarity of the data are reported in Table 2. The lag structure was determined using the Schwarz criterion. We thus estimate our Equation (3.1) using the series in differences.

As noted by Arellano and Bond (1991) if we include a lag of the endogenous variable as an explanatory variable, the results of the Fixed Effect model will be biased and inconsistent. Thus, for the specification presented 3.1 we use the GMM model following the technique proposed by Arellano and Bond (1991). As suggested by these authors we use all possible lags of our dependent variable plus lagged values of all regressors as instruments. In this way we obtain parameter estimates that are consistent and efficient. We have 8 banks that we use in our dynamic panel GMM model. This number of cross sections is not enough to insure consistency and efficiency of our estimates. That's why as a robustness check we performed two additional econometric specifications: panel fixed effects and Two-Stage-Least -Squares. The coefficient estimates of both models are very similar as well as their standard errors. These results somewhat support the consistency

and efficiency of our estimates using the GMM. <sup>3</sup>

Table 3 provides the results of our estimation using specification (3.1). As can be seen changes in bank equity, profits, total asset and previous period securitization activity are all important drivers of securitization. We observe that securitization activity in the previous period has a significant and persistent negative effect on the amount of securitization banks undertake in each quarter. The coefficient of this variable ranges from -0.57 to -0.63 suggesting that an increase of 1 million Turkish liras in bank securitization activity in the previous period decreases a bank's need to securitize in the current period by almost 600 thousand liras. The coefficient of the equity variable is also highly significant and also negative suggesting that as banks increase their equity levels their need for securitization also decreases. Although the coefficient of this variable is not as high as the change in the level of previous period securitization (ranges from -0.22 to -0.28), it suggests that an increase of 10 million Turkish liras in bank equity levels decreases the amount securitized by the banks in the current period by 2.5 million liras. We also observe that increase in profits or bank's total assets decrease their need to securitize further highlighting the importance of strong balance sheets and bank efficiency in securitization activity. However, the insignificance of the bank liquidity variable ( $b$ ) is worth mentioning. This suggests that banks' liquidity positions are not necessarily a key factor in explaining their securitization activity.

## 5.2 Probit Estimation

The results of our probit estimations for the banks in our sample are presented in Table 4. We do not use the actual securitization amounts but a dummy variable instead. McFadden R square and Hosmer-Lemeshow Statistics are also presented.

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<sup>3</sup>Results are available upon request.

Table 3: Determinants of Securitization

| <i>Dep. Variable:</i>     | Securitization          |                        |                        |                       |                       |
|---------------------------|-------------------------|------------------------|------------------------|-----------------------|-----------------------|
| Time Period               | 2004q3-2009q2           |                        |                        |                       |                       |
| C                         | -2374.956<br>(20197.33) | 19140.89<br>(19832.29) | 24078.30<br>(19679.11) | 2022.59<br>(22554.51) | 1585.78<br>(22587.92) |
| $S_{t-1}$                 | -0.632***<br>(0.060)    | -0.616***<br>(0.057)   | -0.595***<br>(0.057)   | -0.578***<br>(0.057)  | -0.571***<br>(0.058)  |
| equity                    |                         | -0.227***<br>(0.054)   | -0.278***<br>(0.057)   | -0.284***<br>(0.057)  | -0.283***<br>(0.057)  |
| profit                    |                         |                        | 0.128***<br>(0.056)    | 0.128***<br>(0.055)   | 0.125***<br>(0.057)   |
| ta                        |                         |                        |                        | 0.023**<br>(0.012)    | 0.022*<br>(0.012)     |
| b                         |                         |                        |                        |                       | 0.011<br>(0.014)      |
| <i>Adj.R</i> <sup>2</sup> | 0.415                   | 0.473                  | 0.488                  | 0.497                 | 0.496                 |
| <i>Numberofobs.</i>       | 152                     | 152                    | 152                    | 152                   | 152                   |
| <i>J - Statistic</i>      | 26.478                  | 11.749                 | 6.891                  | 3.238                 | 2.580                 |
| <i>SarganTestPvalue</i>   | 0.0001                  | 0.0383                 | 0.1417                 | 0.3563                | 0.2751                |

All variables are adjusted for inflation by deflating each series by the cpi. Due to the existence of unit roots in our data series, we use the first difference of all variables in our specification.  $S$  is the total securitization amount by the bank in each quarter in terms of Turkish Liras. *equity* represents shareholders' equity; *profit* is bank's profit before taxes and *ta* represents bank's total assets and *b* represents liquidity, and is measured by summing up bank's cash, due from other banks and total marketable securities. The Sargan test p-value shows the probability of the the null hypothesis that overidentifying restrictions are valid. \* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent.

Table 4: **Probability of Securitization Activity**

| <i>Dependent Variable:</i><br><i>TimePeriod</i> | Securitization of Loans †<br>2004Q2 – 2009Q2 |                           |                            |                            |                             |                           |                           |
|---|--|---------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|---------------------------|
|   | A  | B                         | C                          | D                          | E                           | F                         | G                         |
| equity  | -0.000003**<br>(0.000001)                    | -0.000009*<br>(0.000005)  | -0.000013***<br>(0.000003) | -0.000016**<br>(0.0000087) | -0.000001***<br>(0.0000006) | -0.0000025<br>(0.000002)  | -0.000003<br>(0.0000023)  |
| profit  | 0.000001**<br>(0.0000007)                    | -0.00000004<br>(0.000004) | -0.000001<br>(0.000003)    | 0.0000042<br>(0.0000036)   | 0.0000002<br>(0.0000007)    | 0.000004*<br>(0.000002)   | 0.0000017<br>(0.000002)   |
| ta  | -0.0000002*<br>(0.0000001)                   | 0.0000004<br>(0.0000004)  | -0.000001<br>(0.000001)    | -0.0000005<br>(0.0000006)  | -0.00000016<br>(0.0000001)  | -0.0000001<br>(0.0000002) | -0.0000005<br>(0.0000003) |
| b   | 0.0000002*<br>(0.0000001)                    | -0.0000002<br>(0.0000002) | -0.0000005*<br>(0.0000003) | -0.0000004*<br>(0.0000002) | -0.00000003<br>(0.0000002)  | 0.0000003<br>(0.0000004)  | -0.0000002<br>(0.0000002) |
| <i>McFaddenR<sup>2</sup></i>                    | 0.115  | 0.111                     | 0.137                      | 0.117                      | 0.108                       | 0.111                     | 0.116                     |
| <i>No.ofobservations</i>                        | 21   | 21                        | 21                         | 21                         | 21                          | 21                        | 21                        |
| <i>H-L Statistic</i>                            | 6.161(0.629)                                 | 11.294(0.185)             | 6.159(0.629)               | 14.928(0.060)              | 9.143(0.330)                | 10.514(0.230)             | 10.883(0.208)             |

This table shows the results of probit estimations on the probability of securitization by banks in our sample. The dependent variable is the dummy for loan securitization observed at quarterly intervals; takes on the value of 1 if there is a securitization activity during the period and 0 otherwise. *equity* represents shareholders' equity; *profit* is bank's profit before taxes and *ta* represents bank's total assets and *b* represents liquidity, and is measured by summing up bank's cash, due from other banks and total marketable securities. All variables are in real terms. We cannot estimate probit estimations for Bank H due to missing values in the dataset. H-L Statistic p-value is presented in parenthesis next to H-L Statistic value. The H-L Null Hypothesis suggests that there is no difference between the observed and predicted values of the response variable. \* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent.

We checked for the goodness-of-fit of our model using the Hosmer-Lemeshow(HL) test. This Pearson  $\chi^2$ -type test has as a null that the model provides sufficient fit to the data. We accept the null hypothesis in all specifications suggesting that our model had a good fit for our analysis. We observe equity has a negative and significant impact in explaining bank securitization for the five of the banks in our sample (Banks A through E). The sign of this variable is also worth mentioning. The negative coefficient of this variable suggests as bank equity increases in real terms banks' probability to securitize their loans decrease. This finding confirms the results of our GMM estimation reported in Table 3 and also supports previous research findings in literature regarding the behavior of banks in more developed economies. In that regard, we observe that Turkish banks behave similarly as banks in more developed systems that have a longer history of securitization.

Another variable that takes on an expected sign in our findings is the profit variable. As was the case in the GMM estimations, in our probit estimations we observe that profit level influences a banks' securitization decision. Although in only two of the probit estimations the profit variable has a significant positive coefficient, we can say that banks that are more profitable are more likely to securitize their loan portfolios.

Our estimations also reaffirm our expectations that as banks' balance sheet liquidity increases their likelihood of securitizing decreases. The liquidity variable( $b$ ) takes on a negative and significant coefficient for two of the seven banks for which we were able to run a probit estimation.

Our model can correctly predict securitization decision for four out of the seven banks in our sample(Due to interruptions in the dataset, we cannot perform probit estimations for Bank H in our sample). The percentage gains of using our model versus a model that only includes the constant (meaning that the probability of securitization equals the empirical probability) is equal to 50%, 33.3%, 40% and 50% for Banks A, C, E and F in our sample. (see Table 5) In the case of Bank A, our model can predict three out of the six times the bank successfully sold its securitization portfolio in international capital markets, in the case of Bank C this ratio is only one out of three; two out of five in the case of E and four out of eight in the case of F. We do not observe any gain in terms of the prediction capability of our model in the cases of the remaining 3 banks for which we were able to run a probit estimation. Yet, we believe this is due to the low number of securitization transactions these banks have had during the sample period. Bank B has a securitization frequency of 3 out of 21 quarters(14%), while for banks G and D, this ratio is even lower at 1 out of 21(4.7%) and 2 out of 21(9.5%) respectively. In all the remaining banks for which we were able to see a percentage gain of our model over the constant probability function, this ratio is significantly higher.(For Bank A, 6 out of

21 quarters(28.6%), for Bank E 5 out of 21 quarters(23%), and for Bank F 8 out of 21 quarters(38%)

Table 5: Prediction Tables For Securitization of Loans

|                     | Bank A   |        |             |      | Bank B   |      |              |      |
|---------------------|----------|--------|-------------|------|----------|------|--------------|------|
|                     | Est. Eq. |        | Const.Prob. |      | Est. Eq. |      | Const. Prob. |      |
|                     | 0        | 1      | 0           | 1    | 0        | 1    | 0            | 1    |
| <i>Total</i>        | 15       | 6      | 15          | 6    | 18       | 3    | 18           | 3    |
| <i>Correct</i>      | 14       | 3      | 15          | 0    | 18       | 0    | 18           | 0    |
| <i>% Correct</i>    | 93.33%   | 50%    | 100%        | 0%   | 100%     | 0%   | 0%           | 100% |
| <i>% Incorrect</i>  | 6.67%    | 50%    | 0%          | 100% | 0%       | 100% | 100%         | 0%   |
| <i>Percent Gain</i> | NA       | 50%    |             |      |          | 0%   |              |      |
|                     | Bank C   |        |             |      | Bank D   |      |              |      |
|                     | Est. Eq. |        | Const.Prob. |      | Est. Eq. |      | Const. Prob. |      |
|                     | 0        | 1      | 0           | 1    | 0        | 1    | 0            | 1    |
| <i>Total</i>        | 18       | 3      | 18          | 3    | 20       | 1    | 20           | 1    |
| <i>Correct</i>      | 17       | 1      | 18          | 0    | 20       | 0    | 20           | 0    |
| <i>% Correct</i>    | 94.44%   | 33.33% | 100%        | 0%   | 100%     | 0%   | 100%         | 0%   |
| <i>% Incorrect</i>  | 5.56%    | 66.67% | 0%          | 100% | 0%       | 100% | 0%           | 100% |
| <i>Percent Gain</i> | NA       | 33.33% |             |      | NA       | 0%   |              |      |
|                     | Bank E   |        |             |      | Bank F   |      |              |      |
|                     | Est. Eq. |        | Const.Prob. |      | Est. Eq. |      | Const. Prob. |      |
|                     | 0        | 1      | 0           | 1    | 0        | 1    | 0            | 1    |
| <i>Total</i>        | 16       | 5      | 16          | 5    | 13       | 8    | 13           | 8    |
| <i>Correct</i>      | 16       | 2      | 16          | 0    | 11       | 4    | 13           | 0    |
| <i>% Correct</i>    | 100%     | 40%    | 100%        | 0%   | 84.62%   | 50%  | 100%         | 0%   |
| <i>% Incorrect</i>  | 0%       | 60%    | 0%          | 100% | 15.38%   | 50%  | 0%           | 100% |
| <i>Percent Gain</i> | NA       | 40%    |             |      | NA       | 50%  |              |      |
|                     | Bank G   |        |             |      |          |      |              |      |
|                     | Est. Eq. |        | Const.Prob. |      |          |      |              |      |
|                     | 0        | 1      | 0           | 1    |          |      |              |      |
| <i>Total</i>        | 19       | 2      | 19          | 2    |          |      |              |      |
| <i>Correct</i>      | 19       | 0      | 19          | 0    |          |      |              |      |
| <i>% Correct</i>    | 100%     | 0%     | 100%        | 0%   |          |      |              |      |
| <i>% Incorrect</i>  | 0%       | 100%   | 0%          | 100% |          |      |              |      |
| <i>Percent Gain</i> | NA       | 0%     |             |      |          |      |              |      |

This table shows the predictions of the probit estimations on the probability of securitization decision by Turkish Banks versus the Constant Probability Function. The cutoff point is 0.5. The value 1 represents loan securitization by the bank and 0 the case of no securitization. The column "Est. Eq." lists the predictions by the probit function; the column "Constant Probability" lists the predicted values of the constant probability estimation. The improvement in estimations using the probit function are given in the "Percent Gain" line. We cannot estimate a probit function for Bank H in our sample due to missing data values for this bank.

## 6 Conclusion

Although it has been more than 10 years since the first Turkish bank has successfully sold its outstanding loan portfolio in international capital markets, the securitization market constitutes a relatively small portion of the the total credit market in the Turkey. However securitization is a growing area for Turkish banks and also for researchers that work on emerging markets. By using data from the Turkish Banks Association, in this paper we estimated the determinants of securitization during the 2004-2009 period in Turkey. We believe our research contributes to the current debate on securitization in emerging markets by being one of the first on this issue with focus on Turkey.

Our results suggest that previous period securitization, bank size, profitability level and equity are key determinants of a bank's decision to securitize in the Turkish case. The most important determinant in our estimations, the level of previous period securitization carries a negative coefficient suggesting Turkish banks are influenced to a great degree in determining how much of their loan portfolio to securitize by the amount they securitized in the previous quarter. Another interesting result of our findings suggest that bigger banks are more likely to securitize their loan portfolios in the Turkish case. We also ran probit estimations for each bank in our sample to see if we can predict the probability of securitization on a bank basis. Results of binary probit estimations suggest the factors we have found to be influential in our GMM estimation also predict the probability of securitization activity by each bank. This finding reaffirms results obtained in the GMM analysis with percentage gains in terms of prediction capability in four out of the seven banks in our sample over a constant probability model.



## Appendix

Table 6: Banks in the sample(Alphabetical)

| Bank Name | Ownership Group (as of 2010) | Total Assets as of 2010Q3(mil USD) |
|-----------|------------------------------|------------------------------------|
| A         | Non-state owned - Domestic   | 72,460.13                          |
| B         | Non-state owned - Domestic   | 17,204.37                          |
| C         | Non-state owned - Foreign    | 23,454.34                          |
| D         | Non-state owned - Foreign    | 10,597.03                          |
| E         | Non-state owned - Domestic   | 86,482.10                          |
| F         | Non-state owned - Domestic   | 78,635.06                          |
| G         | State owned - Domestic       | 49,958.55                          |
| H         | Non-state owned - Domestic   | 51,405.33                          |

Source: The Banks Association of Turkey

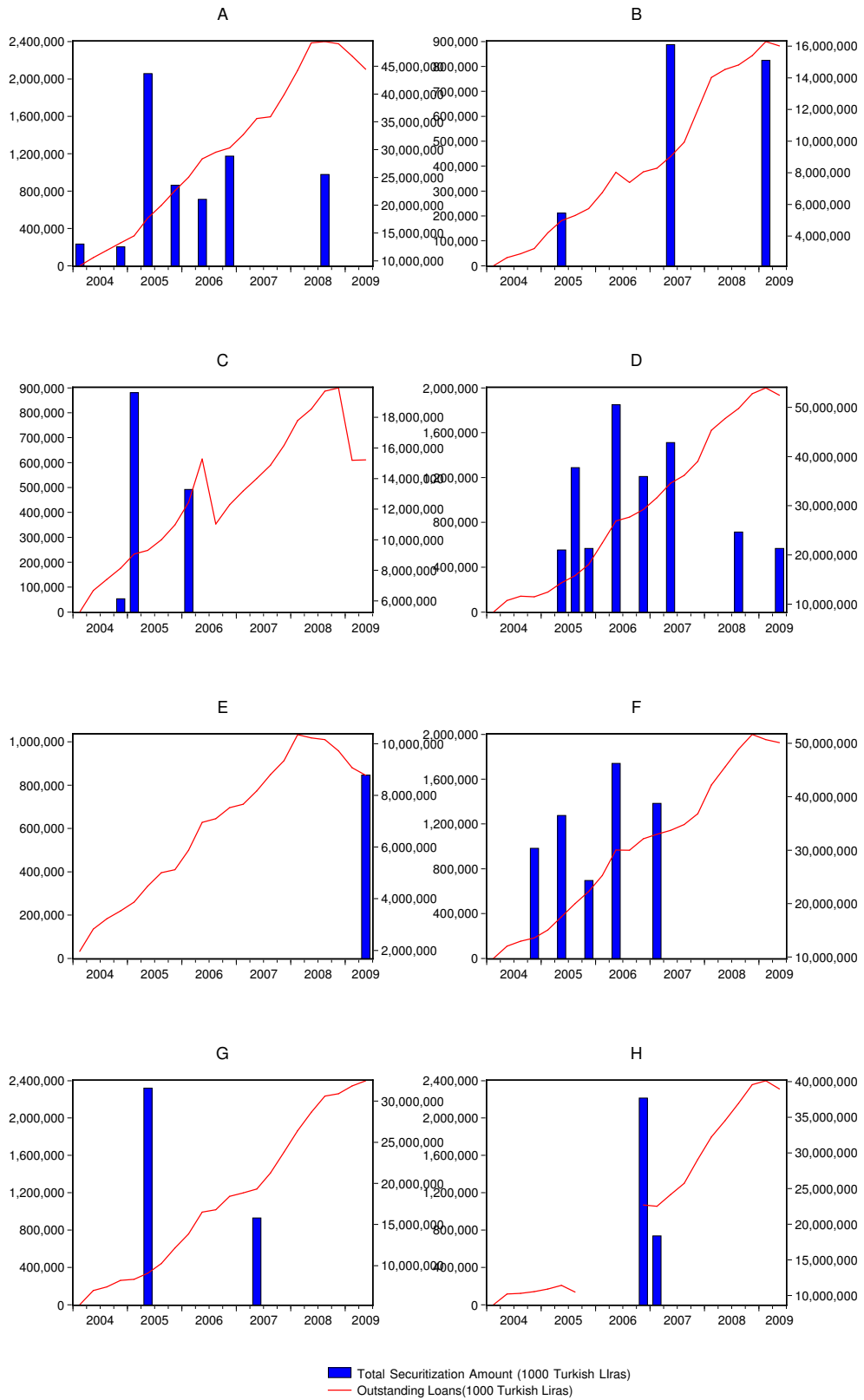


Figure 4: Securitization Activity versus Loans

The figure shows the securitization activity for the group of 8 banks in our sample that have securitized during the study period. All figures in in terms of 1000 Turkish liras.

## References

- AFFINITO, M., AND E. TAGLIAFERRI (2010): “Why do (or did?) banks securitize their loans? Evidence from Italy,” *Temi di discussione (Economic working papers)* 741, Bank of Italy, Economic Research Department.
- ARELLANO, M., AND S. BOND (1991): “Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations,” *Review of Economic Studies*, 58(2), 277–97.
- BERGER, A. N., R. J. HERRING, AND G. P. SZEGO (1995): “The role of capital in financial institutions,” *Journal of Banking & Finance*, 19(3-4), 393–430.
- DELL’ARICCIA, G., D. IGAN, AND L. LAEVEN (2008): “The U.S. subprime mortgage crisis: a credit boon gone bad?,” *Proceedings*, (May), 201–204.
- DEMARZO, P. M. (2005): “The Pooling and Tranching of Securities: A Model of Informed Intermediation,” *The Review of Financial Studies*, 18(1), pp. 1–35.
- JOBST, A. A. (2010): “Sovereign Securitization in Emerging Markets,” *Journal of Structured Finance*, Vol. 12, No. 3, 2006.
- JONES, D. (2000): “Emerging problems with the Basel Capital Accord: Regulatory capital arbitrage and related issues,” *Journal of Banking & Finance*, 24(1-2), 35–58.
- LOUTSKINA, E. (2010): “The Role of Securitization in Bank Liquidity and Funding Management,” *Journal of Financial Economics (JFE)*, *Forthcoming*.
- PARLOUR, C. A., AND G. PLANTIN (2008): “Loan Sales and Relationship Banking,” *The Journal of Finance*, 63(3), 1291–1314.