Cross Sectional Facts on Bank Balance Sheets over the Business Cycle

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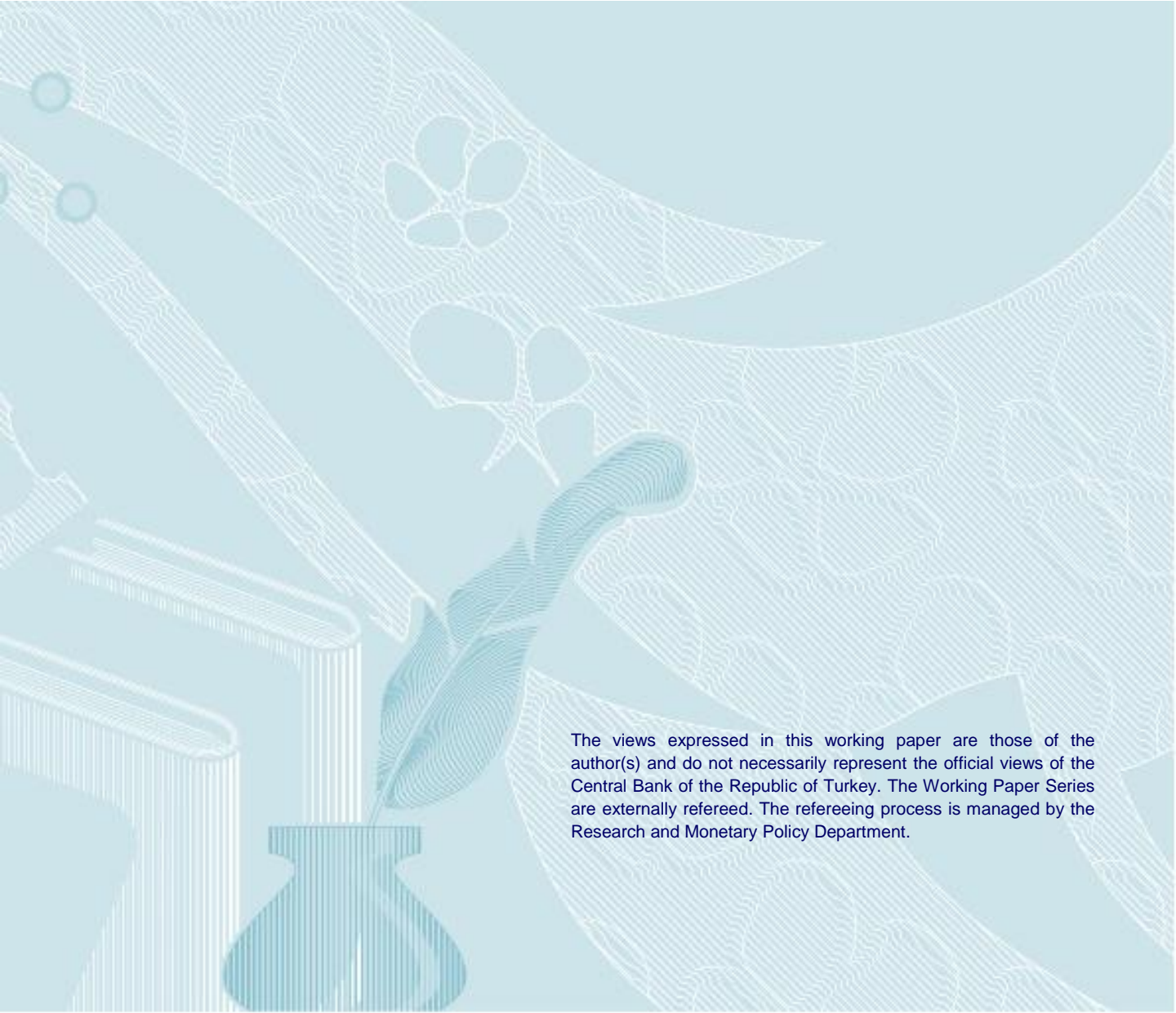
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Cross-Sectional Facts on Bank Balance Sheets over the Business Cycle[*]

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Abstract

We investigate the cyclical behavior of banks' balance sheet variables for different size groups using bank-level Turkish data. We first rank banks based on the size of their assets, and then systematically document business cycle facts of various balance sheet items and profitability measures of different bank groups. We find that the cyclical behavior of these variables is quite heterogeneous at the cross-sectional level: (i) Bottom 25 percent banks finance 73 percent of their asset growth with equity while larger banks fund 55 percent of it with deposits, (ii) bank assets and bank credit are highly procyclical and the level of procyclicality is lower for larger banks, (iii) total deposits are procyclical except for top 25 percent and equity issuance is acyclical to countercyclical at best, (iv) loan spread is strongly countercyclical except for small banks while return on assets and equity are acyclical, and (v) switching between debt and equity financing is more pronounced for the top 25 percent and the aggregate banking sector compared to the bottom 25 percent and top 5 percent. The rich set of cross-sectional empirical facts about the cyclicality of bank balance sheets presented in this paper should be helpful for researchers to build and evaluate theoretical heterogeneous models about financing sources of banks.

Keywords: Debt finance, Equity Finance, Banking Sector, Business Cycle.

JEL Classification: E44, E51, G21, G28

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1 Introduction

Fluctuations in banks' financing sources play an important role in driving business cycles in economies with bank-based financial systems since banks are the main economic agents in efficiently transferring funds from savers (households) to borrowers (firms) which undertake investment activities. Banks experiencing severe frictions in obtaining external or internal finance during recessions might reduce their lending to non-financial sector, leading to a decline in firm investment and thus aggravating the recession. Recent exemplary theoretical papers are Gertler and Kiyotaki (2010), Gertler and Karadi (2011), Jermann and Quadrini (2012), and Gertler et al. (2012), all of which emphasize the role of debt and equity financing in business cycle fluctuations. The 2007-09 global financial crisis has also reaffirmed that understanding the cyclical behavior of different sources of bank financing is crucial in capturing the dynamics of macroeconomic aggregates and has significant policy implications in both advanced and emerging economies. Although a vast body of literature studies cyclical changes in firm financing at both aggregate and cross-sectional levels, little work is done in investigating business cycle properties of bank financing.[1] In this paper, we study both aggregate and cross-sectional facts on banks' balance sheets by documenting the cyclical behavior of debt and equity issuance as well as other balance sheet items and their implications for the business cycle.

We study the topic both from aggregate and cross-sectional perspective since relying solely on aggregate data might lead to an ambiguous picture of the cyclical properties of balance sheet items at individual bank level as aggregate data are mainly driven by the behavior of a few number of very large banks. We use quarterly balance sheet data from the Banks Association of Turkey (TBB) and rank banks based on the size of their assets, and then systematically document cyclical facts of balance sheet items of different bank groups. These bank groups are bottom and top 25 percent, bottom and upper middle 25 percent, top 5 percent and bottom 95 percent, and finally all banks.

We first analyze some cross sectional and time series summary statistics for these bank groups. These statistics reveal that smaller banks (bottom 25 percent) finance 73 percent of their asset growth with equity while it is only 10 percent for the rest of the bank groups. All bank categories except for bottom 25 percent fund nearly 55 percent of their asset growth with deposits, 40 percent of which is domestic and the remaining 15 percent is foreign. Furthermore, we observe that return on equity is monotonically increasing by size from 5.5 percent to 20.5 percent whereas return on assets is around 2 percent for all banks. Loan spread also does not vary much by size.

We then focus on the HP-filtered cyclical components of bank balance sheet items and those

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[1]For firm-financing, see Korajczyk and Levy (2003), Levy and Hennessy (2007), Covas and Den Haan (2011), Jermann and Quadrini (2012).

of aggregate macroeconomic variables.[2] At the aggregate level, we observe that total assets and deposits of banks are less volatile than output while total credits, net worth and leverage are more volatile. All these items are procyclical except for net worth.

We then proceed with individual bank level data and examine the cyclical properties of bank balance sheet items for different size groups. The results show that the cyclical behavior of banks' balance sheet items is quite heterogenous at cross-sectional level. In particular, bank assets and bank credits are highly procyclical for almost all bank groups and volatility of these items is much lower for banks above the third quartile. Total deposits are procyclical except for top 25 percent and equity issuance is acyclical to countercyclical at best. Decomposition of total deposits indicate that domestic and foreign deposits are also procyclical except for top 25 percent. Leverage is procyclical for the top and bottom 25 percent.

The results also show that lead-lag relationships of these variables with GDP mostly depend on bank size. Total deposits of bottom 25 percent banks increase three quarters before output starts to take off whereas those of top 5 percent and top 25 percent banks decline four quarters after output recovers. For the bottom 25 percent banks, domestic and foreign deposits positively lead the output by one and three quarters, respectively, whereas domestic deposits of top 25 percent show the opposite behavior, negatively lagging the output by three quarters. For all different bank groups, equity issuance lags the cycle by one to four quarters. In anticipation of an expansion in real economic activity, smaller banks increase deposits and reduce their equity issuance as they switch from equity financing to debt financing. Leverage of bottom 25 percent positively leads the cycle whereas that of top 5 percent negatively leads the cycle. The co-movement of debt and equity financing reveals that bank switch between the two and this behavior is more pronounced for top 25 percent banks.

Next we look at the cyclical properties of some profitability measures and find that return on assets and return on equity are acyclical while loan spread is strongly countercyclical except for small banks. Finally, Loan spreads of top 50 percent banks lag output by one to two quarters while those of [25,50] group lead the output by one quarter.

Related Literature

This paper is related to the literature on sources of financing, bank profitability and their relation to macroeconomic conditions. The empirical papers on capital structure choice mostly focus on firm financing behavior. Korajczyk and Levy (2003) estimate the relation between firms' debt ratio and firm-specific variables for financially-constrained and unconstrained firms. Their results suggest that the leverage of unconstrained firms varies counter-cyclically with macroeco-

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[2]We use HP-filter as it is the most common method in the business cycle literature to examine cyclicality. We define cyclicality as the correlation between the cyclical components of the time series above and the cyclical component of GDP.

nomic conditions and that of financially-constrained firms are procyclical. Covas and Den Haan (2007) analyze the cyclical behavior of external financing for a set of Canadian firms. Sorting firms according to their sizes, they find that debt and equity financing are procyclical.Covas and Den Haan (2011) similarly document the cyclical behavior of debt and equity financing for U.S. firms. The results they find are similar to the Canadian case with the exception that largest firms do not exhibit procyclical debt and equity financing behavior. They also document that procyclicality of equity financing is stronger for smaller U.S. firms.

Besides these empirical studies, several theoretical models have been developed to study the cyclical behavior of equity finance. Based on the observation that firms' financial flows have become more volatile during a period of moderation in the U.S. output, Jermann and Quadrini (2006) builds a model with financial frictions. They examine the impact of financial innovations and find that increased flexibility in the use of equity financing can explain the reduction in macroeconomic volatility coupled with a higher volatility in the financial structure of firms. Levy and Hennessy (2007) develop a computable general equilibrium model to address the empirical observations regarding the financing behavior of firms over the business cycles. The model incorporates managers which hold a minimum share of the firm's equity. The simulation results show that leverage ratios of firms with more relaxed constraints are counter-cyclical whereas that of more constrained firms display no systematic pattern.

Some recent theoretical models examine the link between financial crises, banks' balance sheets and monetary policy. Gertler and Karadi (2011) build a quantitative monetary DSGE model where financial intermediaries face endogenously determined balance sheet constraints. They analyze how unconventional monetary policies can moderate the impact of financial crises in such an environment. Gertler and Kiyotaki (2010) examine how disruptions in financial intermediation can induce a crisis that affects real activity in a business cycle model with financial intermediation. The financial market frictions are endogenized by introducing an agency problem between lenders and borrowers which creates a wedge between the the cost of debt and equity financing. They also illustrate how various credit market interventions by the Central Bank and the Treasury mitigates the crisis. Gertler et al. (2012) make banks' risk exposure an endogenous choice by incorporating an intermediation sector that allows banks to issue outside equity as well as short term debt. They analyze how different degrees of fundamental risk in the economy affect the balance sheet structure of banks and the aggregate equilibrium. Jermann and Quadrini (2012) first document the cyclical behavior of debt and equity payout of U.S. firms. Following this they introduce debt and equity financing, financial frictions and financial shocks in a standard real business cycle model and explore how financial shocks affect the dynamics of real and financial variables. Another strand of the literature related to our paper examines bank profitability. Determinants of bank profitability

are analyzed using bank-level data of various developing and developed countries. [3]

Turkish Banking Sector

Turkish banking sector has undergone substantial structural changes after the 2000-01 domestic banking crisis. 1990s were years where high budget deficits were mainly financed by domestic borrowing via issuing government debt. Annual interest rates on government securities floated close to and above 100 percent, even hiked to 300 percent, during the 1990s and bank balance sheets were mainly dominated by those government securities. After the severe economic crisis brought by the collapse in the domestic banking system, Turkey signed a stand-by agreement with IMF in order to solve fundamental macroeconomic problems such as high government budget deficits. A deliberate policy of restructuring the financial system followed these events and dramatic measures were taken in order to stabilize the financial system. As a result, the number of deposit banks went from 61 in 2000 to 32 in 2013.

Banking Regulation and Supervision Agency (BRSA), newly founded right after the banking crisis, has played an important role in restructuring the banking sector by resolving banks overtaken by the Savings Deposit Insurance Fund (SDIF), in restructuring state banks, and in strengthening private banks and reinforcing supervisory and regulatory framework. Moreover, the role of the Central Bank to stabilize prices was clearly defined in the Central Bank Law and the Central Bank of the Republic of Turkey was delegated instrumental independence while a Monetary Policy Board was established.

As a result of the restructuring process, inflation and interest rates dropped to single-digits and the banking sector has grown rapidly since then. Bank assets almost tripled in real terms from 2000 to 2013 while total credits increased by about six fold. Assets to GDP ratio of the banking sector went up from 60 percent in 2000 to over 100 percent in 2013. Credit to GDP ratio increased to about 60 percent from 20 percent over the same course. While household credits made up less than one percent of total credits in 2002, over 30 percent of total credits went to households in 2013. In this study we focus on the period starting from 2003, where banking sector data is more reliable and bank balance sheets are healthier.

The rest of the paper is structured as follows: Section 2 describes our data sources on banks' balance sheets and the methodology to construct the cyclical components of relevant variables.

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[3]Pasiouras and Kosmidou (2007) use bank level data of 15 EU countries and analyze how bank specific character-istics, the financial market structure and macroeconomic conditions affect the profitability of domestic and foreign banks. Athanasoglou et al. (2008) make a similar analysis for Greek banks for the 1985-2001 period. Albertazzi and Gambacorta (2009) examine the effects of macroeconomic financial shocks on banking profitability for both the Anglo Saxon and euro area economies. Dietrich and Wanzenried (2011) study the determinants of bank profitability measures using data on Swiss commercial banks for the 1999-2009 period. Olson and Zoubi (2011) study the effi-ciency and profitability of banks for the MENA region. Bolt et al. (2012) study the link between bank profitability and business cycles. By allowing for asymmetry in the co-movement of bank profit and economic activity between recessions and expansions, they find a larger impact of output growth on the profits of banks.

Section 3 presents the business cycle facts on financing sources of banks, particulary lead, lag and contemporaneous correlations between balance sheet variables and GDP for all bank groups. Section 4 concludes.

2　Data Description

The data set consists of quarterly data from The Banks Association of Turkey (TBB) from 2003.Q1 to 2013.Q3. We analyze important balance sheet and profitability items of banks. These are assets, deposits (foreign and domestic), credits, net worth, leverage, liabilities, return on equity, return on assets, and loan spread. In the Turkish accounting system, liabilities include equities. However, the liabilities variable we use in our analysis excludes the equities of the banks. Return on assets and equities are calculated in annual terms by dividing the stock of profits net of taxes in a given quarter to total assets and equities of a bank respectively. Loan spread is calculated as the difference between ratio of interest income on loans to credits and the ratio of interest expense on deposits. We divide all series by quarterly CPI index(2003=100) in order to obtain real variables.

Table 1 provides summary statistics for different size groups of banks. Size groups are constructed by ranking banks according to their asset values in each quarter. The statistics presented in this table reflect the average values for the 2003.Q2-2013.Q3 sample.[4] An important observation is that top 25 percent banks hold 83 percent of all the assets in the banking system whereas the bottom 25 percent own only 0.5 percent of all the assets which is a negligible share. The quarterly growth rates of assets range between 2.3 and 3.3 percent and reveal no big differences among different size groups. Banks' financing behavior also vary by size. Small banks in the bottom 25 percent finance 73 percent of their asset growth with equity financing. This share is around 10 percent for other bank groups, indicating that the role of equity financing is much weaker for them.

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[4]HP filtering distorts the 2003.Q1 value for some series resulting in striking jumps. Therefore we exclude this data point from our analysis.

Table 1: Summary Statistics: Aggregate, Quarterly Data, 2003 - 2013

	[0,25]	[25,50]	[50,75]	[75,100]	[95,100]	[0,95]	All Banks
No. of Banks	9	8	8	8	2	31	33
Assets (mean, in millions)	2023	9427	60659	341454	123676	289861	413643
Fraction of total assets	0.005	0.023	0.145	0.827	0.304	0.695	1.00
Δ Equity/Δ Assets	0.732	0.114	0.079	0.110	0.091	0.111	0.106
Δ Liability/Δ Assets	0.301	0.893	0.919	0.886	0.908	0.888	0.892
Δ Domestic Deposits/ΔAssets	0.075	0.367	0.452	0.421	0.453	0.411	0.422
Δ Foreign Deposits/Δ Assets	0.193	0.186	0.102	0.142	0.136	0.137	0.136
Δ Deposit/Δ Assets	0.299	0.542	0.557	0.569	0.592	0.553	0.563
Δ Credit/Δ Assets	0.086	0.680	0.785	0.794	0.830	0.771	0.786
Δ Assets/Assets	0.023	0.032	0.033	0.026	0.024	0.028	0.027
Return on Equity (percent)	5.5	11.7	14.6	18.2	20.5	16.1	17.3
Return on Assets (percent)	1.7	2.0	1.7	2.1	2.2	1.9	2.1
Loan Spread (percent)	5.7	5.7	6.8	4.6	4.9	5.1	5.0

[a] Return on equity, return on assets and loan spread are expressed in annual terms. The sample for these series starts from 2004Q1. All the remaining are quarterly series.

Change in liabilities relative to change in assets also varies between small banks and the remaining ones. In small banks nearly 30 percent of change in assets is financed by liabilities. Moreover, 30 percent of asset growth is financed by deposit growth in these banks. This immediately implies that for small banks deposits are the sole instrument for debt financing. Decomposing deposits into foreign and domestic shows that foreign deposits play a much more important role for banks below the bottom quartile. This is intuitive since a majority of these banks are foreign-owned. In larger banks the share of asset growth financed by liabilities increases nearly to 90 percent. The change in deposits relative to assets tells a more different story compared to smaller banks. Around 55-57 percent of the asset growth is financed by deposit growth in all banks in top 75 percent and domestic deposits play the major role. Unlike small banks, these banks have access to debt channels other than deposits. These other channels generate the remaining 30-35 percent growth in liabilities for these banks. Small banks also diverge starkly from the rest in terms of the share of credit growth in total asset growth. In these banks, around 9 percent of the asset growth arises due to the increase in credits extended. This share rises to 68 percent for banks in the [25-50] percent group and increases monotonically with size. We also analyze return on equity, return on assets and loan spread as profitability measures. Return on equity is monotonically increasing by size from 5.5 percent to 20.5 percent. However, return on assets is around 2 percent for all banks. Loan spread also does not vary much by size. It displays an inverse U shape peaking at 6.8 percent for banks in [50,75] percent.

3   Empirical Facts

In this section we document some business cycle facts about financial and real variables. The financial variables related to the banking sector are reported on aggregate level and for different size groups in order to analyze heterogeneity in bank behavior along the business cycles. Table 2 presents the cyclical behavior of aggregate real and financial variables. Among the real variables of interest are consumption, investment and output. Consumption is as volatile as output whereas investment is nearly three times more volatile than output. Both series have correlation coefficients above 90 percent implying strong procyclicality.

On the financial side we examine aggregate assets, credits, total, domestic and foreign deposits, net worth, leverage, return on equity, return on assets and loan spread. Total assets of the banking system are less volatile than output whereas credits are 1.5 times more volatile. Both series are procyclical, however credits exhibit the strongest correlation with the second lag of output. This implies that output leads aggregate credits in the economy by two quarters. The cyclical behavior of deposits displays interesting features. Aggregate deposits are less volatile than output. However, decomposing deposits into foreign and domestic, we observe that these two deposit components are more volatile than output. This might suggest that banks switch between domestic and foreign deposit financing over business cycle.

Domestic deposits have a positive contemporaneous correlation with output which is significant at 10 percent. Foreign deposits display an acyclical contemporaneous relation. However they have a positive significant correlation coefficient with the third lag of output implying that they lag the business cycle by 3 quarters. One possible explanation for this behavior might be that foreign depositors wait for a safe environment in order to channel their savings. They also might not be able to withdraw their deposits immediately as the economy enters a recession due to possible exchange rate fluctuations. This behavior is reversed for the procyclical domestic deposits which lead the output by two quarters.

Net worth, which is measured as the sum of equities of all banks, is slightly more volatile than output. It lags output by three quarters with a negative correlation coefficient however it exhibits a weak contemporaneous relation with the business cycle. This implies that banks switch to equity financing 3 quarters following a decline in output since debt financing is more costly and difficult in these periods. The opposite is true for expansionary periods where borrowing costs are lower and equity financing is relatively more costly. Bank leverage is 1.5 times more volatile than output. It moves procyclically and this behavior is mostly driven by the procyclicality of liabilities since equity does not seem to have any significant contemporaneous correlation with output. The strongest correlation coefficient arises with the second lag of output which means bank leverage lags output by two quarters.

We also examine the cyclical properties of various profitability measures for banks. These are

return on equity, return on assets and loan spread. All profitability measures are less volatile than output. Return on equity and assets are acyclical whereas loan spread is strongly countercyclical. Return on assets negatively lags output by 3 quarters. Loan spread also negatively lags output, but by 1 quarter.

Table 2: Cyclical Behavior of Real and Financial Variables: Aggregate, Quarterly Data, 2003 - 2013

	Standard Deviation	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}
Real Variables										
Output	3.65	0.08	0.25	0.54**	0.81**	**1.00**	0.81**	0.54**	0.25	0.08
Consumption	0.97	0.01	0.15	0.04	0.66**	**0.92**	0.82**	0.65**	0.39**	0.17
Investment	2.88	0.05	0.28*	0.53**	0.78**	**0.94**	0.84**	0.64**	0.40**	0.18
Hours										
Financial Variables										
Assets	0.80	-0.01	0.13	0.28*	0.37**	**0.45**	0.36**	0.24	0.10	-0.02
Credits	1.46	0.36**	0.54**	**0.67**	0.67**	0.54**	0.31**	0.06	-0.20	-0.39**
Total Deposits	0.67	-0.22	-0.09	0.06	0.16	**0.28***	0.25	0.19	0.11	0.02
Domestic Deposits	1.06	-0.37**	-0.31**	-0.10	0.07	0.30*	0.36**	**0.38**	0.34**	0.23
Foreign Deposits	1.23	0.29*	**0.38**	0.26*	0.14	-0.02	-0.18	-0.30*	-0.35**	-0.31**
Net Worth	1.12	-0.35**	**-0.47**	-0.47**	-0.35**	-0.14	0.16	0.37**	0.45**	0.47**
Leverage Ratio	1.57	0.27*	0.43**	**0.52**	0.49**	0.38**	0.11	-0.11	-0.25	-0.32**
Return on Equity	0.04	-0.11	**-0.14**	-0.08	0.00	0.03	0.04	-0.004	-0.06	-0.05
Return on Assets	0.04	-0.21	**-0.29***	-0.27*	-0.17	-0.10	0.004	0.04	0.05	0.07
Loan Spread	0.06	-0.15	-0.35**	-0.48**	**-0.49**	-0.46**	-0.38**	-0.25*	-0.04	0.18

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
[b] The standard deviation of output is expressed in percent; standard deviations of the remaining variables are normalized by the standard deviation of output (std(x)/std(Y)).
[c] The correlation coefficients in bold font are the maximum ones in their respective rows.
[d] *: Significant at 10 percent, **: Significant at 5 percent.

3.1 Cyclical Behavior of Assets and Credit

In this subsection we investigate the cyclical behavior of assets and credits for different size groups. Bank size is an important factor in explaining the volatility of assets and credits. Except for the top 25 percent we observe that assets are 2.4 to 4 times more volatile than output. However, assets of banks above the upper quartile are less volatile than output.

For credits a similar situation arises where credits of banks in the bottom 75 percent are 3 to 7 times more volatile than output while those of top 25 percent are 1.5 times more volatile. Since credits are an important chunk of assets, we can argue that except for top 25 percent banks, credits drive the cyclical behavior of assets. The correlation coefficients with leads and lags of output illustrate that assets of banks above the upper quartile are acyclical. Assets of top 5 percent banks are also acyclical but they positively lead output by 4 quarters. Looking at the remaining banks we observe that assets of banks below the bottom 75 percentile all move procyclically. Assets of banks in the bottom [0,25] percent lead the cycle by one quarter and those in [25,50] percent

lag the cycle by one quarter. The correlation coefficients for credits reveal that credits of banks in the top and bottom 25 percent are acyclical whereas credits of banks in other groups move procyclically. Credits of bottom 25 percent banks lead the cycle by 3 quarters while the rest lags by 1 to 2 quarters. This implies that larger banks act more precautiously in extending credits. They observe output changes and adjust their credit decisions accordingly.

Table 3: Cyclical Behavior of Assets: Quarterly Turkish Data, 2003 - 2013

	Standard Deviation	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}
Assets										
[0, 25]	4.16	-0.27*	-0.03	0.16	0.36**	0.44**	**0.47****	0.38**	0.38**	0.26*
[25, 50]	2.43	0.15	0.33**	0.45**	**0.65****	0.61**	0.46**	0.23	0.00	-0.21
[50, 75]	3.07	0.20	0.41**	0.54**	0.65**	**0.65****	0.49**	0.32**	0.12	-0.03
[75, 100]	0.71	-0.17	-0.17	-0.08	-0.06	0.04	**0.06**	0.04	0.03	0.00
[0, 95]	0.82	0.20	0.37**	0.48**	**0.50****	0.49**	0.32**	0.11	-0.09	-0.26
[95, 100]	1.16	-0.37**	-0.31**	-0.15	0.02	0.21	0.28*	0.34**	0.36**	**0.37****
All banks	0.80	-0.01	0.13	0.28*	0.37**	**0.45****	0.36**	0.24	0.10	-0.02
Credit										
[0, 25]	7.31	-0.13	0.10	0.14	0.16	0.20	0.35**	0.36**	**0.40****	0.28*
[25, 50]	3.32	0.06	0.12	0.27*	0.50**	**0.59****	0.34**	0.07	-0.21	-0.37**
[50, 75]	3.65	0.27*	0.50**	0.64**	**0.73****	0.69**	0.50**	0.31**	0.08	-0.07
[75, 100]	1.55	0.27*	0.36**	**0.43****	0.36**	0.21	0.06	-0.11	-0.28*	-0.42**
[0, 95]	1.53	0.39**	0.53**	**0.64****	0.63**	0.52**	0.29*	0.01	-0.26*	-0.48**
[95, 100]	1.64	0.19	0.42**	0.61**	**0.61****	0.47**	0.31**	0.18	0.08	-0.01
All banks	1.46	0.36**	0.54**	**0.67****	0.67**	0.54**	0.31**	0.06	-0.20	-0.39**

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
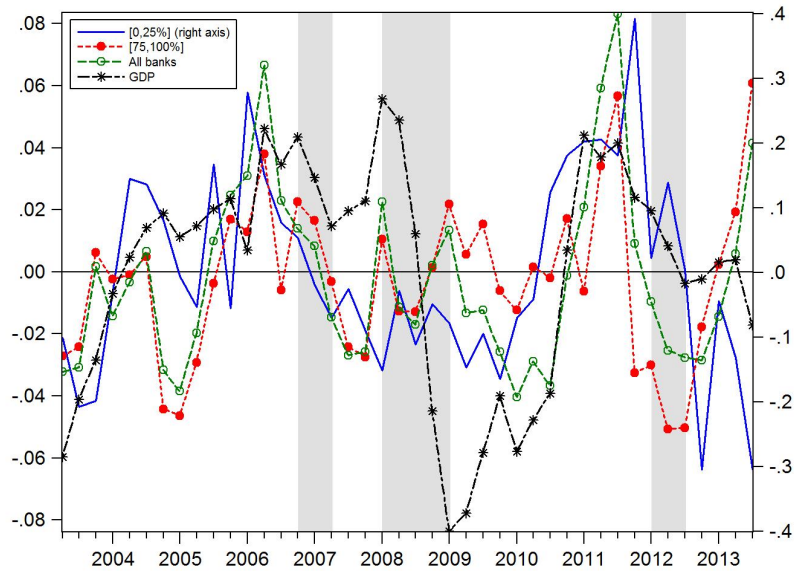[b] The standard deviation of output is expressed in percent; standard deviations of the remaining variables are normalized by the standard deviation of output (std(x)/std(Y)).
[c] The correlation coefficients in bold font are the maximum ones in their respective rows.
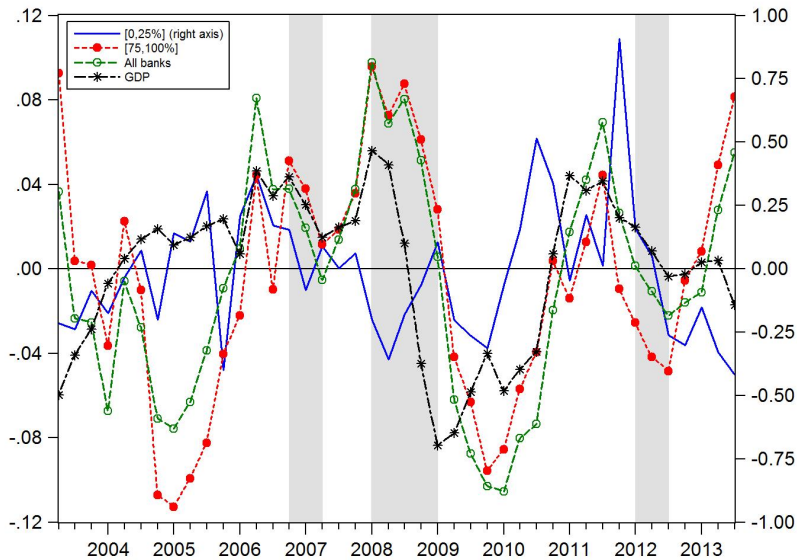[d] *: Significant at 10 percent, **: Significant at 5 percent.

Figure 1 displays the cyclical behavior of assets of bottom 25 percent, top 25 percent, all banks and GDP. All numbers are percentage deviations from their respective long run trend. Assets of top 25 percent move ahead of bottom 25 percent over the business cycle. These two series apart from each other in three periods: 2008.Q1-2008.Q3, 2012.Q1-2012.Q2 and 2013.Q1-2013.Q3. In the first two sub-periods, which are recessions, assets of small banks increase whereas those of large banks decline. During the last sub-period, assets of larger banks start to recover while smaller banks' assets deteriorate.

Figure 1: Cyclical Behavior of Assets

Figure 2: Cyclical Behavior of Credits

Figure 2 plots the cyclical component of credits for the top and bottom 25 percent banks along with output. Between 2008.Q2 and 2009.Q1, credits of top 25 percent and bottom 25 percent move

in opposite directions where credits of smaller banks increase by nearly 45 percentage points and those of larger banks decrease by 5 percentage points.

3.2 Cyclical Behavior of Total, Domestic and Foreign Deposits

Table 4 reports the volatilities of cyclical components of total, domestic and foreign deposits and their correlations with the cyclical component of GDP. The results indicate that total deposits of middle 50 percent banks exhibit positive association with output at 5 percent significance level whereas those of bottom 25 percent and 95 percent banks display positive co-movement with GDP at 10 percent significance level. These findings suggest that total deposits are procyclical for nearly all bank categories, implying that banks increase their deposit financing as the economy recovers.

Table 4: Cyclical Behavior of Liabilities, Quarterly Turkish Data, 2003- 2013

	Standard Deviation	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}
Total Deposits										
[0, 25]	8.91	-0.03	0.15	0.19	0.28*	0.29*	0.41**	0.39**	**0.44****	0.35**
[25, 50]	3.15	-0.04	0.11	0.27*	0.41**	**0.43****	0.21	-0.03	-0.22	-0.29*
[50, 75]	2.94	0.27*	0.46**	0.58**	0.66**	**0.67****	0.51**	0.33**	0.12	-0.06
[75, 100]	0.78	**-0.39****	-0.38**	-0.33**	-0.30*	-0.18	-0.08	-0.01	0.05	0.07
[0, 95]	0.67	0.29*	0.44**	**0.47****	0.37**	0.30*	0.11	-0.06	-0.20	-0.32**
[95, 100]	1.45	**-0.60****	-0.54**	-0.37**	-0.13	0.12	0.25	0.32**	0.34**	0.33**
All banks	0.67	-0.22	-0.09	0.06	0.16	**0.28***	0.25	0.19	0.11	0.02
Domestic Deposits										
[0, 25]	13.23	0.06	0.17	0.19	0.29*	0.32**	**0.44****	0.34**	0.33**	0.23
[25, 50]	3.66	0.05	0.12	0.23	**0.33****	0.23	-0.03	-0.25	-0.29*	-0.27*
[50, 75]	3.53	0.14	0.29*	0.45**	0.55**	**0.60****	0.49**	0.35**	0.18	0.01
[75, 100]	1.18	-0.46**	**-0.48****	-0.34**	-0.22	0.01	0.15	0.25	0.28*	0.25
[0, 95]	0.96	0.06	0.11	0.25	0.25	**0.35****	0.31**	0.27*	0.20	0.05
[95, 100]	1.89	**-0.62****	-0.59**	-0.36**	-0.12	0.15	0.28*	0.35**	0.34**	0.29*
All banks	1.06	-0.37**	-0.31**	-0.10	0.07	0.30*	0.36**	**0.38****	0.34**	0.23
Foreign Deposits										
[0, 25]	8.40	-0.15	0.11	0.15	0.19	0.18	0.27*	0.34**	**0.43****	0.36**
[25, 50]	4.72	-0.12	0.05	0.20	0.33**	**0.40****	0.30*	0.14	-0.06	-0.18
[50, 75]	2.58	0.52**	**0.68****	0.66**	0.68**	0.60**	0.41**	0.20	-0.02	-0.17
[75, 100]	1.24	0.18	0.19	0.03	-0.13	-0.31**	-0.42**	**-0.47****	-0.43**	-0.30*
[0, 95]	1.36	0.36**	**0.46****	0.36**	0.20	0.01	-0.19	-0.34**	-0.45**	-0.44**
[95, 100]	1.52	-0.02	-0.01	-0.12	-0.09	-0.08	-0.06	-0.03	-0.04	**0.18**
All banks	1.23	0.29*	**0.38****	0.26*	0.14	-0.02	-0.18	-0.30*	-0.35**	-0.31**

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
[b] The standard deviation of output is expressed in percent; standard deviations of the remaining variables are normalized by the standard deviation of output (std(x)/std(Y)).
[c] The correlation coefficients in bold font are the maximum ones in their respective rows.
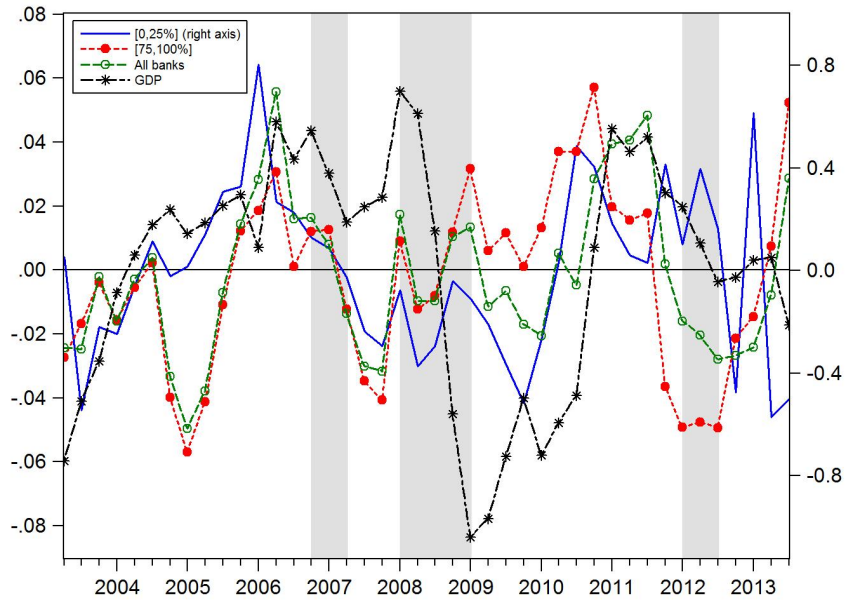[d] *: Significant at 10 percent, **: Significant at 5 percent.

For domestic deposits, we observe a procyclical pattern for [0-25], [50-75] and [0-95] groups. The foreign deposits of the middle 50 percent banks have a significant positive contemporaneous

correlation with the output while those of top 25 percent have a negative one. This implies that foreign deposits of middle 50 percent are procyclical whereas those of top 25 percent are countercyclical. This difference might arise because larger banks have the ability to borrow from foreign financial intermediaries at lower rates in boom times as they have sufficient creditworthiness to do so. Hence they might not need to issue foreign deposits. However, the reverse situation holds for middle-sized banks since they are not able to fund themselves from foreign banks at cheaper rates. Therefore they use foreign deposit financing instead of borrowing from international banks.

Lead-lag patterns of deposits with respect to GDP indicate that cyclical component of total deposits of bottom 25 percent banks positively leads the cycle by 3 quarters while that of top 5 percent and 25 percent banks negatively lag the output by 4 quarters. Deposits of bottom 25 percent banks increase well before GDP starts to take off whereas those of top 5 percent and top 25 percent banks decline well after output recovers. This latter behavior might be explained by the flight to quality motive of investors following a recession as they find deposits a safer saving instrument. They increase their deposit holdings following an economic downturn since returns on all other assets are also low. After the recession, they allocate a lower share of their income to deposits as returns on other assets on average are expected to be higher compared to deposits. For the bottom 25 percent banks, domestic and foreign deposits positively lead the output by 1 and 3 quarters, respectively. Domestic deposits of the top 25 percent show the opposite behavior. They negatively lag the output by 3 quarters. Foreign deposits of the same group negatively lead the cycle by 2 quarters. These findings show that domestic deposits of top 25 percent banks decline after the output starts to recover and their foreign deposits decline before GDP picks up. For top 5 percent banks, domestic deposits negatively lag the output by 4 quarters while their foreign deposits do not have any significant relationship. Finally, standard deviations of cyclical components of these deposit measures show that deposits of bottom 25 percent banks are 9 times more volatile than output. The volatility of total domestic and foreign deposits decline monotonically with size. When we decompose deposits into domestic and foreign, we observe that domestic deposits are about 1.5 times more volatile than foreign deposits.

Figures 3, 4, and 5 plot the cyclical components of GDP, total deposits, domestic and foreign deposits for all, bottom and top 25 percent banks. Figure 3 indicates that total deposits of the bottom 25 percent and top 25 percent banks generally move together except for two sub-periods: 2012Q1-2012Q3 and 2013Q1-2013Q3. In the former sub-period, total deposits of bottom 25 percent rise while those of top 25 percent decline. In the latter period, we observe the opposite.
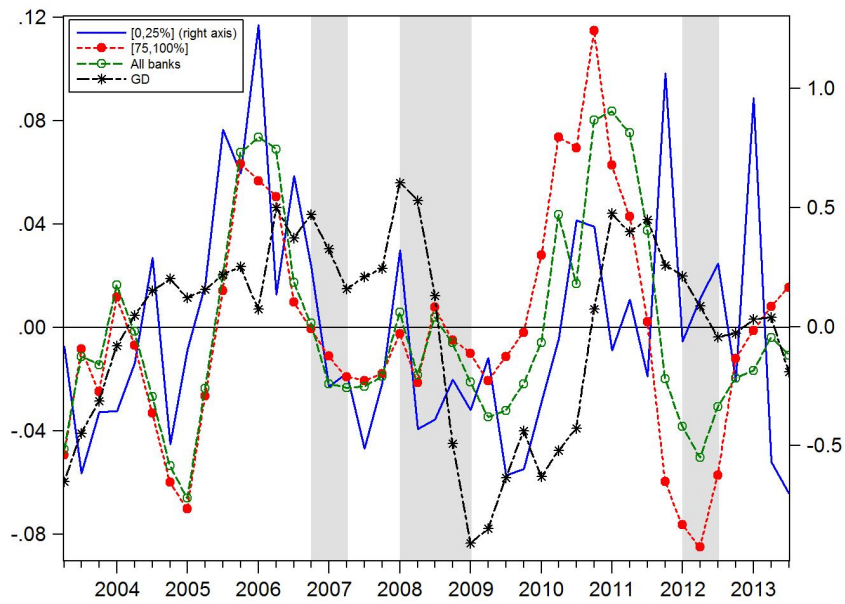
Figure 3: Cyclical Behavior of Total Deposits

Figure 4: Cyclical Behavior of Domestic Deposits

Figures 4 and 5 decompose total deposits as domestic and foreign. These plots suggest that

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smaller and larger banks apart from each other after 2011Q3. Domestic deposits of top 25 percent banks decline until 2012Q2 whereas those of bottom 25 percent first increase in 2011Q3, then fluctuate. Foreign deposits of all banks start declining in 2004Q3. In 2010Q1, foreign deposits of bottom 25 percent pick up whereas those of top 25 percent keep declining until 2011Q1. In 2013Q1 foreign deposits of top 25 percent increase substantially while those of bottom 25 percent decline.
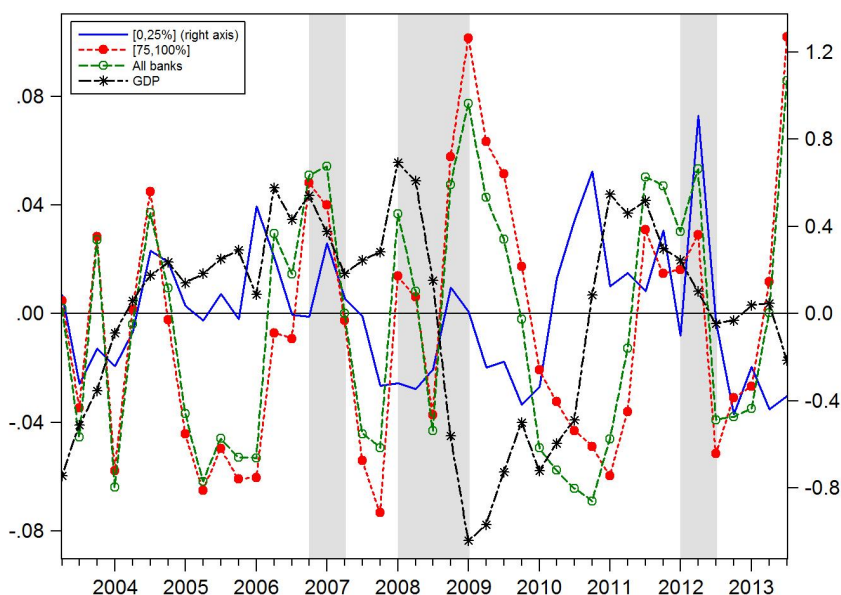
Figure 5: Cyclical Behavior of Foreign Deposits

[a] All the series are deviations of trend from cyclical components of HP-filtered series.
[b] Shaded areas are recession dates.

3.3 Cyclical Behavior of Equity

Table 5 displays the cyclical pattern of equity. We observe that contemporaneous correlations between the cyclical components of equity and output in all groups are insignificant at 5 percent. However, we find a correlation coefficient of -0.28 for the upper 25 percent and 0.28 for the [50,75] group, both of which are significant at 10 percent.

For all bank groups, correlation coefficients are mostly negative and significant when previous periods' GDP levels are used, suggesting that equity issuance lags the business cycle. In particular, equity bottom and top 25 percent negatively lag the cycle by 2 quarters. This result might suggest that these bank groups reduce their equity positions by switching to debt financing after the expansion takes off. However, for top 5 percent, we observe a positive co-movement between equity and leads of GDP. Equity of top 5 percent banks leads the output by 3 quarters. A possible explanation might be that these banks increase their assets by raising their equity positions when they expect an economic expansion in the following quarters. Finally, volatility results indicate

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that cyclical components of equity of all bank groups up to bottom 75 percent are 4 to 5 times more volatile than output while that of top 5 percent is 2 times more volatile.

Table 5: Cyclical Behavior of Equity, Quarterly Data, 2003- 2013

|	Standard Deviation	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}
[0, 25]	4.61	-0.36**	-0.40**	**-0.40****	-0.28*	-0.21	-0.16	-0.25	-0.27*	-0.12
[25, 50]	4.92	**0.35***	0.32**	0.25	0.15	0.06	0.02	0.02	0.04	0.11
[50, 75]	4.43	0.09	0.24	0.30*	**0.33****	0.28*	0.18	0.14	0.07	0.03
[75, 100]	1.40	-0.42**	-0.61**	**-0.63****	-0.52**	-0.28*	0.05	0.29*	0.40**	0.43**
[0, 95]	1.08	-0.35**	-0.43**	**-0.46****	-0.40**	-0.25	-0.06	0.10	0.13	0.18
[95, 100]	2.01	-0.25	-0.35**	-0.28*	-0.11	0.11	0.43**	0.62**	**0.73****	0.69**
All banks	1.12	-0.35**	**-0.47****	-0.47**	-0.35**	-0.14	0.16	0.37**	0.45**	0.47**

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
[b] The standard deviation of output is expressed in percent; standard deviations of the remaining variables are normalized by the standard deviation of output $(std(x)/std(Y))$.
[c] The correlation coefficients in bold font are the maximum ones in their respective rows.
[d] *: Significant at 10 percent, **: Significant at 5 percent.

Figure 6: Cyclical Behavior of Equity
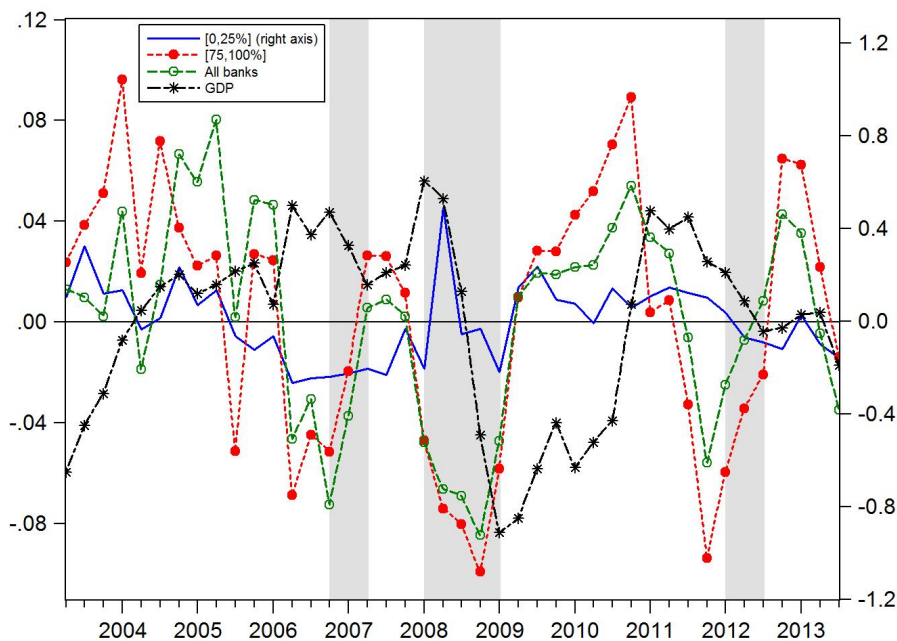
[a] All the series are deviations of trend from cyclical components of HP-filtered series.
[b] Shaded areas are recession dates.

Figure 6 displays the cyclical components of GDP and equity for bottom 25 percent, top 25 percent, and all banks. We find three sub-periods during which the cyclical behavior of equity of smallest and largest banks look different from each other. The first period is between 2008Q1 and

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2008Q2, right after the global financial crisis started. In this sub-period, equity issuance of bottom 25 percent banks rises dramatically whereas that of top 25 percent banks declines. Equity issuance of smaller banks only starts to fall one quarter after the decline in GDP. The second sub-period is 2009Q4-2010Q2, where the equity of smaller banks falls and that of larger banks increases. Here we find that equity issuance of larger banks begins to rise just before output recovers. Finally, the third sub-period is between 2011Q4-2012Q4. In this sub-period, equity of bottom 25 percent banks declines whereas that top 25 percent banks increases.

3.4 Cyclical Behavior of Leverage

Changes in leverage reflect the changes in debt relative to equity. Table 6 shows that leverage is more volatile than output both for the aggregate banking sector and all bank groups. Smaller banks have higher volatility in their leverage. Specifically, leverage of bottom 75 percent banks is 3.5 to 5.5 times more volatile than output while that of top 5 percent is twice as volatile as output.

Table 6: Cyclical Behavior of Leverage, Quarterly Data, 2003- 2013

	Standard Deviation	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}
[0, 25]	5.55	0.09	0.28*	0.41**	0.47**	0.51**	0.49**	0.50**	**0.51****	0.33**
[25, 50]	4.63	**-0.29***	-0.15	0.01	0.21	0.28*	0.24	0.10	-0.05	-0.21
[50, 75]	3.55	-0.01	-0.01	0.05	0.12	**0.19**	0.17	0.07	-0.02	-0.09
[75, 100]	1.64	0.33**	0.49**	**0.56****	0.48**	0.33**	0.03	-0.19	-0.30*	-0.34**
[0, 95]	1.65	0.32**	0.46**	**0.55****	0.54**	0.45**	0.23	0.02	-0.10	-0.21
[95, 100]	2.01	0.10	0.23	0.25	0.16	0.03	-0.28*	-0.45**	**-0.55****	-0.52**
All banks	1.57	0.27*	0.43**	**0.52****	0.49**	0.38**	0.11	-0.11	-0.25	-0.32**

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
[b] The standard deviation of output is expressed in percent; standard deviations of the remaining variables are normalized by the standard deviation of output (std(x)/std(Y)).
[c] The correlation coefficients in bold font are the maximum ones in their respective rows.
[d] *: Significant at 10 percent, **: Significant at 5 percent.

For the top and bottom 25 percent banks, leverage is procyclical while for the middle 50 percent there is no significant cyclicality at 5 percent. Leverage of bottom 25 percent has the highest contemporaneous correlation with output. This supports our previous observation that banks prefer debt financing over equity financing in good times as they have easier access to the former in those times.

Leverage of bottom 25 percent and top 5 percent banks both lead the cycle by 3 quarters. While the former has a positive correlation, the latter has a negative one. This is due to the expectations of top 5 percent banks that GDP will decline in the future, so they increase their leverage beforehand by reducing equity relatively more than debt. On the other hand, bottom 25 percent banks decrease leverage by increasing equity and decreasing debt in bad times. All other bank groups lag the cycle with positive correlation except the middle 50 percent.

Figure 7: Cyclical Behavior of Leverage
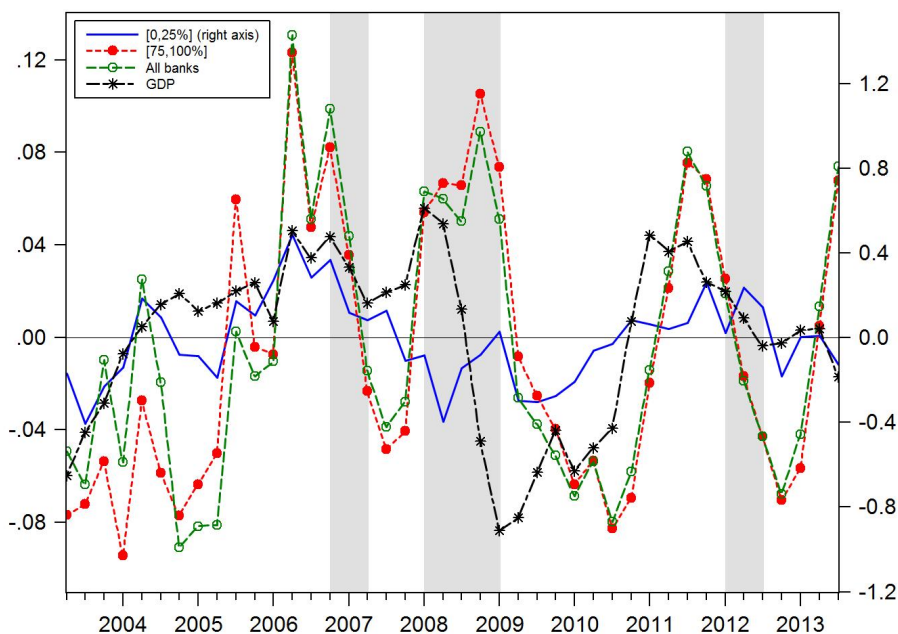
[a] All the series are deviations of trend from cyclical components of HP-filtered series.
[b] Shaded areas are recession dates.

Figure 7 plots the cyclical component of leverage for top and bottom 25 percent, all banks as well as that of GDP. Leverages of top and bottom 25 percent banks mostly move together except for the first three quarters of 2008 and first quarter of 2012 which are recession dates. We also observe that changes in the bottom 25 percent are much larger compared to top 25 percent. Movement in the leverage of all banks is mostly driven by the top 25 percent, especially after 2006.

3.5 Co-movement of Debt and Equity Financing

Table 7 reports the cross correlations of equity with leads, lags and current level of debt, denoted by D. Debt has negative contemporaneous correlation with equity for bottom 95 percent banks and aggregate banking sector. Behavior of top 5 percent banks and [50,75] group diverge from the aggregate banking sector with their positive contemporaneous correlation between debt and equity. For the bottom 25 percent, debt leads equity by 3 quarters. This might arise from the need for equity financing to meet capital requirements after an increase in debt is observed. For the [25,50] group, equity leads debt by 4 quarters. A similar reasoning might hold here: Higher equity increases banks' capacity to borrow, hence they increase debt financing.

Figure 8 illustrates the co-movement of debt and equity for top 25 percent, bottom 25 percent, top 5 percent and the aggregate banking sector. We can see that switching between debt and equity financing is more pronounced for top 25 percent and the aggregate banking sector compared to

bottom 25 percent and top 5 percent.

Table 7: Co-movement of Debt and Equity Financing, Quarterly Data, 2003- 2013

	D_{t-4}	D_{t-3}	D_{t-2}	D_{t-1}	D_t	D_{t+1}	D_{t+2}	D_{t+3}	D_{t+4}
$[0, 25]$	0.25	**0.31****	0.08	-0.05	-0.20	-0.26*	-0.16	-0.17	-0.32**
$[25, 50]$	0.00	-0.02	-0.07	-0.30*	-0.30*	-0.23	-0.01	0.23	**0.45****
$[50, 75]$	0.15	0.24	0.34**	0.39**	**0.46****	0.35**	0.18	0.04	-0.09
$[75, 100]$	0.04	0.10	0.07	-0.09	-0.26*	**-0.29***	-0.28*	-0.19	-0.06
$[0, 95]$	0.20	0.11	-0.01	-0.30*	**-0.65****	-0.61**	-0.51**	-0.36**	-0.10
$[95, 100]$	0.08	0.18	0.29*	**0.31****	0.19	0.19	0.12	0.16	0.29*
All banks	0.44**	0.38**	0.28*	-0.04	-0.45**	**-0.46****	-0.46**	-0.32**	-0.09

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
[b] The correlation coefficients in bold font are the maximum ones in their respective rows.
[c] *: Significant at 10 percent, **: Significant at 5 percent.

Figure 8: Co-movement of Debt and Equity Financing
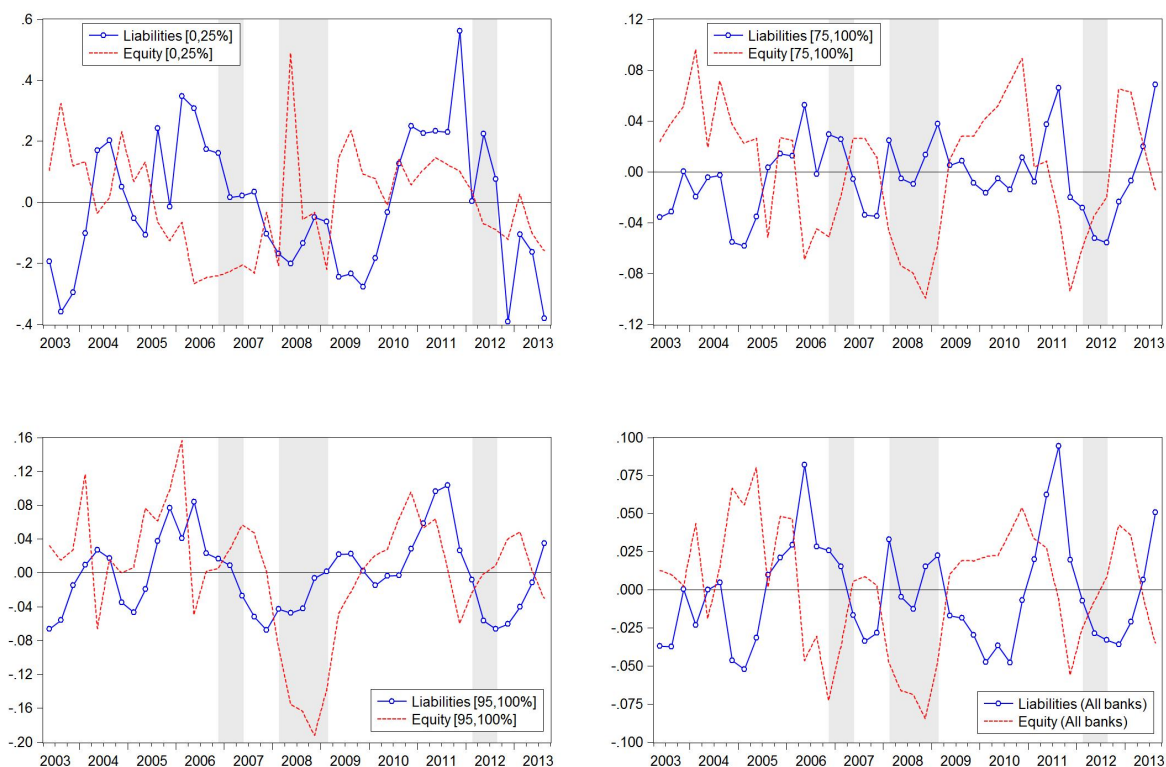
[a] All the series are deviations of trend from cyclical components of HP-filtered series.
[b] Shaded areas are recession dates.

3.6 Cyclical Behavior of Profitability Measures

Table 8 displays the cross sectional correlations of different profitability measures as well as loan spreads with GDP and its leads and lags. Contemporaneous correlations show that ROA and ROE are acyclical while loan spread is strongly countercyclical except for bottom 25 percent banks. ROA of top 25 percent and top 5 percent negatively lag the cycle by 3 quarters while that of [25,50] group positively lags the cycle by 4 quarters. Only ROA of [50,75] percent group positively leads the output by 4 quarters. For top 25 percent, since assets are acyclical, a rise in GDP leads to a decline in ROA through reduced net profits. For ROE, similar story applies except for [50,75] percent group, for which ROE positively lags output by 4 quarters. Loan spreads of top 50 percent banks lag output by 1 to 2 quarters while those of [25,50] group lead the output by 1 quarter.

Table 8: Cyclical Behavior of Profitability Measures, Quarterly Turkish Data, 2003- 2013

|	Standard Deviation	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}
Return on Assets										
[0, 25]	0.32	0.07	0.02	-0.03	-0.11	-0.24	**-0.25**	-0.22	-0.18	-0.11
[25, 50]	0.11	**0.58****	0.45**	0.28*	0.10	0.00	-0.04	0.00	0.10	0.17
[50, 75]	0.07	0.27*	0.22	0.18	0.17	0.12	0.10	0.07	0.18	**0.32****
[75, 100]	0.06	-0.25	**-0.32****	-0.28*	-0.17	-0.10	0.00	0.03	-0.01	-0.02
[0, 95]	0.06	-0.13	**-0.19**	-0.16	-0.10	-0.08	-0.02	-0.01	-0.02	0.00
[95, 100]	0.03	-0.41**	**-0.56****	-0.55**	-0.36**	-0.16	0.06	0.18	0.23	0.26
All banks	0.04	-0.21	**-0.29***	-0.27*	-0.17	-0.10	0.00	0.05	0.05	0.07
Return on Equity										
[0, 25]	0.38	0.10	0.09	0.06	-0.01	-0.15	**-0.16**	-0.12	-0.06	-0.05
[25, 50]	0.10	**0.57****	0.47**	0.33**	0.20	0.10	0.04	0.03	0.08	0.08
[50, 75]	0.06	**0.35****	0.34**	0.35**	0.33**	0.30*	0.22	0.13	0.18	0.28*
[75, 100]	0.05	-0.17	**-0.20**	-0.13	-0.04	-0.01	-0.01	-0.05	-0.13	-0.14
[0, 95]	0.06	-0.03	-0.04	0.02	**0.07**	0.07	0.06	0.00	-0.05	-0.06
[95, 100]	0.03	-0.32**	**-0.43****	-0.43**	-0.33**	-0.19	-0.18	-0.16	-0.19	-0.11
All banks	0.04	-0.11	**-0.14**	-0.08	0.00	0.03	0.04	0.00	-0.06	-0.05
Loan Spread										
[0, 25]	0.44	0.01	-0.03	-0.09	-0.03	0.03	-0.05	-0.04	-0.05	**0.09**
[25, 50]	0.08	0.11	0.06	-0.06	-0.27*	-0.39**	**-0.44****	-0.43**	-0.39**	-0.23
[50, 75]	0.05	0.08	-0.18	-0.39**	**-0.55****	-0.53**	-0.47**	-0.37**	-0.15	0.09
[75, 100]	0.07	-0.21	-0.40**	**-0.50****	-0.48**	-0.43**	-0.34**	-0.20	0.00	0.20
[0, 95]	0.06	-0.16	-0.34**	-0.45**	**-0.47****	-0.45**	-0.39**	-0.27*	-0.07	0.16
[95, 100]	0.07	-0.13	-0.37**	**-0.54****	-0.53**	-0.46**	-0.32**	-0.16	0.03	0.21
All banks	0.06	-0.15	-0.35**	-0.48**	**-0.50****	-0.46**	-0.38**	-0.25	-0.04	0.18

[a] Business cycle statistics in the table are based on HP-filtered cyclical components of quarterly empirical time series (smoothing parameter:1600).
[b] The standard deviation of output is expressed in percent; standard deviations of the remaining variables are normalized by the standard deviation of output (std(x)/std(Y)).
[c] The correlation coefficients in bold font are the maximum ones in their respective rows.
[d] *: Significant at 10 percent, **: Significant at 5 percent.
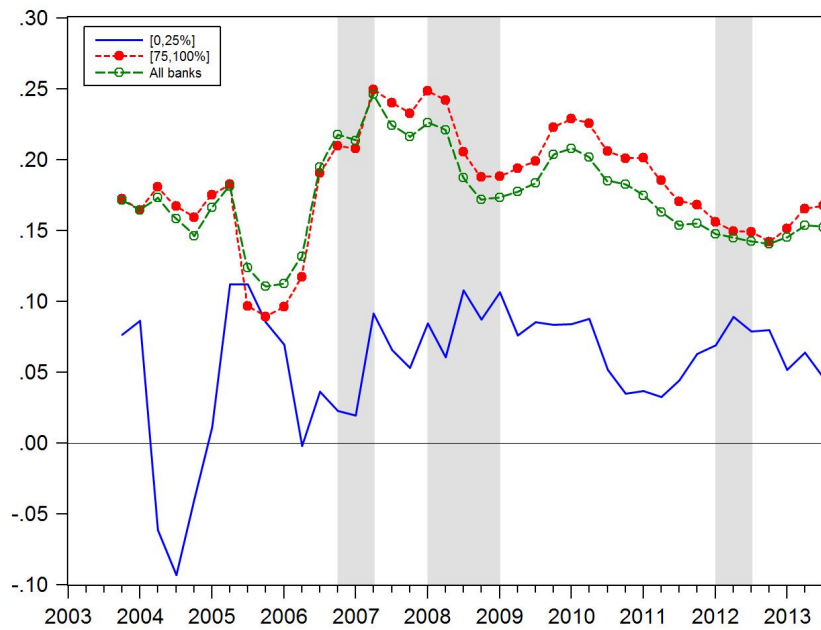
Figure 9: Return on Assets
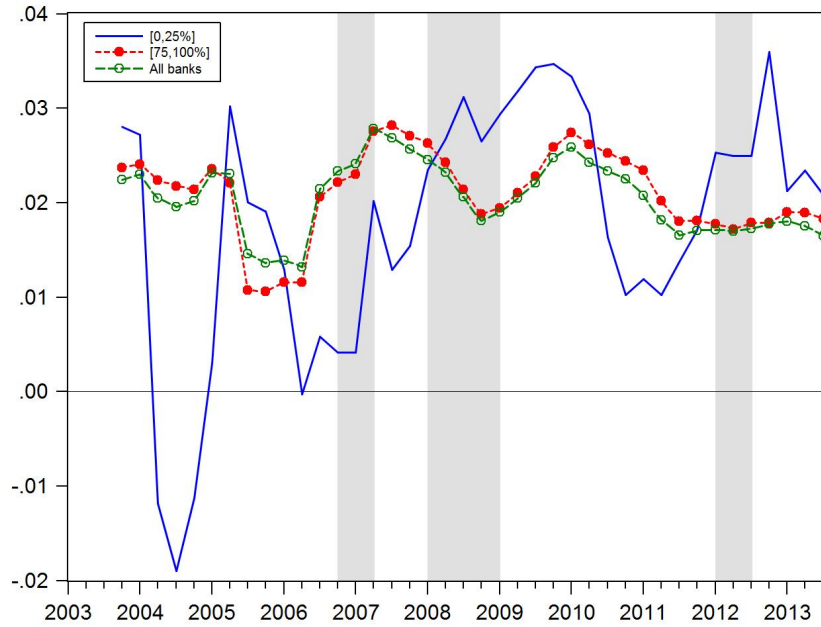
^a All the series are denoted in levels.
^b Shaded areas are recession dates.
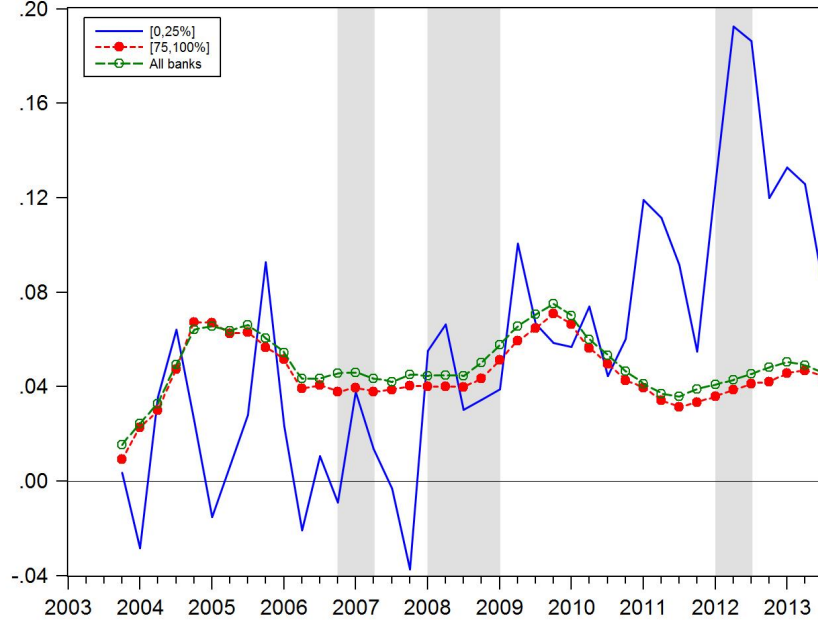
Figure 10: Return on Equity

^a All the series are denoted in levels.
^b Shaded areas are recession dates.

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Figure 11: Loan Spread

Figures 9, 10 and 11 show the annualized levels of ROA, ROE and loan spreads respectively. While we observe a substantial difference between the top and bottom 25 percent banks in terms of all aforementioned profitability measures, it can be seen that the behavior of the aggregate banking sector almost coincides with that of top 25 percent. Starting 2005.Q2, ROA and ROE of top 25 percent banks decrease sharply. Profitability of bottom 25 percent goes sharply negative in 2004.

Loan spread for the bottom 25 percent stays below that of top 25 percent and is more volatile until the 2008 recession. After 2008, loan spread of the bottom 25 percent banks remains more volatile but goes above that of top 25 percent. This is possibly because smaller banks are increasing their profits by charging relatively higher loan rates in order to support their worsening equity positions.

4   Conclusion

Understanding the financing behavior and profits of financial intermediaries over the business cycle is essential for capturing the dynamics of real and financial macroeconomic aggregates and deriving policy implications. This paper studies the business cycle dynamics of banks' balance sheet items as well as important profitability measures using Turkish bank-level data for the 2003Q1-2013Q3 period. An important novelty in this paper is that we conduct our analysis for different size groups

of banks and document the volatility and correlations of the cyclical components of asset and liability side variables as well as return on assets, return on equity, leverage and loan spread.

Our findings reveal that banks' financing patterns along the business cycle vary both across time and within different size groups. Small banks finance a significant fraction of their asset growth with equity whereas large banks depend more on debt financing. We also observe that most bank groups switch between debt and equity financing over the business cycle. At the aggregate level, assets and deposits of banks are less volatile than output while credits, net worth, and leverage are more volatile. All of these variables but net worth move procyclically. At the cross-sectional level, assets and credits are procyclical for nearly all size groups and the volatility declines sharply for top 25 percent banks. Deposits display a procyclical pattern for all size groups except for [75,100] percent size group. Decomposing deposits into foreign and domestic, we observe a similar pattern. Banks in the top 25 percent differ from the rest whose foreign and domestic deposits are procyclical. Equity issuance on the other hand is acyclical or countercyclical for all banks groups and bank credits are highly procyclical. The lead lag patterns of bank balance sheet items also vary with size. In terms of the cyclical movements of credits, bottom 25 percent behave differently compared to those above the second quartile by leading the cycle. Deposits of banks in top 5 and 25 percent lag the cycle whereas those of the rest lead the cycle. Equity lags the cycle for all banks groups. Finally return on assets and equity are acyclical for all bank groups while loan spread is strongly countercyclical except for bottom 25 percent.

These results highlight the fact that bank size is a significant factor in explaining the cyclicality of bank financing, implying the importance of incorporating heterogeneity in modeling the financing behavior of banks. From this perspective, this paper provides a rich set of empirical facts about the cyclicality of bank balance sheets that should be helpful to construct and assess theoretical heterogeneous models about financing sources of banks. Although our findings suggest major differences in bank balance sheets across size groups in terms of cyclicality, identifying the determinants of observed heterogeneity in the degree of cyclicality requires further investigation.

The fact that balance sheet items of banks of different sizes exhibit heterogeneous behavior over the business cycle might have different policy implications as policy decisions targeting the aggregate banking-sector might not always lead to better outcomes for all bank groups. Monetary and macroprudential policy authorities might calibrate their policy decisions based on the bank size, leading to welfare-improving outcomes for the entire economy.

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