IV. SPECIAL TOPICS

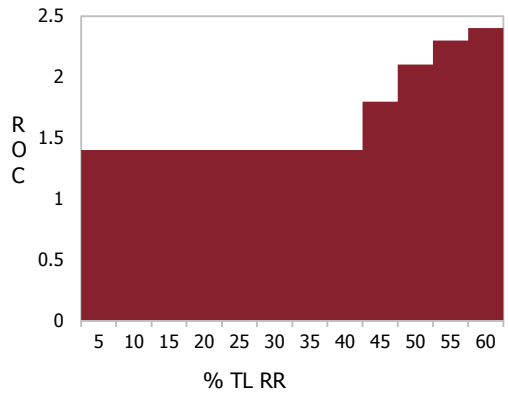
IV.1. Reserve Option Mechanism in Reserve Requirements

With a view to meeting the TL liquidity requirement of the Turkish banking system permanently and at a lower cost, bolstering the build-up of the Central Bank's foreign exchange (FX) reserves in a timely, controlled and effective manner, reducing the adverse impact of volatile capital flows on the macroeconomic and financial stability, bringing in gold to the economy, the Reserve Option Mechanism (ROM) has begun to be used as monetary policy instrument. In this context, Reserve Option Coefficients (ROC) were set with the aim of narrowing the cost differential of meeting the Turkish lira reserve requirements in Turkish lira or FX, and to enable banks to benefit fully the facility as called for by their liquidity needs.

ROM expresses the implementation that allows banks to keep a certain ratio of Turkish lira reserve requirements in FX and gold, whereas ROC means the amount of FX or gold to be held per unit of Turkish lira reserve requirements in case of the facility used.

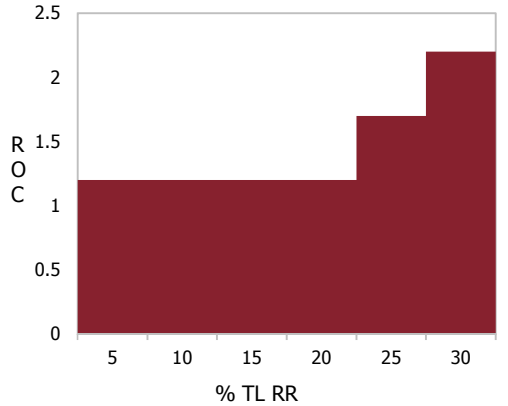
The build-up phase of the ROM is engineered at a gradual pace. As a first step, banks are allowed to hold a fraction of their Turkish lira reserve requirements as FX in September 2011, as gold in October 2011. These facilities have been gradually raised within the market condition, with the latest revisions the limits were set as 60 percent for FX and 30 percent for gold on 17.08.2012 and 31.08.2012, respectively. ROC has been determined for the first tranche corresponding to 40 percent and each additional 5 percent tranches increasing between 1.4 and 2.4 for FX, and for the first 20 percent and subsequent 5 percent tranches between 1.2 and 2.2 for gold (Chart IV.1.1, Chart IV.1.2).

Chart IV.1.1. FX ROC



Source: CBRT

Chart IV.1.2. Gold ROC

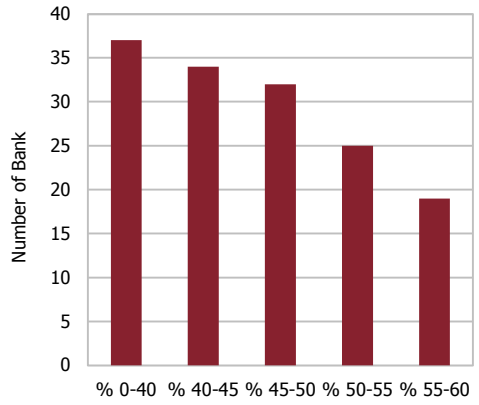


Source: CBRT

As the facility to meeting the Turkish lira reserve requirement at a lower cost is provided to banks through ROM, to what extent banks will use the facility may change on the relative cost of FX and Turkish lira funding. Banks have been consistently using the facility at high rates. 12 banks out of 37 banks, which benefit from the facility to hold FX for Turkish lira reserve requirement, use the last

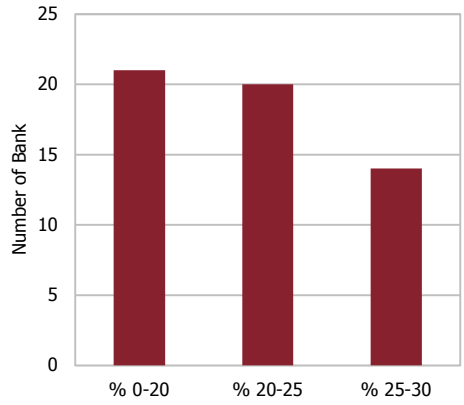
55-60 percent tranche wholly. 7 banks out of 21 banks, benefiting from the facility to hold gold for Turkish lira reserve requirements, entirely use the last tranche of this facility (Chart IV.1.3, Chart IV.1.4).

Chart IV.1.3. Utilization FX ROM Across Tranches (As of 09.11.2012)



Source: CBRT

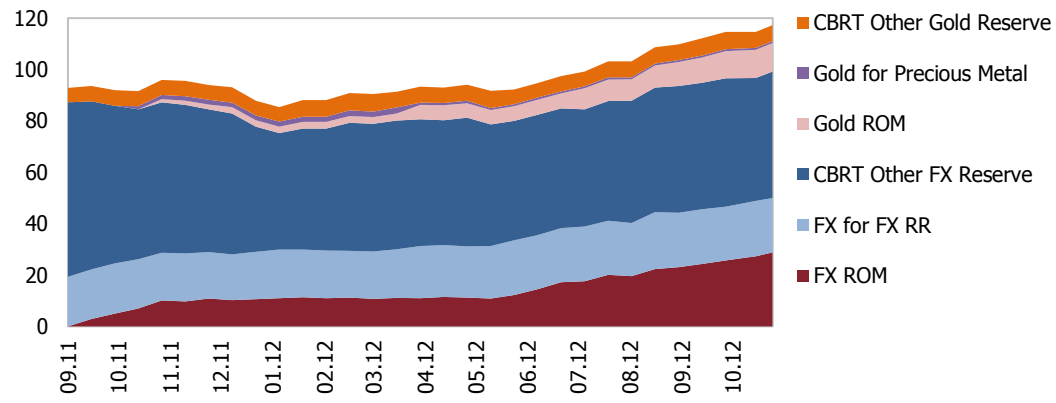
Chart IV.1.4. Utilization Gold ROM Across Tranches (As of 09.11.2012)



Source: CBRT

CBTR's gross reserves has been increased thanks to the fact that banks are taking advantage of the increasing ROC practice in consideration of lower borrowing cost of FX and gold compared to that of Turkish Lira. As of 9 November 2012 CBRT reserves at USD 99,3 billion includes USD 28,8 billion of FX held within ROM and USD 21,2 billion of FX held for FX required reserves liability. Similarly, CBRT's gold reserves at USD 18,1 billion includes USD 11,1 billion worth of gold held under ROM and USD 0,7 billion worth of gold maintained as required reserves for precious metal deposit accounts (Chart IV.1.5).

Chart IV.1.5. CBRT Reserves and RR-ROM (Billion USD)



Source: CBRT

Effect of ROM on Banks' Balance Sheets

ROM implementation has important effects on the banks' balance sheet structures (Table IV.1.1). During September 2011-September 2012, while the Turkish lira amount held in CBRT's free accounts for Turkish lira reserve requirement was declining, the FX reserves held in blocked accounts increased with the facility of holding TL required reserves as FX and gold. While TL claims from CBRT decreased by TL 53.1 billion the "FX required reserves" account increased by USD 31.7 billion.

Depending on the decline of TL amount that was held in CBRT as required reserve, borrowing from CBRT via repo and Turkish Lira liquidity requirement in the markets has decreased. Therefore, while the TL funds obtained through repo transactions were reduced TL 32.8 billion, dependence on repo transactions has fallen. This fall reduced TL interest costs of banks and positively affected their net interest incomes.

Part of the required reserves that is being held in FX and gold has been financed by FX liquid assets. FX claims mainly constituting the banks foreign correspondents have decreased USD 3.1 billion and FX securities account has decreased USD 4 billion. As some part of the amount that is being held in FX and gold for the required reserves has been financed by liquid assets, a significant part has been financed by FX borrowing. In this period, FX liabilities increased by USD 35.3 billion.

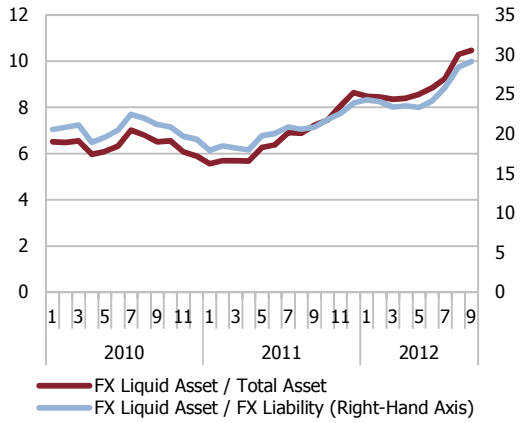
Since significant part of the external borrowing was used for the maintenance of reserve requirements in FX and gold required reserves by banks, the FX credit growth was limited. In fact during the same period, despite of the FX funding of USD 35.3 billion, FX loans has been increased only by USD 6.1 billion. On the other hand, with the ROM implementation, while the FX maintenance was increasing, the decrease in Turkish lira borrowing swap operations used in order to meet the banks Turkish lira liquidity requirement resulted in a decline in the growth of Turkish lira loans (Chart IV.1.7).

Table IV.1.1. Asset- Liability Change from September 2011 to September 2012

	TL *(Million TL)*	FX *(Million USD)*		TL *(Million TL)*	YP *(Million USD)*
Exposures to CBRT	-53.1	0.0	Repos	-32.8	4.2
Reserve Requirements	-0.1	31.7	Deposits	34.9	15.0
Exposures to Banks	3.1	-3.1	Due to Banks	3.4	7.2
Loans	89.8	6.1	Securities Issued by Banks	10.0	4.1
Reverse Repo	8.9	0.0	Provisions	6.8	0.1
Securities	-1.5	-4.0	Other	-0.7	3.3
Other	5.0	-0.3	Equity	24.1	1.4
Total Assets	**52.1**	**30.4**	**Total Liabilities**	**45.8**	**35.3**

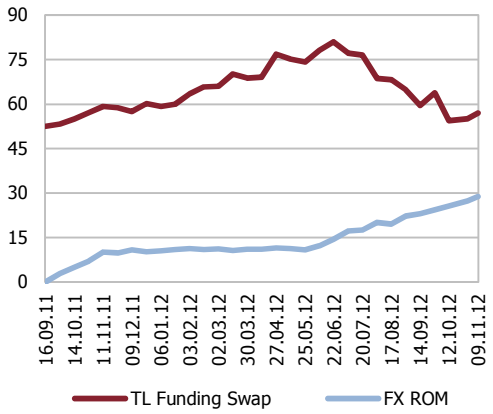
Through ROM, reserves are largely accumulated by banks rather than CBRT. Since the volatility of capital flows adversely influence the banks debt payment capacity and balance sheets, storage of the reserves mostly by the banks and using them at optimal levels according to the nature of the shocks will increase efficiency of the system. In fact, holding Turkish Lira required reserves as FX and gold has increased the share of banks FX liquid and equivalent assets in the balance sheet and the ratio of these assets to meet the FX liabilities (Chart IV.1.6).

Chart IV.1.6. Share of FX YP Liquid Assets on Balance Sheet[1] (%)



Source: CBRT
(1) FX Liquid Assets= Cash +CBRT + Money Markets + Banks +Reverse Repo+ Reserve Requirements

Chart IV.1.7. TL Borrowing Swap and FX for ROM (Billion USD)



Source: CBRT

Through increasing or decreasing ROCs, CBRT's need to intervene the markets via foreign exchange purchase or sale to overcome the negative effects of the volatility in capital flows has been decreased. Moreover, by serving as an automatic stabilizer, the reserve requirements contribute to lessen the volatility in the exchange rates. Depending on the outlook for the global growth, the potential movements in short term capital flows and their effects on national currency, ROM, which is being under constitution, will actively be used as before.

IV.2. Interest Rate Spread and Determinants in Turkish Banking Sector

Banking sector provides an efficient mechanism between savers and lenders by channeling deposits into loans. During this intermediation process, banks operate by setting an optimal level of spread between return from funding cost. In other words, the margin between loan and deposit rates is the most basic profitability indicator.

Interest margin, for efficiency of monetary policy, is also an important indicator for central banks. In the context of monetary transmission mechanism, the changes in policy rates affects aggregate through banking sector as they adjust funding and loan rates accordingly, hence the desired equilibrium level of the economy is achieved by adjustments in aggregate demand.

The effect of central bank policies on aggregate demand depends on pass-through degree of such policies, and at the same time, on the extent to which the non-financial sector is funded through the banking industry. In the case of highly dependent non-financial sector on bank funding, especially changes in interest margins which is determined by adjustments in loan interest rates become highly important for firms in their production and employment decisions.

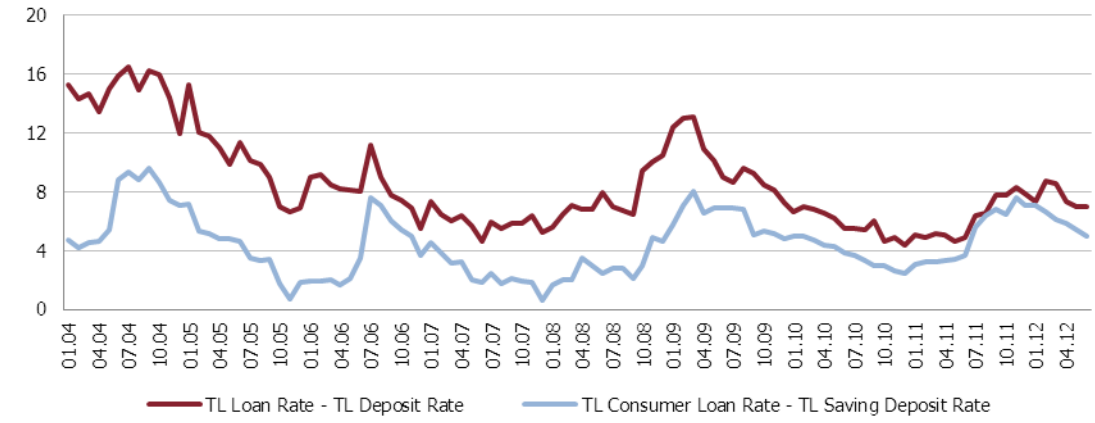
Since the determination of loan, deposit, and hence interest margin is important for the banks, monetary policy and non-financial sector, due to reasons mentioned above, the subject is addressed in in the literature extensively. Being one of the first and leading studies on the net interest margin, Ho and Saunders (1981) model bank behaviors as an intermediary between depositors and lenders. In this study, risk aversion, market structure, transaction sizes and volatility of deposit and interest rates are factors which have an effect on optimal interest margin determination. Ho and Saunders' study is extended by many studies in in both theoretical and empirical direction. Among those studies, Allen (1988) investigates elasticity between different loan types and bank's different financial instruments, Angabazo (1997) uses interest rate and credit risk in his theoretical model, Angabazo's model is estimated empirically by Brock and Rojas (2000) for Latin American countries, then by Saunders and Schumacher (2006) for 6 European countries, and by Hawtrey and Liang (2008) for OECD countries.

Among the studies covering Turkish banking sector, Turker-Kaya (2001) points out a structure shaped by high inflation and public sector borrowing requirement as well as some bank-specific variables, Erol (2007) finds that exchange rate and interest rate risk besides bank specific variables such as diversification, risk aversion and credit risk variables have an effect on bank interest margin. On the other hand, Ozdincer and Ozyildirim (2010) examine interest rate spread instead of net interest margin values based on income statements which is frequently used measure in the literature, and they analyze both Turkish Lira and foreign exchange interest rate spreads, and find that maturity mismatch, interest rate risk and funding structure based on deposits have a particular effect on bank interest rate spreads. Aysan et al. (2012) find that macroeconomic and market structure variables such as inflation rate, interbank interest rate, and reel economic growth have more explanatory power than bank specific variables in explaining net interest margin.

In this feature, bank specific, macroeconomic and monetary policy variables were used to estimate the determinants of net interest margins of banks which operate in Turkey. The time period

which used in the study is from January of 2004 to June of 2012 during which inflation rates has been relatively stable. In that period, because of Turkish banking sector balance sheet dominated by Turkish lira, only Turkish Lira interest margin and sub components are examined. Interest margin series are calculated using weighted average of loan and deposit interest rates of 14 banks which constitute of a large part of Turkish banking sector, and are shown in Chart IV.2.1.

Chart IV.2.1. Average Interest Margin



Source: CBRT

Flow loan data is used to construct the net interest spread. In other words, monthly interest rates are constructed using weighted average of the interest charged on newly opened credits and deposit accounts for each week within that month.

Thus, in contrast to commonly used data in the literature such as the net interest margin measured by difference between income and expense or interest rate spread between the stock of deposit and loans, the flow interest rate data is used in this analysis to examine the impact of the current macroeconomic variables and monetary policy decisions on the interest rate decisions taken by the banks.

Variables that may affect the determination of the interest rate spread could be divided into three categories. Those are bank specific variables, macroeconomic variables and monetary policy variables. As widely used in previous literature, for bank- specific variables, operational costs, credit risk, risk aversion, credit and deposit specialization are taken into account (Ho and Sounders, 1981; Demirguc–Kunt and Huizinga, 1999; Brock and Suarez, 2000; Hawtrey and Liang, 2008; Maudos and Fernandez de Guevara, 2004; Mauodos and Solis, 2009). Variable descriptions are presented in Table IV.2.1.

Table IV.2.1. Variables and Descriptions

Variable	Description	Data
TL Interest Margin	TL loan and deposit spread from flow data	CBRT
TL Consumer Loan Rate/Saving Deposit Rate Margin	TL Consumer Loan Rate and Saving Deposit Rate Spread using flow data.	CBRT
Operating Costs	Operating Costs /Total Assets	CBRT
Credit Risk	Non-performing loans /Total Loans	CBRT
Interest Rate Risk	Volatility of bond/bill interest rate	CBRT, ISE
Risk Aversion	Equity/ Total Assets	CBRT
Loan specialization	Loan/ Total Assets	CBRT
Deposit specialization	Deposits/ Total Assets	CBRT
GDP Growth	Year-over-year GDP growth	CBRT, TurkStat
Inflation	Year-over-year CPI growth	TCMB, TurkStat
CBRT Average Interest Rate	Average of O/N CBRT lending and borrowing rate	CBRT
RR Rate -TL	Required reserves on TL liabilities	CBRT

Note: Monthly GDP data is constructed using methodology in Fernandez (1981).

Banks with higher operational costs are expected to operate with larger interest rate spread to cover these costs. In particular, for the banks with larger portion of assets consisting of loans, the most important risk is default or credit risk. Therefore, to compensate the expected or unexpected default risk, banks are expected to operate with a higher interest rate spread. Thus, the banks' interest margins are expected to be a positively correlated with credit risk.

On the other hand, measured by the share of loans and deposits in total assets, credit and deposit specializations are used to investigate the impact of the structure of banks' lending and funding sources on the interest rate spread. For instance, particularly in a negatively sloped yield curve environment with high expectations for growth, banks have tendency to provide more loans. These periods also overlap with increased competition in the loan market. On the other hand, considered as core liability and stable source of funding for banks, higher share of deposits in the balance sheet facilitate the liquidity management of the banks, hence it affects the interest rate spreads. However, given that the maturity of deposits is generally shorter than loans, the re-pricing risk is also an important factor for determination of deposit and loan rates.

As in previous studies (eg. McShane and Sharpe, 1985; Maudos and Fernández de Guevara, 2004) risk aversion is measured by equity/total asset ratio. Interest margin is expected to be a positively related with risk aversion since banks with higher risk aversion need to operate with higher interest margin to cover costly equity financing rather than external financing (Maudos and Fernández de Guevara, 2004).

As for macroeconomic variables, GDP growth is used as an indicator for total demand condition. GDP affects demand side of the credits, thus it has impact on the loan rates. On the other hand, since total savings is a function of GDP, this variable also affects the volume of deposits in the banks' balance sheets which is the main liability item. At the same time, once the linkages between the financial and real cycles are taken into account, the GDP is expected to be a strong correlated with the interest spreads.

Inflation is one of the important variables that can play a role in determining deposit and loan rate, and hence the interest rate spreads. Given the Fisher effect (and assuming the expected and realized inflation being equal), the change in the inflation rate is directly reflected in nominal interest rates, and depending on the extent to which it affects loan and deposit rates, it affects interest rate spread. At the same time, inflation uncertainty may also change corporate sector's and the household's credit demand, and hence it may affect banks' interest margin.

On the other hand, for the effectiveness of monetary policy, development in interest rate margins is also an important indicator for central banks. Adjustments in policy rates affect banks' short-term funding costs, and interbank borrowing rates, thus the formation of short-term interest rates is aimed to be aligned with the policy objectives of the central banks. In this context, adjustments in policy rate and inflation expectations also have power to influence the bond yield curves, and the term structure of other savings and debt instruments. Therefore, low policy interest rates, for example, reduce borrowing costs, and may enable lower interest margin.

One of the policy tools that affect banks' intermediation costs and also which has been used actively in Turkey is the reserve requirements. In particular, within the framework of inflation targeting, reserve requirements affect interest rates and accordingly, the macro economy, through two channels. First, changes in reserve requirements directly affect the interest rate spread, because banks compensate the increase in costs of the liabilities due to the increase in the reserve requirement ratio by adjusting the difference between deposits and loans. On the other hand, due to their short-term liquidity needs, borrowing requirements of the banks from the central bank increase through liquidity channel and as a result, their lending behavior is affected (Alper and Tiryaki, 2011). In particular, when the interaction of reserve requirements with other liquidity tools and methods is considered, it is expected that reserve requirements also affect the credit supply through the liquidity channel.

The following model is used to examine the factors that affect the spread.

$$Spread_{it} = \beta_0 + X_{it}^{'}\theta + Y_t^{'}\psi + Z_t^{'}\vartheta + \alpha_i + \varepsilon_{it} \qquad (1)$$

where *Spread* is the difference between lending and deposit rates, X include bank specific variables (operational costs, credit risk, risk aversion, loan and deposit specialization), Y includes macro variables (interest risk measured by interest volatility, GDP growth, and inflation), Z includes monetary policy variables (the average of overnight lending and borrowing rates of the CBT, and required reserve ratio), α_i is the bank specific fixed effect, ε is the error term, i denotes banks and t denotes time. The model is estimated by using panel fixed effects estimator and the standard errors are adjusted for heteroskedasticity and auto correlation. In two distinct specifications, spread is defined as the difference between weighted average of total loan and total deposit rates, and the difference between weighted average of consumer loans and savings deposits denominated in Turkish liras.

Table IV.2.2 reports results from estimating equation (1). For each spread definition, 3 specifications are estimated depending on whether inflation and policy rate are used together or alternatively.

Table IV.2.2. Interest Margin Model Results

	TL Interest Margin			Consumer Loan/Saving Deposit Interest Margin		
	(1)	(2)	(3)	(1)	(2)	(3)
Operating Costs	1.652***	1.274**	1.383**	0.669**	0.496*	0.567*
	(0.598)	(0.638)	(0.649)	(0.280)	(0.285)	(0.292)
Credit Risk	0.394***	0.422***	0.414***	0.270***	0.332***	0.322***
	(0.069)	(0.072)	(0.072)	(0.086)	(0.095)	(0.096)
Interest Rate Risk	0.218***	0.253***	0.229***	0.223***	0.243***	0.227***
	(0.083)	(0.085)	(0.083)	(0.039)	(0.040)	(0.039)
Risk Aversion	-0.195	-0.210	-0.187	0.174***	0.168***	0.180***
	(0.133)	(0.131)	(0.132)	(0.062)	(0.060)	(0.061)
Loan specialization	-0.199***	-0.143***	-0.164***	-0.151***	-0.110***	-0.131***
	(0.043)	(0.046)	(0.048)	(0.037)	(0.038)	(0.039)
Deposit specialization	-0.032	-0.036	-0.034	-0.018	-0.010	-0.014
	(0.057)	(0.058)	(0.057)	(0.041)	(0.041)	(0.041)
GDP Growth	-0.145**	-0.140**	-0.160***	-0.133***	-0.113***	-0.130***
	(0.059)	(0.059)	(0.059)	(0.028)	(0.026)	(0.028)
Inflation	0.347***		0.240*	0.197***		0.161**
	(0.122)		(0.142)	(0.059)		(0.066)
CBRT Average Interest Rate		0.139**	0.095		0.069**	0.041
		(0.055)	(0.063)		(0.030)	(0.033)
RR Rate	0.391***	0.372***	0.422***	0.424***	0.423***	0.448***
	(0.133)	(0.131)	(0.133)	(0.061)	(0.062)	(0.062)
Number of Obs.	1392	1392	1392	1392	1392	1392
R^2	0.244	0.243	0.246	0.157	0.152	0.159

Note: Heteroskedasticity and autocorrelation adjusted standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Results indicate that, in line with the findings in the literature, operational costs, credit risk and interest rate risk affect the spread positively. Contrary to Ozdincer and Ozyildirim (2010), loan specialization affects the spread negatively, but deposit specialization is statistically insignificant. This result implies that banks that increase the share of loans in assets operate with a lower spread, and additional loans are financed by non-deposit funds. Considering the fact that credit booms coincide with lower spreads and higher non-core liabilities, empirical results in this study are consistent with the developments in the banking sector.

Risk aversion variable is positively significant in those specifications where the spread is calculated based on consumer loans, supporting the hypothesis that more risk averse banks charge higher spreads to compensate for the higher costs due to the funding by equity.

Consistent with theoretical predictions and empirical findings in the literature, GDP and inflation affect the spread negatively and positively, respectively. Periods with higher GDP growth coincide with higher credit growth, easier access to foreign funding and increased competition provides an explanation for lower spreads in these periods.

Both monetary policy measures, the average of overnight lending and borrowing rates, and required reserve ratio, have a positive and statistically significant effect on the spread. These results

imply that monetary policy decisions can have an impact on total demand and total credit demand through spread channel, and establish a link between lending channel and business cycles.

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