

The Determinants of Interest Rate Spreads in the Czech Republic: Bank Characteristics, Macroeconomic Environment and Financial Crisis

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Abstract

We analyze the determinants of interest rate spreads in the Czech Republic in 2004-2011. We employ a detailed bank supervisory dataset that allows us to construct the actual spreads for different loan categories, namely small and large corporate loans, consumer loans and mortgages, on a monthly basis. Our regression analysis shows that several bank characteristics such as capital, profitability and loans-to-assets ratio influence the size of spreads. Bank characteristics seem to be more relevant for spreads than the macroeconomic environment. We find that the determinants of spreads remained largely stable during the sample period and its variability increased slightly during the crisis. The global financial crisis has increased the responsiveness of spreads to interest rate risk but less so for liquidity risk.

JEL Classification: G01, G21

Keywords: interest rate spreads, banks, financial crisis, Czech Republic.

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1 Introduction

Interest rate spreads form a substantial part of bank profits (for example, 70% for our sample of Czech banks) and therefore, they represent an important element for financial stability. Despite its prominence for bank performance, there is still little research on the determinants of interest rate spreads based on disaggregate loan data. Because of data availability most of previous literature investigated the interest rates spreads estimated calculated from accounting data at the yearly frequency. Spreads based on accounting data are average spreads for one bank. However, spreads typically differ greatly across different loan categories. For example, interest rates charged for consumer loans are much higher than those for mortgages.¹ In addition, banks may experience substantial changes in the structure of their credit portfolio. Therefore it is not surprising that Brock and Franken (2003) find that the regression results on the determinants of interest rate spreads differ substantially between interest rate spreads based on balance sheet data and interest rate spreads based on disaggregated loan data. Related to this is the question which factors determine the actual interest rate spreads for different loan categories.

In this paper we address this question making use of detailed bank level supervisory data from the Czech National Bank. The richness of dataset allows us to calculate the bank-specific interest rate spreads for various loan categories, namely for small and large corporate loans, consumer loans and mortgages², at a monthly frequency and examine the determinants of interest rate spreads. The Czech Republic represents an interesting case to examine the effect of global financial crisis on the interest rates spreads. Unlike most European countries, the Czech banks have not received any government support and according to the available data, remained largely stable during the crisis (Financial Stability Report, 2012). Therefore, we examine to what extent the banks' pricing policies have changed during the crisis and whether the banks increased responsiveness to perceived risks even though their financial health has not deteriorated.

Our results suggest that spreads remained largely stable during the sample period of 2004-2011. The variability of spreads was a bit lower before the crisis but did not increase substantially during the crisis. Our regression analysis shows that several bank characteristics

¹ See Horvath and Podpiera (2012) for the Czech evidence.

² To be precise, we use housing loans, as we use not only mortgages from commercial banks but also loans from building societies. For simplicity, we label this category as mortgages.

such as capital, profitability and liquidity influence the size of spreads. However, there are also notable differences between the individual loan categories. Bank characteristics seem to be more relevant for spreads rather than macroeconomic environment. The global financial crisis has increased the responsiveness of spreads to interest rate risk but less so for liquidity risk.

The paper is organized as follows. Section 2 gives a brief overview of related literature. The main features of Czech banking sector are described in section 3. The data are presented in section 4. The results are available in section 5. Concluding remarks are offered in section 6. Appendix with additional results follows.

2 Related Literature

There is extensive evidence on the determinants of interest rate spreads. Most of this research focuses on developed countries (e.g. Ruthenberg and Elias, 1996, Angbazo, 1997, Demirguc-Kunt et al., 2004) and examine to what extent the spreads are driven by bank, macroeconomic, institutional or regulatory characteristics.

The empirical applications typically build on Ho and Saunders (1981), who develop a theoretical model of banks as financial intermediaries between demand and supply of capital. They show that due to the uncertainty related to in- and outflows of capital the spreads are positive. In that paper, they also present empirical evidence for the US for the positive effect of market imperfections, regulatory restrictions and default risk on spreads. In an cross-country study among seven OECD countries, Saunders and Schumacher (2000) show that restrictions on the explicit interest rates paid to depositors as well as reserve and capital requirements increase spreads. But also less competitive market structures and higher volatility of refinancing rates have a positive effect on spreads. Valverde and Fernandez (2007) extend the theoretical analysis to a multiproduct output-framework where banks grant loans and undertake other, fee-generating activities. Their empirical results for seven European countries shows that fee-generating activities do not directly influence spreads but that fees increase broader measures of bank margins, such as the Lerner-Index. The cross-country studies also show that macroeconomic, regulatory and institutional characteristics have important effects (Demirguc-Kunt and Huizinga, 1999). However, Demirguc-Kunt,

Laeven and Levine (2004) argue that these differences are driven by the country's different approaches to private property and competition.

Several studies examine the determinants of interest rate spreads in Central and Eastern European countries. The spreads were continuously falling during the course of transition of these countries towards the market-oriented economies (Drakos, 2003). In a sample of thirteen accession and non-accession countries for the period 1994-2001, Claeys and Vander Venet (2008) find that bank characteristics, such as efficiency, capital endowment, the share of loans and demand and savings deposits influence spreads, but that the effects differ across the two groups of countries. Dumitic and Ridzak (2012) compare the determinants of spreads before (2000-2007) and during the financial crisis (2008-2010) and show that capital becomes insignificant during the crisis.

Bank ownership and foreign bank entry is an important focus in this literature. Generally, it can be seen that foreign bank entry reduces bank lending rates and that this effect is more pronounced for greenfield entry as Claeys and Hainz (2007) show in a sample of ten CEE countries. For Russia, Fungacova and Poghosyan (2011) find that the effect of commonly used determinants of spreads differs across banks of different ownership types. For Poland, Degryse et al (2012) do not find that spreads depend on ownership type although it influences the maturity and currency structure of loans. In this paper, we do not address the issue of ownership since more than 95% of bank assets in the Czech Republic were owned by foreign banks during our sample period. In addition, Poghosyan (2011) finds that the presence of foreign banks does not affect the interest rate spreads in the Central and Eastern European countries. For the Czech Republic, Horvath (2009) studies spreads as calculated from bank balance sheets and finds that price stability contributes positively to lower spreads and several bank characteristics such as bank efficiency and loan to assets ratio matter, too.

To our knowledge, all the papers so far use accounting data to calculate interest rate spreads. Therefore, they can only employ one measure for interest rate spreads per bank and thus cannot differentiate between different segments of the credit market. The exception is Degryse et al. (2012), who use data from the Polish National Bank that allow discrimination between loans to very small and larger firms and therefore can calculate from balance sheet data spreads for two categories of loans.

3 The Development of Czech Banking Industry

This section gives a brief overview of the developments of Czech banks in the 2000s and their key characteristics.³ There is a very strong foreign ownership in the Czech banking sector (97% of the assets of the Czech banking sector is under either direct or indirect control of the foreign owners, mainly from the EU). The Czech banking sector is quite concentrated, as four biggest banks form 57% of the banking sector assets.

In addition, there are some specific features of the Czech banking sector in comparison to European banks. The Czech banks exhibit a surplus of liquidity throughout the financial crisis. The ratio of deposits to granted loans was 134 % at the end of 2011, compared to an EU average of 87 %. As a consequence, the central bank uses repo operations to withdraw liquidity from the Czech banking sector. Commercial banks display a relatively high share of the government bonds holdings (the share of domestic government bonds on the banking sector assets was 15% at the end of 2011).

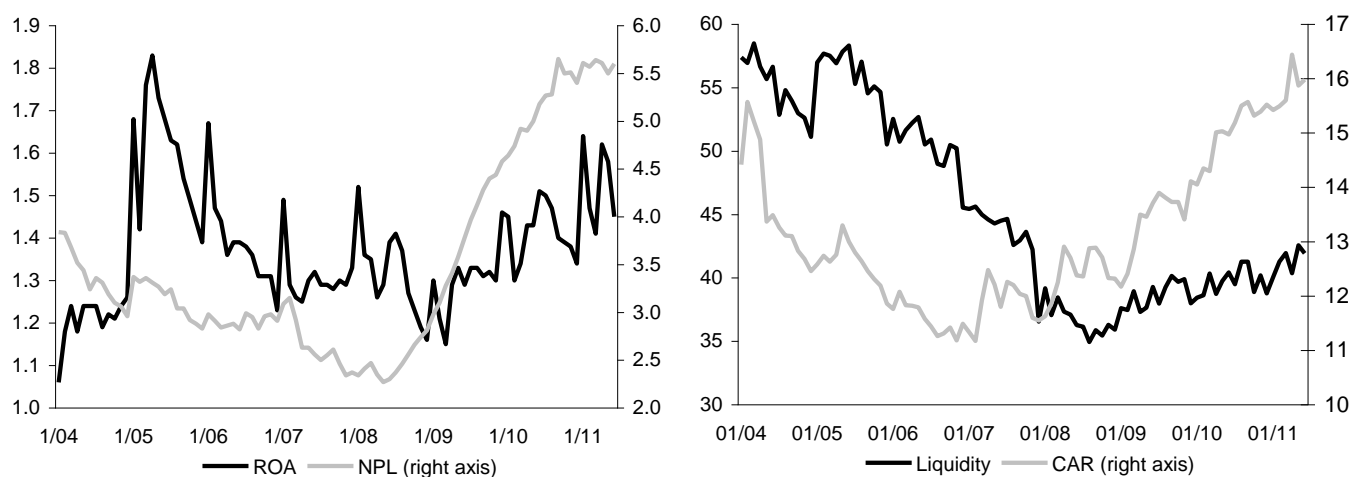
Thanks to this surplus of liquidity accompanied by the conservative business model applied by the Czech banks, the Czech banking sector remained largely stable during ongoing financial crisis. Even though the share of non-performing loans to total loans increased in the reaction to the worsening economic situation of the Czech corporate and household sectors, the profitability of the Czech banks remains on high levels in contrast to many other banks in the EU countries (see Figure 1). The high profits of banks remain from large part undistributed, which leads to the increase in capital buffers that grew to record high levels (see Figure 1). Though the liquidity ratio (expressed as the share of the quickly liquidated assets over the clients deposits) decreased before the financial crisis and in its early phases, it shows an increasing tendency in the last four years and remains high.

After banks' restructuring in the early 2000s, the credit to the private sector grew substantially, especially for the household sector (Geršl and Seidler, 2012). The share of the loans to households on total loans (especially mortgage loans and consumer loans) has soared from about 10 % in 2000 to 45 % in 2011. In contrast to other Central and Eastern European countries, the loans were typically granted in domestic currency (on average, 99% of mortgages and 80% of corporate loans in domestic currency). The credit growth weakened substantially during the crisis especially for the corporate loans and for household consumer

³ The detailed description of the developments in the financial sector is available in the CNB's Financial Stability Reports (for latest see CNB, 2012a) or Financial market supervision reports (see CNB, 2012b).

loans. However the dynamics of the new housing loans soared in 2011 despite the decrease of the number of housing transactions.

Figure 1 – Basic indicators of Czech banking sector



Source: Czech National Bank

Note: ROA, NPL and CAR stand for return on assets, non-performing loans ratio and capital adequacy, respectively.

4 Data and Econometric Model

We use monthly data from the Czech National Bank’s internal banking supervision database from 2004:1-2011:6. All commercial banks are required to report, among other things, their newly granted loans as well as interest rates on those loans. Although the data on individual loans are available, for tractability, we focus on four different loan categories: small and large corporate loans⁴, mortgages and consumer loans. We calculate the bank-specific interest rates for four representative loan categories. The spread is calculated as the difference between the average lending interest rate for loans in a particular category in a particular month and 3M PRIBOR in this month (interbank rate). These data are available on a bank to bank basis and cover the whole banking system. Given some changes in the methodology for interest rate reporting, we use the data from 2004 onwards.

⁴ Small loans and large loans are defined as those with total volume below and above 1 million euro, respectively.

In general, our empirical model follows the literature (Claeys and Vander Venet, 2008, Valverde and Fernandez, 2007). The spreads are assumed to reflect bank-specific as well as macroeconomic characteristics.

$$IRS_{i,t} = f(\text{bank characteristics}_{it-j}, \text{macroeconomic characteristics}_{it-j}, \text{time dummies}) + \eta_i + v_{it}$$

for $i = 1, \dots, N, j = 1, \dots, M, \text{ and } t = 1, \dots, T.$ (1)

i denotes the bank, j captures the number of lags and t stands for time. Since we use the data at monthly frequency, we lag all explanatory variables (except time dummies) by 12 months for the baseline regressions and by 6 months as a robustness check. This is motivated by the fact that it takes time for banks to adjust their pricing policies with respect to their performance and macroeconomic environment. $\eta_i \sim \text{IID}(0, \sigma_\eta^2)$ and $v_{it} \sim \text{IID}(0, \sigma_v^2)$ are independent of each other and among themselves, η_i being individual effects.

The explanatory variables we use are based on the findings of previous research, in particular on the transition economies (see the previous section). We provide a description of all variables and the data sources in Table 1 below. In line with Ho and Saunders (1981), we expect capital to be positively related to spreads. Nevertheless, we cannot a priori rule out an opposite effect. It is argued that more capitalized banks may invest more cautiously because they have more capital at risk (Brock and Franken, 2003). Generally, the effect of profitability may have both negative and positive effects on spreads. On the one hand, more profitable banks may charge smaller interest rates given their efficiency. On the other hand, more profitable banks may exercise their market power.

Banks with higher share of liquid assets are likely to receive lower interest rate income, which will lead to lower spreads, if deposit market is sufficiently competitive. On the other hand, banks that are financed strongly by quickly liquidated assets, i.e. those that face higher liquidity risk, may charge higher spreads because by holding highly liquid assets they forgo higher interest income. Therefore, greater liquidity may increase or decrease spreads depending on which effect prevails. Fees are included because banks, apart from their traditional lending business, can operate in fee-generating activities and thus fees may be a proxy for the business model of the bank. Loans are risky and the banks want to be compensated for bearing the risk. Therefore, the loans to asset ratio is likely to affect the magnitude of spreads positively. Similarly, the loans loss provisions should to be positively

associated with spreads. Interest rate risk, defined as in Valverde and Fernandez (2007), is expected to increase the spreads.

Finally, on the macroeconomic level we expect higher inflation to be detrimental for financial intermediation because of the increased uncertainty and therefore it should increase the spreads. Similarly, higher unemployment is likely to result in higher spreads.

To capture the potential effect of the global financial crisis, we interact our measure of liquidity risk and interest rate risk with the crisis dummy, which takes the value of one from September 2008 onwards.⁵ This date is chosen because of the fall of Lehman Brothers. Doing so, we examine whether the interest rate spreads become more responsive to interest rate and liquidity risk during the global financial crisis.

⁵ As a robustness check, we define the start of crisis as of August 2007 even though the crisis in 2007 involved only several developed economies. We also tried to interact our crisis dummy with some measure of credit risk but fail to find any significant effects. Therefore, we focus on interest rate and liquidity risk to conserve the degrees of freedom.

Table 1 – Data Definitions

Capital adequacy	The ratio of a bank's endowment by its own resources (capital) over the risk weighted assets (RWA) that relate to the regulation valid in given time period. Ratio is calculated according to the Basel core principles (see also the CNB decree no. 123/2007). The CAR is a comprehensive indicator reflecting all banking activities (both balance and off-balance) and potential losses from asset impairment. The capital includes not only Tier 1 capital, but also other types of capital. ⁶
ROA	The ratio of bank profit after taxation to the bank assets.
Liquidity risk	The ratio of Quickly Liquid Assets (QLA) to the clients' total deposits. QLA are those that are readily available to cover the bank liabilities, thus cash in bank's cash desks and vaults, deposits at the CNB (excluding Obligatory Minimum Reserves requirements and term deposits over 24 hours), current accounts and term deposits under 24 hours in other banks, treasury bills and the CNB bills and government bonds.
Fees	The ratio of fees to assets. Fees are the returns from fees and provisions that relate to the operations with financial instruments for customers, with clearing and settlement, with management of clients' assets, with credit covenants and guarantees, with payment system, structured finance, securitization and other services. They include also the returns from payments and provisions of the credit contracts, but only if they are not included in calculation the effective interest rate from credit. The data come from bank profit and loss account and are thus aggregated across all types of products.
Loans	The ratio of credit and other claims on clients that are not tradable to assets. Credit and other claims include non-derivative financial assets with fixed payments that are not quoted and that are not a) used for trading, b) realized, c) during initial entry reported in its real value into profit or loss, or d) kept under maturity.
Loan loss provisions	The ratio of losses of a bank related to the devaluation of credit. Thus, the losses related to the write-offs and creation of adjusting items. Adjusted for revenues from liquidation of adjusting items and revenues from already liquidated credit.
Non-performing loans	The ratio of non-performing loans to total loans according to the banks' classification. Non-performing loans consist of substandard, doubtful and loss loans. Also called loans in default or default loans. All loans past due more than 90 days are require to be classified as non-performing, but not all non-performing loans are necessarily past due more than 90 days.
Interest rate risk	Difference between 3M PRIBOR and bank's deposit rate
Inflation	The year on year change of the Consumer Price Index on a monthly basis.
Unemployment	The rate of unemployment according to the Ministry of Labor and Social Affairs on a monthly basis.

Sources: Czech National Bank, Czech Statistical Office

Table 2 gives descriptive statistics for all variables. There is large heterogeneity among banks. The spreads are smallest for large loans. The size of spreads for small loans and mortgages are largely comparable. The spreads are several times higher for consumer loans in comparison to other segments.⁷ The difference between can be substantial in this market, spreads from zero to as high as 18% for consumer loans.

⁶ The difference between CAR and CAR Tier 1 ratios remains however quite low and stable (on average the CAR ratio is 1.1 p.p. higher than CAR Tier 1 ratio).

⁷ The data for some banks are missing or incomplete. For example, the Capital Adequacy data for foreign bank branches are missing due to the fact that those banks do not have their own capital and their Risk Weighted Assets are not subject to the CNB capital regulation. Similarly, the building societies are somewhat specific type of banks that are allowed to offer only housing loans. These loans are subject to state support and to additional regulation.

Table 2 – Descriptive Statistics

Variable	Mean	Std. Dev.
Small loan spread	3.39	0.76
Large loan spread	2.48	0.97
Mortgages spread	3.79	0.88
Consumer loans spread	12.07	1.92
Capital adequacy	13.63	5.50
ROA	1.23	5.28
Liquidity risk	0.48	75.7
Fees/assets	0.006	0.004
Loans/assets	0.74	342.7
Loan loss provisions/assets	0.001	0.002
Non-performing loans/assets	2.99	3.26
Interest rate risk	1.05	0.87
Inflation	2.64	1.77
Unemployment	6.72	1.30

Note: The descriptive statistics are weighted by the banks' assets.

Note that we opt for estimation of equations in a reduced form. This is motivated by the fact that we analyze the interest rate setting at the micro level and want to investigate how the financial crisis propagates through various market segments. The existing structural models on the determination of interest rate spread (see Elyasiani et al., 1995 or Dia and Giuliadori, 2012) are estimated at much more aggregated level.

To assess the degree of integration of our series, we used the the panel data unit root tests developed by Maddala and Wu (1999), which do not require balanced panel. The results suggest that the unit root is not present in these data.

5 Results

This section presents our regression results on the determinants of interest rate spreads. We present first the baseline results and then a series of robustness checks. All in all, we find that the results typically have the expected signs but we see also some interesting variation across the loan categories.

TABLE 3 ABOUT HERE

Our baseline results are available in Table 3. The results suggest that capital adequacy is positively associated with interest rate spreads, which is in line with the dealership model of Ho and Saunders (1981). Only for consumer loans we get a negative effect. Greater bank profitability is found to increase spreads. Liquidity risk is likely to decrease the interest rate spreads even though it is marginally insignificant in several specifications (the p-values typically slightly above 0.10). Thus, it seems that banks do not get compensated for holding more liquid assets by higher spreads.

We find little evidence that fees are systematically related to interest rate spreads. Banks with higher fee income charge lower interest rates on large loans and mortgages but higher rates on consumer loans. One tentative explanation is that banks with higher fee income focus more strongly on private banking, which generates fees, and therefore can exert some market power in this segment. At the same time they are less strong in the other market segments and can get only lower lending rates.

Our results suggest that a higher loan to assets ratio increases spreads. This is in line with our expectations since granting loans involves risk taking. However, for consumer loans the sign is negative. Our measure of credit risk (loan loss provisions over assets) is positive and significant for small loans and consumer loans. However, for mortgages it is significantly negative. We would expect higher loan loss provisions to increase spreads. However, we measure loan loss provisions for all types of loans and thereby might lose information as the size of loan loss provision might vary across market segments.

The banks encountering greater interest rate risk are found to charge higher spreads. The banks with more limited deposit base are forced to borrow more heavily on interbank market and charge higher spreads when the difference between the price of borrowed funds from other banks and deposit rates increases.

Somewhat surprisingly, the macroeconomic environment, as captured by unemployment and inflation, do not seem to be an important determinant of spreads in our sample. Inflation is insignificant in our regressions. Unemployment carries the expected positive sign only for the spreads on mortgages but is negative for large loans.

It is interesting to note that bank characteristics are more important for spreads for corporate loans and mortgages rather than for consumer loans. The R-squared for the spread on consumer loan is only 0.01, when we include the bank characteristics only (see Table 3). Once we include time dummies, the regression fit increases substantially. This indicates that unobserved characteristics of borrowers might be more important than the bank characteristics. This corroborates with Horvath and Podpiera (2012), who find that the pass-through from interbank rates into consumer rate is very weak in the Czech Republic. The number of observations varies because, for example, small banks often do not grant any consumer loans but rather focus on several corporate clients.

TABLE 4 ABOUT HERE

We examine more closely the effect of the financial crisis on the interest rate spreads in Table 4. While our baseline results from Table 3 remain largely unaffected, our results indicate that during the financial crisis Czech banks have increased the responsiveness to interest rate risk and to a certain extent, to a liquidity risk as well. As concerns the interest rate risk, an increase in its effect on spreads may stem from increased uncertainty on interbank markets associated with a substantial decline in the trading activity of this market. As a consequence, the banks relying more heavily on this market might have been more inclined to increase the spreads more during the crisis. On the other hand, the majority of Czech banks maintain a high degree of liquidity during the crisis and therefore, it is likely that the evidence for increased importance of liquidity risk shocks is more limited.

Next, we carry out several robustness checks to address the stability of our results. Table 5 reports the results on the determinants of interest rate spreads before the crisis. The results largely support our findings presented in Table 3. We see that higher liquidity risk lowers spreads in all regressions, i.e. also for large and consumer loans. However, interest rate risk is significant in fewer market segments. Inflation becomes significant, but the signs are ambiguous.

Next, we re-estimate our regression models with the explanatory variables lagged by 6 months (instead of 12 months as it is the case for the baseline regressions). Again, the results seem to be in line with baseline regressions. The effect of interest rate risk becomes stronger

because its effect is significant in all regressions. And also for the macroeconomic determinants there are some notable differences. Inflation becomes significant in this specification but with positive signs for corporate loans and negative signs for mortgages and consumer loans. In contrast, unemployment is only significant with a positive sign for small loans.

TABLE 5 ABOUT HERE

TABLE 6 ABOUT HERE

Finally, we also estimate the regression models with a different measure of credit risk. We use the non-performing loans to assets ratio instead of loan loss provisions. These measures differ in the extent to which they are forward-looking indicator of credit risk. While loan loss provisions are more forward-looking measure of credit risk, non-performing loans are more backward-looking indicator of credit risk. Nevertheless, our results change minimally and we fail to find evidence that non-performing loans systematically affect the size of spreads. Next, we also excluded outliers by running regressions without 5% highest and lowest spreads and introduced a dummy for building societies as an additional explanatory variable. Again, these regressions do not provide any additional insight. All these tables are available upon request from the authors.

6 Concluding Remarks

Due to data restrictions, a vast literature on this topic used accounting data as a proxy for the spreads. Based on these data, one may obtain only an average bank-specific interest rate spreads. Nevertheless, the spreads typically differ largely across various loan categories given a different level of risk associated with these loans. For example, consumer loans typically exhibit much higher interest rate than mortgages.

Our results show that there are some differences in the determinants of interest rate spreads across different segments of the credit market. In general our results are in line with our expectations. We find that higher capital and profitability increase spreads. Also higher loans and higher interest rate risk have a positive effect on spreads. In contrast, higher liquidity reduces them. On the macroeconomic level, the results concerning the effect of inflation and unemployment do not have a clear direction and its significance varies depending on the actual specification.

We also investigate the possible effects stemming from the current global financial crisis. On the one hand, the Czech banking system has remained largely stable during this period (see Financial Stability Report, 2012). On the other hand, the degree of uncertainty has increased substantially and the banks may be more prudent or more responsive even to small changes in the perceived risks. Indeed, we find that the responsiveness of spreads to the changes in the interest rate risk has increased during the crisis. This effect is, to a certain extent, present for a liquidity risk, too.

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Table 3: The Determinants of Interest Rate Spreads

	Spread Category							
	Small Loans	Large loans	Mortgages	Consumer loans	Small Loans	Large loans	Mortgages	Consumer loans
Capital adequacy	0.01*** (0.003)	0.02*** (0.006)	0.007** (0.003)	-0.02 (0.03)	0.001 (0.003)	0.016*** (0.004)	0.01*** (0.003)	-0.03 (0.02)
ROA	-0.04 (0.05)	0.15*** (0.04)	0.10** (0.04)	0.09 (0.11)	0.02 (0.04)	0.34*** (0.03)	0.11** (0.04)	0.94*** (0.10)
Liquidity risk	-0.0006 (0.001)	-0.01 (0.01)	-0.001 (0.0008)	0.001 (0.002)	-0.002* (0.001)	-0.004 (0.002)	-0.001* (0.0008)	0.002 (0.002)
Fees	18.38** (7.50)	11.56 (10.60)	-17.77*** (5.67)	-50.58*** (14.82)	-23.04*** (7.92)	-14.16 (11.49)	-0.19 (6.67)	27.10 (21.20)
Loans	0.74** (0.33)	0.41 (0.64)	1.88*** (0.26)	0.65 (1.07)	2.35*** (0.32)	0.78** (0.38)	0.98*** (0.34)	-4.67*** (0.63)
Loan loss prov.	-46.75*** (12.50)	-16.11 (17.45)	10.52 (9.54)	62.90*** (22.04)	22.43* (13.09)	25.68 (20.51)	-22.90** (11.26)	72.80** (34.18)
Interest rate risk	0.20*** (0.04)	0.16** (0.07)	0.16*** (0.03)	0.09 (0.10)	0.23*** (0.06)	0.26*** (0.07)	0.08 (0.05)	2.19*** (0.14)
Inflation					0.05 (0.04)	-0.06 (0.06)	0.03 (0.03)	0.07 (0.12)
Unemployment					-0.01 (0.08)	-0.24* (0.14)	0.15** (0.06)	0.36 (0.26)
Time Effects	NO	NO	NO	NO	YES	YES	YES	YES
No. of observations	990	648	945	559	990	648	945	559
R-squared	0.09	0.10	0.15	0.01	0.30	0.20	0.12	0.59

Notes: Fixed effects estimation, Liquidity risk defined as the ratio of liquid assets to total assets. Fees, loans and loans loss provisions divided by total assets. Interest rate risk defined as the difference between 3M PRIBOR and bank-specific deposit rate. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. Explanatory variables lagged by 12 months.

Table 4: The Determinants of Interest Rate Spreads, Financial Crisis Effects

	Spread Category							
	Small Loans	Large loans	Mortgages	Consumer loans	Small Loans	Large loans	Mortgages	Consumer loans
Capital adequacy	0.01** (0.00)	0.02*** (0.01)	0.01*** (0.00)	0.01 (0.02)	0 (0)	0.02*** (0.00)	-0.02*** (0.00)	-0.04* (0.02)
ROA	-0.06 (0.05)	0.18*** (0.04)	0.12*** (0.04)	0.96*** (0.10)	0.05 (0.05)	0.35*** (0.04)	0.26*** (0.04)	0.91*** (0.10)
Liquidity risk	0 (0)	-0.01* (0.00)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fees	1.44 (7.17)	4.61 (10.9)	-11.57** (5.85)	4.76 (21.45)	-15.74** (7.89)	-18.13 (11.67)	7.16 (8.76)	47.67** (21.00)
Loans	1.03*** (0.32)	0.49 (0.6)	1.79*** (0.30)	-5.91*** (0.66)	2*** (0.33)	0.7* (0.39)	0.34 (0.24)	-4.15*** (0.66)
Loan loss prov.	-24.59** (12.04)	-3.69 (18.39)	-6.29 (10.01)	119.6*** (33.34)	3.6 (13.26)	41.01* (21.19)	-31.78** (15.91)	16.56 (34.08)
Interest rate risk	0.13*** (0.05)	0.15* (0.09)	0.06* (0.04)	1.41*** (0.15)	0.12* (0.07)	0.33*** (0.09)	0.43*** (0.06)	2.26*** (0.18)
Liquidity risk*Crisis	-0.02*** (0.00)	-0.01** (0.00)	0.01*** (0.00)	0.05*** (0.01)	-0.01*** (0.00)	0 (0)	0 (0)	0.01 (0.01)
Interest rate risk*Crisis	0.25*** (0.05)	0 (0.09)	0.16*** (0.04)	-0.23 (0.2)	0.27*** (0.06)	0.03 (0.1)	0.5*** (0.08)	0.2 (0.22)
Inflation					-0.05 (0.04)	0.05 (0.07)	-0.25*** (0.05)	-0.14 (0.15)
Unemployment					-0.06 (0.08)	-0.34** (0.14)	-0.03 (0.1)	0.96*** (0.26)
Time Effects	NO	NO	NO	NO	YES	YES	YES	YES
No. of observations	990	648	945	559	990	648	945	559
R-squared	0.24	0.11	0.16	0.01	0.33	0.21	0.36	0.60

Notes: See Table 3.

Table 5: The Determinants of Interest Rate Spreads, Pre-Crisis Sample

	Spread Category							
	Small Loans	Large loans	Mortgages	Consumer loans	Small Loans	Large loans	Mortgages	Consumer loans
Capital adequacy	0.02*** (0.01)	0.03** (0.01)	-0.01 (0.01)	-0.003 (0.04)	0.02*** (0.01)	0.02*** (0.01)	-0.01 (0.01)	-0.06* (0.04)
ROA	-0.03 (0.08)	0.12 (0.11)	0.1* (0.06)	0.33** (0.14)	0.13 (0.08)	0.5*** (0.06)	0.11* (0.07)	0.54*** (0.16)
Liquidity risk	-0.01** (0.00)	-0.01** (0.00)	-0.01*** (0.00)	0.06*** (0.01)	-0.01*** (0.00)	-0.01* (0.00)	-0.01*** (0.00)	0.05*** (0.01)
Fees	8.29 (10.66)	-17.02 (16.11)	-16.62** (8.05)	18.81 (31.8)	-39.42*** (14.48)	-33.97 (21.24)	-20.06* (11.84)	100.27** (40.46)
Loans	0.58 (0.56)	0.97 (0.86)	1.67*** (0.64)	0.53 (1.22)	1.53*** (0.55)	0.3 (0.51)	1.84*** (0.67)	0.49 (1.21)
Loan loss prov.	13.21 (27.62)	53.99 (38.39)	5.4 (21.45)	73.48 (71.88)	52.8* (27.90)	55.6 (40.85)	5.27 (22.84)	0.25 (76.6)
Interest rate risk	0 (0.09)	-0.01 (0.15)	0.04 (0.06)	2.2*** (0.22)	0.03 (0.1)	0.32*** (0.12)	0.01 (0.08)	2.23*** (0.25)
Inflation					0.15*** (0.05)	0.04 (0.09)	0.07* (0.04)	-0.33* (0.17)
Unemployment					-0.13 (0.19)	-0.91*** (0.28)	-0.05 (0.14)	1.83*** (0.54)
Time Effects	NO	NO	NO	NO	YES	YES	YES	YES
No. of observations	570	379	528	329	570	379	528	329
R-squared	0.08	0.09	0.22	0.01	0.20	0.22	0.22	0.52

Notes: See Table 3.

Table 6: The Determinants of Interest Rate Spreads, Explanatory Variables Lagged by 6 Months

	Spread Category							
	Small Loans	Large loans	Mortgages	Consumer loans	Small Loans	Large loans	Mortgages	Consumer loans
Capital adequacy	0.02*** (0.00)	0.02*** (0.01)	0.01*** (0.00)	-0.03 (0.03)	0.02*** (0.00)	0.03*** (0.00)	0.01** (0.00)	-0.04* (0.02)
ROA	0.04 (0.05)	0.25*** (0.04)	0.08* (0.04)	0.13 (0.1)	0.02 (0.05)	0.4*** (0.04)	0.09** (0.04)	0.93*** (0.09)
Liquidity risk	-0.01*** (0.00)	-0.01*** (0.00)	0.0001 (0.0008)	0.002 (0.002)	-0.01*** (0.00)	-0.01*** (0.00)	0.0001 (0.0001)	0.003 (0.002)
Fees	19.17*** (7.32)	-11.3 (10.38)	-29.12*** (5.79)	-41.8*** (14.42)	-1.09 (7.52)	-24.65** (10.79)	-16.04*** (6.17)	40.37** (20.15)
Loans	0.12 (0.35)	-0.1 (0.5)	1.46*** (0.25)	-2.82*** (1.03)	0.65* (0.34)	-0.03 (0.38)	0.64** (0.29)	-4.25*** (0.62)
Loan loss prov.	-47.39*** (11.89)	5.38 (15.9)	47.3*** (9.41)	34.13 (20.88)	-12.42 (12.47)	27.81 (18.53)	20.52** (10.35)	23.91 (31.88)
Interest rate risk	0.21*** (0.04)	0.19*** (0.06)	0.10*** (0.03)	-0.10 (0.10)	0.24*** (0.06)	0.14** (0.07)	0.2*** (0.05)	2.14*** (0.14)
Inflation					0.08*** (0.03)	0.11** (0.04)	-0.06*** (0.02)	-0.28*** (0.08)
Unemployment					0.25*** (0.06)	0.15 (0.11)	0.04 (0.05)	0.07 (0.19)
Time Effects	NO	NO	NO	NO	YES	YES	YES	YES
No. of observations	1077	699	1030	610	1077	699	1030	610
R-squared	0.16	0.16	0.10	0.02	0.28	0.21	0.19	0.58

Notes: Fixed effects estimation, Liquidity risk defined as the ratio of liquid assets to total assets. Fees, loans and loans loss provisions divided by total assets. Interest rate risk defined as the difference between 3M PRIBOR and bank-specific deposit rate. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Appendix

Table A.1: Means for spreads over time

Spread	2004-2011	2004	2005	2006	2007	2008	2009	2010	2011
Firm small loans rate	3.31	3.57	3.43	3.29	3.35	3.54	3.19	3.18	3.04
Firm large loans rate	2.7	2.61	2.38	2.49	2.78	3.1	2.66	2.61	2.8
Consumer	9.61	10.24	10.07	9.31	9.25	9.36	9.52	9.82	9.56
Mortgage	3.46	3.86	3.21	3.21	3.21	3.45	3.77	3.66	3.58

Table A.2: Variability of spreads over time

Spread	2004-2011	2004	2005	2006	2007	2008	2009	2010	2011
Firm small loans rate	1.46	1.55	1.42	1.44	1.57	1.34	1.45	1.57	1.35
Firm large loans rate	1.43	1.56	1.52	1.33	1.06	1.25	1.24	1.74	1.67
Consumer	3.51	3.87	3.21	3.45	3.26	3.21	3.51	3.80	3.85
Mortgage	1.21	1.25	0.93	1.09	0.94	1.16	1.36	1.47	1.40

Figure A.1: The correlations among spreads: Various loan categories

