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Interest Margins Determinants of Czech Banks

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IES Working Paper: 11/2009

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Bibliographic information:
Horváth, R. (2009). " Interest Margins Determinants of Czech Banks "
IES Working Paper 11/2009. IES FSV. Charles University.

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Interest Margins Determinants of Czech Banks

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February 2009

Abstract:
We examine the determinants of interest rate margins of Czech banks employing bank-level dataset at the quarterly frequency in 2000-2006. Our main results are as follows. We find that more efficient banks exhibit lower margins and there is no evidence that the banks with lower margins would compensate themselves with higher fees. Price stability contributes to lower margins. There are some economies of scale, as larger banks tend to charge lower margins. Higher capital adequacy is associated with lower margins contributing to the banking stability. Overall, the results indicate that the determinants of interest rate margins of Czech banks are largely similar to those reported in other studies for developed countries.

Keywords: commercial banks, interest rate margins, bank efficiency

JEL: G21, D40, P27

Acknowledgements
Special thanks go to Michal Ježek who contributed to the initial stage of this research when he was employed at the Czech National Bank. The views expressed in this paper are not necessarily those of the Czech National Bank.

1 Introduction

Czech banks have undergone massive changes since the fall of communism. The banks were state-owned at the outset of transition and it took more than a decade until commercial banks were privatized. The 1990s were characterized by abrupt changes in credit conditions, from relatively soft credit conditions in the first half of 1990s to rather tight conditions, credit rationing, accumulation of bad loans and bank failures in the second half (Kreuzbergová, 2006). Podpiera and Weill (2008) and Podpiera-Pruteanu and Podpiera (2008) claim that deterioration in cost efficiency rather than bad luck has been behind the accumulation of bad losses and bank failures. Increasingly, the Czech banking industry has been characterized by large foreign ownership presence (Haselmann, 2006), greater stability and less government intervention (Turnovec, 1999).

Drakos (2003) puts forward that the fall in interest rate margins represents the success of market-oriented reforms implemented in transition countries. In this paper, we investigate the determinants of bank interest rate margins. Among the determinants, we examine both bank-specific and macroeconomic variables. While the former may have policy implications for bank supervision such as how different market structures affect the financial intermediation, the latter may convey useful information how macroeconomic policies in general may contribute to the stability of banking industry. In consequence, we may compare the results to evidence on other Central European countries provided by Claeys and Vander Vennet (2008) or to evidence on developed countries.

In this paper, we examine the interest rate margins of Czech banks in 2000-2006 within the dynamic panel data framework. In contrast to majority of empirical applications in this stream of literature, we base our results on the quarterly rather than annual data by employing a unique Czech National Bank dataset on financial statements of Czech banks. Anticipating our results, we find that more efficient banks exhibit lower interest margins and that banks want to be compensated for more risky activities. Price stability positively contributes to lower margins, thus enhancing financial intermediation and subsequently fostering economic growth. This finding is in line with Boyd et al. (2001), who documents a negative impact of the inflation rate on the financial sector performance.

The paper is organized as follows. In section 2, we briefly review related literature. Section 3 contains data description and empirical methodology. Section 4 presents the results and section 5 offers the concluding remarks. Appendix follows.

2 Related Literature

The pricing policies of banks have been traditionally in the focus of economists. Typically, it has been emphasized that bank margins are a result of banking structure, regulatory issues and macroeconomic environment. There is immense evidence on the determinants of interest rate margins in developed countries (e.g. Ruthenberg and Elias, 1996, Angbazo, 1997, Wong, 1997, Demirguc-Kunt and Huizinga, 1998, Saunders and Schumacher, 2000, Demirguc-Kunt et al., 2004 and others).

Large cross-country evidence on the determinants of interest rate margins is provided by Demirguc-Kunt and Huizinga (1999), who analyze it using weighted least squares in 80 countries in 1988-1995 period. Except taking account bank and macroeconomic conditions, they also analyze the role of taxation, deposit insurance, financial structure as well as legal and country-level institutional indicators such as indexes on the rule of law, corruption and contract enforcement. Similarly, Gelos (2009) investigates interest rate spreads in 85 countries with a focus on Latin America. He finds that higher interest rates, bank efficiency and regulatory requirements contribute to higher spreads in Latin America.

Saunders and Schumacher (2000) analyze the bank interest rate margins in six European countries building on a model developed by Ho and Saunders (1981). They follow a two-step process. First, controlling for the effects of net interest margins of various imperfections that can't be built directly into the model (i.e. implicit interest, the opportunity costs of reserves and capital requirements) so as to isolate estimates of the pure spread in each country each year. Second, they undertake an analysis of determinants of these pure spreads (i.e. market structure, interest rate volatility). They find that bank market structure, interest rate volatility and bank capitalization matter for the spreads.

Another piece of evidence in provided by Hawtrey and Liang (2008), who investigate bank interest rate margins in a set of OECD countries and focus on bank-specific characteristics. They find bank market structure, cost efficiency, risk aversion and interest rate volatility among the main determinants of margins. Similar set of countries and similar results are presented by Valverde and Fernandez (2007).

Regarding the central and eastern Europe, there is much less evidence. Claeys and Vander Vennet (2008) analyze the determinants of bank interest rate margins in central and eastern European countries in comparison to Western Europe in 1994-2001 (sample of 2279 banks from 36 countries). Generally, they examine the role of country-specific bank market characteristics, country-specific macroeconomic conditions, bank-specific characteristics and regulatory features in influencing the interest rate margins.

One of the hypotheses Claeys and Vander Vennet (2008) raise in their study is whether the interest rate margins are driven either by structure conduct performance or efficient structure hypothesis. Structure conduct performance postulates a positive relationship between margins and market structure reflecting non-competitive pricing behavior in concentrated markets. An attendant theory is a relative-market-power hypothesis, i.e. only banks with large market shares are able to exercise market power in pricing and consequently earn higher margins. On the other hand, efficient structure hypothesis states that differences in interest margins are attributable to differences in operational efficiency across banks. There are two versions of this hypothesis. X-efficiency version points out that bank with superior management or production technologies have lower costs and subsequently can offer more competitive interest rates on loans and/or deposits, leading to a negative relationship between operational efficiency and interest margins. Since these firms are also assumed to gain larger market shares, the market may become more concentrated as a result of competition. Hence the correlation between market structure and margins is spurious (runs via higher efficiency). One way to deal with this is to include market concentration, market share and operational efficiency simultaneously into the regression. Second, scale-efficiency version emphasizes that some firms simply produce at a more efficient scale resulting under competition to smaller margins. Again, these firms assumed to increase market share leading to higher market concentration.

3 Data and Econometric Approach

The data available to us cover financial statements of 25 banks (nearly all Czech banks) at the quarterly frequency from 2000:1 to 2006:1 and the source of the data is Czech National internal dataset of financial statements on commercial banks and building societies. Given that data for 2 banks in the sample are not available for all periods renders the panel unbalanced. The number of observations is 562.

In general, our empirical model follows the literature (Claeys and Vander Vennet, 2008, Valverde and Fernandez, 2007).

$$NIM = \delta \cdot NIM(-1) + \beta_1 \cdot FEES + \beta_2 \cdot CAD(-4) + \beta_3 \cdot LOANS + \beta_4 \cdot ADMIN + \beta_5 \cdot SIZE + \beta_6 \cdot HERF + \beta_7 \cdot INFL + \beta_8 \cdot GDP + \Sigma\, a_t \cdot (\text{time dummy}) + \eta_i + \upsilon_{it}$$

for $i = 1, \dots, N$ and $t = 1, \dots, T$

where variables are described in Table 1. As a result, we include bank-specific variables to tackle with inherent bank heterogeneity, market structure and macroeconomic conditions as potential determinants of interest rate margins. $\eta_i \sim IID(0, \sigma_\eta^2)$ and $\upsilon_{it} \sim IID(0, \sigma_\upsilon^2)$ are independent of each other and among themselves, η_i being individual effects. As stated above, we have N = T = 25. Descriptive statistics of our variables are presented in Table 2 in the Appendix.

Table 1: Description of variables

Notation:	*Variable description:*
NIM	net interest margin, i.e. net interest income / assets
FEES	fees income / assets
CAD	capital adequacy
LOANS	total loans / assets
ADMIN	administrative costs / assets
SIZE	assets / median assets in the banking sector
HERF	Herfindahl index (higher number implies less competitive environment)
INFL	current inflation rate
GDP	real GDP growth

As the model is primarily empirical, we also tested other determinants such as the level of interest rate, stock market capitalization, corporate income tax and government ownership dummy, but failed to find them significant. These results are available upon request.

CAD(-4), i.e. capital adequacy lagged by 4 quarters, is chosen with regard to the consideration that riskiness of a banking portfolio as assessed at a given point in time is reflected in interest income only with a certain lag.[1]

Before estimation of our empirical model, we tested each series for stationarity based on panel data unit root tests developed by Maddala-Wu (1999). This test of panel stationarity was used at varying lag lengths using both ADF and Phillips-Peron statistics.[2] Overall, evidence for stationarity of our panel has been found. These results are available upon request.

To deal with endogeneity and dynamic nature of interest margin determination, we opt for the Arellano and Bond (1991) estimator. This seems to be a suitable dynamic panel estimator for us, as we find that the persistence of lagged dependant variable is not high.

4 Results

We report the results on interest margin determination in Table 3 and 4. Various specifications of equation (1) are reported. The specifications differ based on whether we include the full set of explanatory variables, time dummies and whether one-step or two-step Arrelano-Bond estimator has been carried out.

TABLE 3 and 4 ABOUT HERE

Subject to various sensitivity tests, the results suggest that less efficient banks, as proxied by the administrative costs, exhibit greater interest margins. This is beneficial for customers, as it the finding implies – in line with theory – that more efficient banks pass lower costs on to their clients in the form higher deposit or lower lending rates (Claeys and Vander Vennet, 2008). Higher capital adequacy of a bank is associated with lower interest margins. This contrasts with the Ho and Saunders (1981) dealership model that predicts positive relationship, as net interest

[1] Presumably more than for other banking variables in the model.
[2] Unlike some other tests, the Maddala-Wu (1999) test doesn't require a balanced panel.

rate margins should increase the capital base as the exposure to risk increases. Our finding is rather in line with the hypothesis raised by Brock and Franken (2003), who put forward that less capitalized banks have the motivation to accept more risk (associated with higher spread) in order to receive higher returns. Analogously, more capitalized banks invest more cautiously, as there is more capital at risk (Brock and Franken, 2003).

Interest margins are higher for banks with a higher loans-to-assets ratio. This indicates that banks providing credit for riskier projects require higher margins as compensation. Income from fees and charges does not seem to have explanatory power and we have not discovered any substitution relationship in which lower interest margins would be compensated by higher fees income and vice versa. Larger banks seem to set lower margins, which is suggestive of economies of scale. This contrasts with evidence on new EU member states, where no systematic relationship is found (Claeys and Vander Vennet, 2008).

Our measure of competition, Herfindahl index, is never significant and thus, we do not find evidence that market power matters for interest margin. Albeit, the insignificance of index may reflect multicollinearity with some other explanatory variables, even simple scatter plot do not indicate any pattern. We also used concentration ratio for 3 largest banks instead of HERF, but also failed to find any significant relationship.

Next, macroeconomic conditions seem to affect the margins, too. While GDP growth is not significant (which may reflect 7 years time dimension of our sample that may not be sufficient to capture the business cycle fully), banks seem to be setting higher margins in a higher-inflation environment. Thus, central banks aiming to achieve price stability also contribute to better financial intermediation (Boyd et al., 2001), which is crucial for economic development (Levine, 2005) especially in less financially developed countries (Coricelli and Roland, 2008). Overall, the results indicate that the determinants of interest rate margins of Czech banks are similar, to a large extent, to those reported in other studies for developed countries.

We also estimated our empirical model by different econometric techniques such as random or fixed effects panel estimator. While this approach is prone to endogeneity, these results largely support our aforementioned findings and are available upon request.

5 Concluding Remarks

In this paper we investigate the determinants of interest rate margins of Czech banks based on quarterly data in 2000-2006 using Arrelano-Bond dynamic panel data estimator. We find that that more efficient banks exhibit lower margins and there is no evidence that the banks with lower margins would compensate themselves with higher fees. The results advocate the hypothesis that more efficient banking systems are supportive for financial intermediation and allocation of funds.

Price stability contributes to lower margins and thus, enhances financial intermediation, too, and, subsequently fosters economic development (Levine, 2005). This finding can thus be interpreted as additional evidence in support of price stability oriented central banking. The results indicate some economies of scale, as larger banks tend to charge lower margins. Higher capital adequacy of a bank is associated with lower interest margins. Our finding is rather in line with the hypothesis raised by Brock and Franken (2003), who put forward that less capitalized banks have the motivation to accept more risk (associated with higher spread) in order to receive higher returns.

In terms of future research, we believe that it would be worthwhile to build carefully calibrated structural models that would be useful for financial markets stress testing and, more generally, for policy advice in the authorities such as the central banks dealing with financial stability.

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Appendix

Table 2: Summary statistics[3]

Variable:	*Mean:*	*Std. dev.:*	*Variable:*	*Mean:*	*Std. dev.:*
NIM	0.00506	0.00341	ADMIN	0.00499	0.00349
FEES	0.00204	0.00223	SIZE	3.21615	5.53045
CAD	28.1953	38.3449	HERF	0.14991	0.01397
LOANS	0.71429	0.19216	INFL	2.54533	1.59944
GDP	3.73536	1.63834	---	----	---

[3] These are unweighted statistics, hence e.g. mean CAD high due to some small banks with a secure portfolio and high capital adequacy.

Table 3: Arellano-Bond (1991) dynamic panel GMM estimation of interest margin determinants

	Specification 1:			Specification 2*:			Specification 3:			Specification 4*:			Specification 5:		
Variable:	coeff.	std. err.	p	coeff.	std. err.	p	coeff.	std. err.	p	coeff.	std. err.	p	coeff.	std. err.	p
NIM(-1)	-0.144	0.170	39.7	-0.144	0.170	39.5	-0.145	0.175	40.8	-0.145	0.175	40.6	-0.140	0.167	40.1
FEES	0.142	0.101	16.1	0.137	0.089	12.4	0.121	0.106	25.1	0.116	0.094	21.7			
CAD	-7.0x10^{-6}	5.1x10^{-6}	16.9	-7.0x10^{-6}	5.1x10^{-6}	17.1	-7.3x10^{-6}	5.0x10^{-6}	14.5	-7.3x10^{-6}	5.0x10^{-6}	14.9	-8.6x10^{-6}	5.7x10^{-6}	13.3
LOANS	8.8x10^{-3}	2.4x10^{-3}	0.0	8.9x10^{-3}	2.3x10^{-3}	0.0	9.0x10^{-3}	2.3x10^{-3}	0.0	9.1x10^{-3}	2.3x10^{-3}	0.0	8.8x10^{-3}	2.3x10^{-3}	0.0
ADMIN	0.366	0.096	0.0	0.371	0.096	0.0	0.334	0.111	0.2	0.339	0.111	0.2	0.424	0.088	0.0
SIZE	-1.5x10^{-4}	7.6x10^{-5}	4.5	-1.5x10^{-4}	7.5x10^{-5}	4.6	-1.5x10^{-4}	7.5x10^{-5}	4.3	-1.5x10^{-4}	7.4x10^{-5}	4.5	-1.5x10^{-4}	7.5x10^{-5}	4.4
HERF	dropped due to collinearity			dropped due to collinearity			0.014	0.008	8.5	0.014	0.008	8.5	dropped due to collinearity		
INFL	2.1x10^{-4}	9.5x10^{-5}	3.0	2.1x10^{-4}	9.5x10^{-5}	2.9	9.0x10^{-5}	5.8x10^{-5}	11.8	9.1x10^{-5}	5.8x10^{-5}	11.4	1.9x10^{-4}	1.1x10^{-4}	8.5
GDP	4.9x10^{-5}	1.5 x10^{-4}	74.8	4.8x10^{-5}	1.5 x10^{-4}	75.4	1.2x10^{-4}	9.6x10^{-5}	20.3	1.2x10^{-4}	9.6x10^{-5}	20.4			
time dum.	yes			yes			no			no			yes		
	df	χ^2(df)		df	χ^2(df)		df	χ^2(df)		df	χ^2(df)		df	χ^2(df)	
Wald test	25	7.5x10^{8}	R	25	1.8x10^{9}	R	9	91.44	R	9	83.10	R	24	12504.1	R
Sargan test	1765	0.22	NR	1742	0.22	NR	2063	17.38	NR	2040	17.40	NR	1467	1.20	NR
	z	p		z	p		z	p		z	p		z	p	
AR(1) test	-2.21	2.7	R	-2.21	2.7	R	-2.13	3.3	R	-2.13	3.3	R	-2.23	2.6	R
AR(2) test	0.94	34.6	NR	0.97	33.4	NR	1.05	29.4	NR	1.08	28.0	NR	0.98	32.7	NR

Dependent variable: NIM
One-step results with robust standard errors reported, p = p-value (in %).
time dum. = time dummies, not reported if included; df = degrees of freedom
R = rejected at 5 % significance level; NR = not rejected at 5 % significance level
INFL, GDP and time dummies specified as exogenous; CAD, LOANS, ADMIN, SIZE, HERF as predetermined;
* = FEES specified as endogenous in (2) and (4), while the variable is specified as predetermined in (1) and (3)
AR(j) test = Arellano-Bond test that average autocovariance in residuals of order j equal to zero
Sargan test = test of overidentifying restrictions based on two-step Arellano-Bond (1991) GMM estimates

Table 4: Arellano-Bond (1991) dynamic panel GMM estimation of interest margin determinants

	Specification 1:			Specification 2*:			Specification 3:			Specification 4*:			Specification 5:		
Variable:	coeff.	std. err.	p	coeff.	std. err.	p	coeff.	std. err.	p	coeff.	std. err.	p	coeff.	std. err.	p
NIM(-1)	-0.138	0.170	41.6	-0.137	0.170	42.3	-0.138	0.175	42.9	-0.137	0.175	43.6	-0.135	0.166	41.5
FEES	0.142	0.100	15.3	0.141	0.093	12.9	0.125	0.104	22.9	0.123	0.096	20.0			
CAD(-4)	-9.4×10^{-6}	4.8×10^{-6}	5.1	-9.5×10^{-6}	4.9×10^{-6}	5.3	-8.2×10^{-6}	4.9×10^{-6}	9.6	-8.3×10^{-6}	5.0×10^{-6}	9.9	-1.0×10^{-5}	5.6×10^{-6}	6.4
LOANS	8.9×10^{-3}	2.3×10^{-3}	0.0	8.8×10^{-3}	2.3×10^{-3}	0.0	9.0×10^{-3}	2.3×10^{-3}	0.0	8.9×10^{-3}	2.2×10^{-3}	0.0	8.9×10^{-3}	2.3×10^{-3}	0.0
ADMIN	0.370	0.091	0.0	0.374	0.090	0.0	0.334	0.106	0.2	0.338	0.105	0.1	0.432	0.081	0.0
SIZE	-1.6×10^{-4}	7.4×10^{-5}	3.0	-1.5×10^{-4}	7.3×10^{-5}	3.4	-1.6×10^{-4}	7.3×10^{-5}	3.2	-1.5×10^{-4}	7.2×10^{-5}	3.6	-1.6×10^{-4}	7.4×10^{-5}	3.2
HERF	dropped due to collinearity			dropped due to collinearity			0.013	0.009	14.4	0.013	0.009	14.1	dropped due to collinearity		
INFL	2.1×10^{-4}	9.1×10^{-5}	2.3	2.1×10^{-4}	9.1×10^{-5}	2.3	1.0×10^{-4}	5.8×10^{-5}	7.8	1.0×10^{-4}	5.8×10^{-5}	7.8	2.0×10^{-4}	1.1×10^{-4}	6.0
GDP	2.5×10^{-5}	1.5×10^{-4}	87.0	2.4×10^{-5}	1.5×10^{-4}	87.1	1.1×10^{-4}	9.7×10^{-5}	27.0	1.1×10^{-4}	9.7×10^{-5}	27.0			
time dum.	yes			yes			no			no			yes		
	df	χ^2(df)		df	χ^2(df)		df	χ^2(df)		df	χ^2(df)		df	χ^2(df)	
Wald test	26	5.4×10^{9}	R	26	1.8×10^{10}	R	9	82.53	R	9	78.65	R	24	3857.7	R
Sargan test	1765	0.06	NR	1742	0.06	NR	2063	18.87	NR	2040	19.01	NR	1467	3.82	NR
	z	p		z	p		z	p		z	p		z	p	
AR(1) test	-2.17	3.0	R	-2.17	3.0	R	-2.09	3.6	R	-2.10	3.6	R	-2.19	2.9	R
AR(2) test	1.10	27.0	NR	1.14	25.3	NR	1.24	21.6	NR	1.29	19.9	NR	1.12	26.4	NR

Dependent variable: NIM
Two-step results with robust standard errors reported, p = p-value (in %).
time dum. = time dummies, not reported if included; df = degrees of freedom
R = rejected at 5 % significance level; NR = not rejected at 5 % significance level
INFL, GDP and time dummies specified as exogenous; CAD, LOANS, ADMIN, SIZE, HERF as predetermined;
* = FEES specified as endogenous in (2) and (4), while the variable is specified as predetermined in (1) and (3)
AR(j) test = Arellano-Bond test that average autocovariance in residuals of order j equal to zero
Sargan test = test of overidentifying restrictions based on two-step Arellano-Bond (1991) GMM estimates
Data for CAD available for a longer period than for some other variables, so using CAD(-4) does not decrease the number of observations.

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