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## Essays on foreign ownership in transition banking

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## *Chapter 6*

# Re-examining the Impact of Foreign Bank Participation on Interest Margins

## 6.1 Introduction

In the absence of developed bond and stock markets, banks continue to play a major role as financial intermediaries in former socialist economies (FSEs) (Berglof and Bolton, 2002; Bonin et al., 1998; Bonin and Wachtel, 2003). As a result, the costs of financial intermediation services offered by banks remain crucial for the economic development of FSEs. The observed massive increase of foreign bank participation during the last decade inevitably raises the question to what extent foreign entry has influenced bank interest margins, which is a commonly used measure of financial intermediation costs offered by banks.

There is an established theoretical literature on the determinants of interest margins initiated by the *dealership* model of Ho and Saunders (1981). This model assumes that bank serves as a risk-averse dealer in the deposit and loan markets, bearing the risk of refinancing due to the possible mismatch between the arrival of

deposits and demand for loans. This mismatch is dealt with by the bank through its activities in the money market, which creates a link between the optimal level of the net interest margin set by the bank and the volatility of the money market rate (the market risk). Some simplifying assumptions of the Ho and Saunders (1981) model were later on relaxed by introducing heterogeneous bank products (Allen, 1988), credit risk (Angbazo, 1997), and operating costs (Maudos and Fernandez de Guevara, 2004) as important additional determinants of the bank interest margin. The most recent development of the bank *dealership* model is provided by the model of Maudos and Fernandez de Guevara (2004), in which the set of theoretically motivated determinants of the net interest margin includes market structure, operating costs, managerial risk aversion, credit and market risks, and the size of bank operations.

A notable feature of the *dealership* model is that foreign ownership is not considered to be a determinant of interest margins. This is in sharp contrast to a different stream of theoretical literature, which underscores the problem of asymmetric information between entrant (foreign) and incumbent (domestic) banks that might influence the margin. Foreign banks have better screening technologies to identify good borrowers based on *hard* information, while domestic banks possess superior *soft* information (Dell’Ariccia and Marquez, 2004). Differences in information distribution may result in a *cream-skimming* caused by foreign entry: in equilibrium foreign banks would focus on providing services to less risky and large borrowers, while domestic banks would concentrate their lending to more opaque and small firms (Sengupta, 2007).<sup>1</sup>

Generally speaking, foreign entry can influence banks in host countries through

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<sup>1</sup>Depending on the relative strength of the two opposite effects, the host countries can even experience a decline in total lending following foreign bank entry, which has been empirically documented in some less developed countries (Detragiache et al., 2008).

various direct and indirect channels (Lehner and Schnitzer, 2008). One possible channel is spillover effects from foreign to domestic banks in terms of better screening facilities, technology utilization, and transfer of *know-how*. These indirect benefits from increased foreign bank participation should result in lower average unit costs associated with the financial intermediation process, reflected in lower equilibrium margins. Another possible channel is the increase in competition due to opening up of the banking market for foreign competitors. The mode of foreign entry (acquisition versus greenfield investment) has important implications in this respect. While greenfield investments increase the number of banks in the economy, entry through foreign acquisition only affects ownership distribution of existing banks and does not influence the total number of banks. Therefore, theoretically, the entry via foreign greenfield investments should result in more competition than the entry via foreign acquisition.<sup>2</sup> In addition, the advantage of acquisition over greenfield entry is that the foreign bank acquires information about the quality of incumbent borrowers using the credit information inherited from the target bank. The average quality of incumbent borrowers may influence the lending rate demanded by the acquired banks for extending new loans, giving rise to the *portfolio composition effect* (Claeys and Hainz, 2007).

Surprisingly, this apparent contradiction between the predictions of the *dealership* model and the other stream of theoretical literature has not been examined in previous empirical studies analyzing the impact of foreign bank participation on interest margins. Most of these studies took an *ad hoc* approach by analyzing various determinants that are likely to affect bank interest margins (some of which partially overlap with the theoretically motivated determinants of the *dealership* model). The

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<sup>2</sup> Although in theory the number of banks and market concentration are considered to be important determinants of the level of competition, empirical studies do not find support for this argumentation (Claessens and Laeven, 2004).

impact of foreign ownership is commonly estimated by introducing a dummy variable for foreign-owned banks (direct effect due to the magnitude of margins set by foreign banks) and/or a country-wide measure of foreign bank participation, such as the market share of foreign-owned banks (indirect effect due to spillovers).

Based on this approach, the empirical literature provides mixed evidence on the impact of foreign bank participation on interest margins in emerging economies. Among cross-country studies, Demirguc-Kunt and Huizinga (2000) found that foreign bank participation had a positive effect on interest margins in a worldwide sample of 80 countries during 1988-1995. Schwaiger and Liebeg (2008) came to a similar conclusion using a sample of 11 FSEs during 2000-2005. In contrast, the impact of foreign entry was found to be negative in 5 Latin American countries during 1995-2000 (Martinez Peria and Mody, 2004), in 11 FSEs during 1993-1999 (Drakos, 2003), and in 13 FSEs during 1994-2001 (Claeys and Vander Venet, 2008).<sup>3</sup> The evidence is also mixed in single-country studies: Dabla-Norris and Floerkmeier (2007) did not find any significant association between foreign ownership and interest margins in Armenia, whereas Denizer (2000) and Barajas et al. (2000) found that foreign entry has driven down interest margins in Turkey and Colombia, respectively. All in all, due to the absence of a unified theoretical framework and inconclusive empirical evidence, the overall impact of foreign bank participation on interest margins remains unclear.

The aim of this chapter is to fill this gap in the literature by re-examining the empirical relationship between foreign bank participation and interest margins using a more formal approach. Unlike most of the previous studies, we try to account for theoretically motivated determinants of (the most advanced version of) the *dealer-*

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<sup>3</sup>In Martinez Peria and Mody (2004), the decrease is largely attributed to the participation of greenfield foreign banks, whereas indirect effects due to foreign bank participation were found to play a crucial role in Claeys and Vander Venet (2008).

*ship* model by Maudos and Fernandez de Guevara (2004) and the other stream of literature theorizing on the impact of foreign bank participation on interest margins. Careful analysis of the later literature suggests that most of the channels through which foreign bank participation is expected to influence the margins are already accounted for by the *dealership* model. For instance, Martinez Peria and Mody (2004) argue that one of the channels through which increased foreign bank participation can affect the margins is its impact on the cost of operations. However, the empirical specification inspired by the *dealership* model already includes this variable among interest margin determinants. Similarly, Bonin et al. (2005) and Lehner and Schnitzer (2008) argue that foreign banks are able to charge lower margins due to their superior efficiency. However, cost efficiency is taken into account by the *dealership* model as determinant of the margins, too. Lastly, Claeys and Hainz (2007) hypothesize that the possible negative impact of foreign bank participation may be due to the portfolio effect, since foreign banks tend to be largely involved in financing relatively safer clients. The *dealership* model, however, also considers the riskiness of bank's portfolio as an important factor influencing margins.

As a result, we conclude that there is no particular reason to expect that foreign bank participation affects bank interest margins after the theoretically motivated determinants of the *dealership* model are fully taken into account in the empirical specification. Our empirical analysis supports this conclusion, as we find that after controlling for the theoretically motivated determinants described in the *dealership* model, various indicators of foreign bank participation (such as dummy variables for greenfield and acquired foreign banks, a country-wide measure of foreign bank participation) do not elicit a significant impact on interest margins. Intuitively, this result suggests that both direct and indirect channels, through which the impact of foreign bank participation on margins is expected to materialize (e.g., market

structure), are fully accounted for by the *dealership* model. Our findings call for re-examination of some of the previous studies, in which foreign bank participation was found to have a significant own impact on interest margins.

The remainder of this chapter is structured as follows. Section 6.2 describes the empirical methodology and data. Section 6.3 presents the estimation results and their discussion. The last section concludes.

## 6.2 Methodology and Data

### 6.2.1 Empirical model

We estimate the *dealership* model using a fixed effect estimator to capture unobserved heterogeneity at the individual bank level. The Maudos and Fernandez de Guevara (2004) model is taken as a baseline specification, which we augment by introducing two measures of foreign participation at the individual bank-level (foreign greenfield banks and banks that entered through cross-border acquisitions) and one measure at the country level (market share of foreign banks). We test the robustness of our results regarding the impact of foreign participation by adding several macroeconomic variables.

The general specification takes the following form:

$$\begin{aligned} Margin_{ijt} = & \alpha_i + \sum_{n=1}^N \beta_n Theoretical_{nijt-1} + \sum_{m=1}^M \gamma_m Environmental_{mijt-1} + \quad (6.1) \\ & + \lambda_1 * D^{GF} + \lambda_2 * D^A + \lambda_3 * ForeignShare_{jt} + Macro_{jt} + D^{YEAR} + \varepsilon_{ijt} \end{aligned}$$

where  $i$ ,  $j$ , and  $t$  indices stand for bank, country, and time, respectively, *Margin* is the interest margin, *Theoretical* and *Environmental* are vectors of bank-specific (*pure margin* determinants) and environmental variables as defined in Maudos and Fernandez de Guevara (2004),  $D^{GF}$  is a dummy variable for greenfield foreign banks,  $D^A$  is a dummy variable for acquired foreign banks, *ForeignShare* is a percentage of

banking system assets in the country controlled by the foreign-owned banks, *Macro* is a set of macroeconomic control variables, and  $\varepsilon_{ijt}$  is an i.i.d. random error. The individual bank heterogeneity is captured by the fixed effects intercept term  $\alpha_i$  and the time-specific variation is captured by a vector of time dummies  $D^{YEAR}$ .

Table 6.1 provides a description of all variables and their sources. The net interest margin is measured as the ratio of the net interest income over total earning assets. We use the following *pure margin* determinants in our estimations (see Maudos and Fernandez de Guevara, 2004). *Market structure* is captured by the Herfindahl index measured as the sum of squares of individual bank market shares for each country.<sup>4</sup> *Operating costs* are measured as a ratio of operating expenses to total assets. *Risk aversion* is proxied by the equity-to-total assets ratio, implying higher risk aversion for banks having higher ratios. *Market risk* is captured by the standard deviation of monthly interbank money market rates.<sup>5</sup> *Credit risk* is measured by the ratio of loan loss provisions to net loans.<sup>6</sup> The *interaction of market and credit risk* is controlled for by introducing the interaction term of the above two risk measures into the specification. The *size of operations* is captured by the logarithm of net loans.

Furthermore, we control for environmental factors influencing interest margins using three variables. *Implicit interest payments* are measured by the ratio of operating expenses net of non-interest revenues to total assets. Higher implicit interest payments should be compensated by an increase in interest margins. *Opportunity costs of bank reserves* are measured by the ratio of liquid assets to total assets. More

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<sup>4</sup> Total assets are used as a measure of banking activity.

<sup>5</sup> In the absence of money market rates for some of the FSEs, the government T-Bill rates are used as a measure of market rates.

<sup>6</sup> Due to a large amount of missing data, we cannot proxy credit risk by the ratio of non-performing loans to total assets. Although a second best option, our measure of credit risk is still an improvement compared to the ratio of loans to total assets used by Maudos and Fernandez de Guevara (2004).



liquid banks are expected to have higher margins in order to compensate for opportunity costs of holding extra liquidity. Finally, the *managerial quality* is proxied by the cost-to-income ratio. Banks having a more qualified management are expected to decrease interest margins due to lower cost-to-income ratio.

The model with the aforementioned theoretically-motivated and environmental variables is based on the specification used in Maudos and Fernandez de Guevara (2004), in which there is no role for the impact of the ownership structure on bank interest margins. To test for the impact of foreign bank presence, we augment the model by including proxies for foreign bank participation that are hypothesized to affect the margin through a set of direct and indirect channels. By introducing the  $D^{GF}$  and  $D^A$  dummies it is tested whether the average margins for foreign banks (new and acquired) are significantly different from the average margin of the rest of the banking institutions. By introducing *ForeignShare* variable, we test whether there is a spillover effect arising from the presence of foreign banks in the banking systems of host countries. That is, we test whether the overall level of foreign bank participation in the banking system raises or lowers the margin after controlling for individual bank ownership effects.

Given that the differences in margins across countries may be affected by the macroeconomic environment in which banks operate, we control for the following commonly used variables to check the robustness of our results. *GDPPC* is per capita GDP in US dollars and *GDPGR* is the real GDP growth rate for each of the countries capturing the influence of the level of economic development and economic growth on interest margins, respectively. *Inflation* is the CPI-based inflation rate.<sup>7</sup>

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<sup>7</sup> In a separate set of regressions, we also included institutional characteristics of countries proxied by the arithmetic average of EBRD indices covering small- and large-scale privatization, enterprise reforms, price liberalization, forex and trade liberalization, competition policy, banking and non-banking sector reforms, and reforms in infrastructure as an additional control variable. We obtained insignificant coefficients, probably reflecting that the institutional characteristics of the CEECs in our sample are relatively homogenous.

In order to avoid simultaneity problems, we take lagged values of the theoretically-motivated and environmental variables. A bias due to simultaneity can arise when dependent and independent variables are contemporaneously related due to an accounting identity or via a functional form. Using lagged values of independent variables rules out the possibility of a simultaneous interaction, as the independent variables become predetermined with respect to the dependent variable.<sup>8</sup>

### 6.2.2 Data

We combine information from different data sources for our analysis. The main data source is the BankScope database of Bureau van Dijk, from which we extract information on individual bank balance sheets and profit and loss accounts. Our sample is an unbalanced panel of 2,044 observations for 387 commercial, cooperative, and savings banks from 11 CEECs for the period 1995-2006.<sup>9</sup> Since BankScope provides information only on current ownership of banks, we complement this data set by collecting historical information on foreign ownership from different sources. First, we use information on foreign-owned banks from the extended data set of De Haas and Van Lelyveld (2006) employed in Havrylychuk and Jurzyk (2008). The data set covers the period 1995-2004 and categorizes foreign-owned banks into two groups: green-field establishments and banks taken over as a result of a cross-border acquisition. Next, for the remaining two years, we obtain a list of cross-border bank takeovers from the Securities Data Company (SDC) mergers and acquisitions database produced by Thompson Financial. We identify 8 cross-border bank acquisition events that led to a transfer of bank control from domestic to foreign ownership (at least 50

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<sup>8</sup> We obtain qualitatively similar results with respect to the impact of foreign bank participation on interest margins when the current values of the theoretically-motivated and environmental variables are used in the estimations. Using the lagged variables only influences coefficient estimates of theoretically motivated and environmental variables, while the impact of foreign bank participation remains unaffected.

<sup>9</sup> Our sample comprises Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

percent of capital) during 2005-2006. Finally, the aforementioned bank-level information is complemented by country level information on the share of foreign-owned banks in total banking assets from the EBRD Transition Report (EBRD, 2007). Our macroeconomic variables - per capita GDP, GDP growth rates and consumer prices - are taken from the World Development Indicators database (see Table 6.1).

Table 6.2 shows descriptive statistics of the net interest margin and its determinants for the total sample, as well as for subsamples of domestic and foreign banks. The average margin is about 4.2% but it has a large variation as shown by its wide range. The magnitude of the margin is on average lower for the sample of domestic banks, compared to foreign banks. This indicates that foreign banks are charging a lower margin than domestic banks, suggesting a negative direct effect of foreign bank participation on the margin. However, summary statistics of both theoretically-motivated and environmental determinants of the margin suggest that this variation can be explained by differences in variables influencing the margin. For instance, foreign banks incur lower operating costs than domestic banks and the credit portfolio of foreign banks is characterized by lower risks in comparison to the credit portfolio of domestic banks.

### 6.3 Estimation Results

Table 6.3 presents estimation results for the reference and augmented *dealership* models. All estimations are performed using the fixed effects estimator, which is superior to the random effects estimator according to the Hausman test. We do not present the coefficient estimates for time dummies to save space and keep the discussion focused.

### 6.3.1 The reference model

We start by fitting the model of Maudos and Fernandez de Guevara (2004) as reference specification. In this model, some of the theoretically-motivated variables determining the margin have a significant impact and the expected sign. Interest margins are higher for banks incurring greater operational expenses and more risk, as well as for banks characterized by greater risk aversion. Similar to the finding of Maudos and Fernandez de Guevara (2004) for selected EU countries, we find that interest margins increase with the size of operations, presumably reflecting compensation for a possibility of larger losses per operation due to greater stakes. However, contrary to Maudos and Fernandez de Guevara (2004), we do not find a significant impact for market concentration. This result might imply that in CEECs, the impact of bank-specific characteristics outweighs the importance of the market structure. Although the individual impact of market and credit risks come out insignificant, their interaction term has a negative significant impact on the margin. This suggests that the impact of the credit risk on the margins is amplified by the level of the market risk, and vice versa. The negative sign is in contrast to the theoretical expectation and suggests that CEECs banks are unable to value their risks properly.

For the environmental variables, we find a negative association between implicit interest payments and margins. Banks holding greater liquid reserves compensate their alternative costs by setting higher margins. Likewise, the cost-to-income ratio has a significantly positive impact, reflecting that more cost inefficient banks charge higher margins.

### 6.3.2 The impact of foreign bank participation

In order to evaluate the indirect impact of foreign bank participation on interest margins, in specification (II) we include the market share of foreign banks as additional

explanatory variable.<sup>10</sup> Our estimations do not support the hypothesis that foreign bank participation has significant spill-over effects, when theoretically-motivated and environmental variables are controlled for.

Specification (III) tests for the direct impact of foreign bank participation on interest margins. The dummy variable for foreign-owned banks is not significant, implying no significant own effect above the theoretically-motivated and environmental determinants. Since theoretical models of foreign bank entry underscore the importance of the mode of entry, in specifications (IV) and (V) we split the foreign ownership dummy variable into two components: a dummy variable for greenfield foreign banks and a dummy variable for acquired foreign banks. Our estimations suggest that different modes of entry do not significantly influence interest margins, after controlling for the impact of the theoretically-motivated and environmental determinants. The impact remains insignificant when both dummy variables enter the specification simultaneously (column VI) and together with the measure of indirect impact of foreign bank participation (column VII).

Finally, in specification (VIII) we control for the impact of macroeconomic variables as additional explanatory variables influencing the margin. This does not change our conclusion regarding the insignificant direct and indirect impact of foreign bank participation on the interest margin. We find that the margin is lower in relatively more developed countries (negative and significant coefficient of per capita GDP), while the impact of economic growth is insignificant. The margins increase with the level of inflation, probably reflecting additional price uncertainty risk. It is also important to note that introducing the macroeconomic variables wipes out the impact of the market and credit risks interaction dummy, while the direct impact of the market risk variable becomes significant.

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<sup>10</sup>This variable was also used as a measure of spill-over effects from foreign bank participation to margins in Latin American economies by Martinez Peria and Mody (2004).

### 6.3.3 Economic significance

So far, we have focused on statistical significance only. In this section, we analyze the economic relevance of the determinants of interest margins. Table 6.4 presents the economic impact of interest margin determinants, measured as a response of the interest margin in percentages to a one percentage change in its determinants based on specification (VIII). The results suggest that among the theoretically-motivated determinants, the most substantive impact comes from the size of banking operations (1.25 percentage points) and the size of operating costs (0.25 percentage points). Among the environmental variables, the economic impact of implicit interest payments (0.11 percentage points) and cost inefficiency (0.09 percentage points) are comparable in size. Finally, among the macroeconomic variables, the strongest impact comes from the level of economic development of the country measured by the per capita GDP (-9.6 percentage points).

The analysis of the relative impact of these variables suggests that the insignificant impact of the foreign participation may be explained by the fact that all the channels through which foreign participation may affect margins are already accounted for in the *dealership* model. The insignificant own impact of foreign bank participation calls for reassessment of previous findings on the impact of foreign bank participation on interest margins.

## 6.4 Conclusions

This chapter has re-examined the impact of foreign bank participation on interest margins using the recent sharp increase of foreign bank presence in CEECs as a laboratory experiment. We start by observing that the *dealership* model widely used in empirical work to provide a quantitative assessment of factors driving the margin

does not allow for the impact of foreign bank participation to be explicitly tested. The mechanisms through which foreign bank participation may influence bank behavior and ultimately the margin are analyzed by other models in a framework different from the *dealership* model. However, the majority of these mechanisms, like market concentration, riskiness of bank portfolio, and operational costs, are already taken into account by the margin determinants inspired by the *dealership* model. This raises the question of whether the foreign bank participation has its own direct and/or indirect impact on interest margins.

Previous empirical studies that addressed this question have produced mixed results. Most of the studies report a negative effect, suggesting that foreign participation helps to decrease the margin due to spillover effects and portfolio mix of foreign banks (see, for example, Martinez Peria and Mody, 2004), while others did not find any significant impact, or even reported a positive impact (see, for example, Schwaiger and Liebeg, 2008). The mixed results in these studies can be explained by differences in the coverage of theoretical determinants inspired by the *dealership* model.

Using data on domestic and foreign-owned banks in 11 CEECs, we show that after fully accounting for all interest margin determinants inspired by the *dealership* model, foreign bank participation does not have any significant impact on interest margins in CEECs. The impact remains insignificant when we differentiate between proxies for indirect (foreign bank market share) and direct (dummy variables for greenfield and acquired foreign banks) effects of foreign bank presence. We explain this finding by the fact that the variables inspired by the *dealership* model already account for the main mechanisms through which the impact of foreign bank participation on the margins may be materialized. Our results call for a reassessment of results reported in some of the previous studies, which suggest a direct impact of foreign bank participation.

Table 6.1. Variable definition and sources

Variable	Measure	Source
Net interest margin	Ratio of total interest revenues net of total interest expenses to total assets	BankScope
Market concentration	Herfindahl index (total assets)	BankScope
Operating costs	Ratio of total operating expenses to total assets	BankScope
Risk aversion	Ratio of total equity to total assets	BankScope
Market risk	Standard deviation of monthly money market rates	International Financial Statistics (IMF)
Credit risk	Ratio of loan loss provisions to total loans	BankScope
Size of operations	Logarithm of total loans	BankScope
Implicit interest payments	Ratio of operating expenses net of non-interest revenues to total assets	BankScope
Opportunity costs of bank reserves	Ratio of liquid reserves to total assets	BankScope
Cost inefficiency	Ratio of total costs to total income	BankScope
Market share of foreign banks	Ratio of total assets controlled by foreign-owned banks to total banking system assets	EBRD Transition Report
Foreign bank dummy	Dummy variable that takes value of 1 for foreign banks (both greenfield and acquired)	De Haas and Van Lelyveld (2006), Havrylychuk and Jurzuk (2008)
Foreign greenfield bank dummy	Dummy variable that takes value of 1 for greenfield establishments of foreign banks	De Haas and Van Lelyveld (2006), Havrylychuk and Jurzuk (2008)
Foreign acquired bank dummy	Dummy variable that takes value of 1 for domestic banks acquired by a foreign bank	De Haas and Van Lelyveld (2006), Havrylychuk and Jurzuk (2008) and Thomson's SDC Platinum Database
Economic development	Logarithm of GDP per capita (US dollars)	World Development Indicators (World Bank)
Economic growth	Real GDP growth rate	World Development Indicators (World Bank)
Inflation	Percentage change in consumer price index	World Development Indicators (World Bank)



Table 6.2. Descriptive statistics

	Mean	Median	Standard deviation	Maximum	Minimum
<i>Domestic banks</i>					
Net interest margin	0.045	0.040	0.024	0.002	0.196
Market concentration	0.158	0.129	0.070	0.084	0.473
Operating costs	0.062	0.054	0.034	0.007	0.272
Risk aversion	0.133	0.111	0.088	0.012	0.658
Market risk	0.024	0.013	0.038	0.001	0.296
Credit risk	0.036	0.019	0.052	0.000	0.574
Size of operations	11.739	11.653	1.639	7.436	15.565
Implicit interest payments	-0.014	-0.013	0.026	-0.125	0.123
Opportunity costs of bank re-serves	0.052	0.034	0.050	0.000	0.280
Cost inefficiency	0.851	0.804	0.372	0.160	3.999
<i>Foreign banks</i>					
Net interest margin	0.037	0.031	0.026	0.003	0.185
Market concentration	0.146	0.123	0.069	0.084	0.473
Operating costs	0.048	0.039	0.031	0.010	0.237
Risk aversion	0.123	0.101	0.082	0.021	0.612
Market risk	0.016	0.009	0.028	0.001	0.296
Credit risk	0.018	0.010	0.030	0.000	0.278
Size of operations	12.439	12.500	1.557	7.787	15.560
Implicit interest payments	-0.011	-0.012	0.020	-0.112	0.100
Opportunity costs of bank re-serves	0.040	0.025	0.045	0.000	0.264
Cost inefficiency	0.823	0.773	0.297	0.156	2.954
<i>Total sample</i>					
Net interest margin	0.042	0.036	0.025	0.002	0.196
Market concentration	0.154	0.128	0.070	0.084	0.473
Operating costs	0.057	0.049	0.034	0.007	0.272
Risk aversion	0.130	0.106	0.086	0.012	0.658
Market risk	0.021	0.011	0.035	0.001	0.296
Credit risk	0.030	0.015	0.046	0.000	0.574
Size of operations	11.987	11.968	1.644	7.436	15.565
Implicit interest payments	-0.013	-0.012	0.024	-0.125	0.123
Opportunity costs of bank re-serves	0.048	0.031	0.049	0.000	0.280
Cost inefficiency	0.841	0.793	0.347	0.156	3.999

Notes: all variables are measured in thousands of US dollars and deflated by the consumer price index, using 1995 as a reference year. Each variable is winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles, to confront the influence of outliers and reporting mistakes.

Table 6.3. Estimation results: Does foreign bank participation affect interest margins?

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>Theoretically-motivated determinants</i>								
Market concentration	-0.0142**	-0.0132**	-0.0143**	-0.0142**	-0.0144**	-0.0144**	-0.0134**	-0.0097*
Operating costs	0.3582***	0.3578***	0.3577***	0.3582***	0.3573***	0.3573***	0.3571***	0.3397***
Risk aversion	0.0465***	0.0466***	0.0463***	0.0465***	0.0463***	0.0463***	0.0464***	0.0426***
Market risk	0.0223	0.0217	0.0222	0.0223	0.0221	0.0221	0.0215	0.0271*
Credit risk	0.0130	0.0132	0.0133	0.0130	0.0136	0.0136	0.0138	0.0036
Interaction term (Market risk*Credit risk)	-0.2868**	-0.2888**	-0.2882**	-0.2868**	-0.2888**	-0.2888**	-0.2905**	0.0681
Size of operations	0.0024***	0.0024***	0.0024***	0.0024***	0.0024***	0.0024***	0.0024***	0.0034***
<i>Environmental factors</i>								
Implicit interest payments	-0.4910***	-0.4904***	-0.4920***	-0.4910***	-0.4924***	-0.4924***	-0.4918***	-0.4720***
Liquidity	0.0109	0.0101	0.0111	0.0109	0.0112	0.0112	0.0104	0.0121
Cost inefficiency	0.0037**	0.0037**	0.0038**	0.0037**	0.0038**	0.0038**	0.0037**	0.0034**
<i>Foreign ownership in banking</i>								
Market share of foreign banks		0.0025					0.0024	-0.0025
Foreign bank dummy			0.0010					
Foreign greenfield bank dummy				0.0000		0.0000	0.0000	0.0000
Foreign acquired bank dummy					0.0013	0.0013	0.0011	0.0015
<i>Macroeconomic variables</i>								
GDP per capita (US dollars)								-0.0456***
Real GDP growth rate								-0.0001
Inflation (consumer prices)								-0.0000***
Intercept	-0.0152*	-0.0289**	-0.0273**	-0.0152*	-0.0156**	-0.0156**	-0.0296**	0.3550***
<i>Statistics</i>								
Number of observations	2,039	2,039	2,039	2,039	2,039	2,039	2,039	2,039
Log-likelihood	6381.0	6382.0	6381.3	6381.0	6381.6	6381.6	6382.5	6439.7
R <sup>2</sup>	0.5764	0.5760	0.5751	0.5764	0.5743	0.5743	0.5741	0.3607

Notes: the dependent variable is the net interest margin. Estimations are performed using the fixed-effects OLS estimator. Each specification also contains a set of dummy variables to control for time fixed effects (not shown in the table to conserve the space). \*, \*\*, and \*\*\* denote significance at the 10 percent, 5 percent, and 1 percent level, respectively.

Table 6.4. Economic significance of interest margin determinants

	<b>Coefficient</b>	<b>P-value</b>
Market concentration	0.0309	0.1800
Operating costs	0.2537	0.0000
Risk aversion	0.0751	0.0030
Market risk	-0.0351	0.0020
Credit risk	-0.0032	0.6740
Interaction term (Market risk*Credit risk)	-0.0042	0.1220
Size of operations	1.2490	0.0000
Implicit interest payments	0.1061	0.0000
Liquidity	0.0176	0.1740
Cost inefficiency	0.0931	0.0140
Market share of foreign banks	-0.0001	0.9990
Foreign greenfield bank dummy	0.0000	0.9190
Foreign acquired bank dummy	0.0090	0.2260
GDP per capita (US dollars)	-9.5853	0.0000
Real GDP growth rate	0.0049	0.8480
Inflation (consumer prices)	0.1090	0.0000

Notes: reported are economic significance results from specification (VII) in Table 6.3. The coefficients reflect percentage point changes in the interest margin in response to a 1 percent change in corresponding determinants.