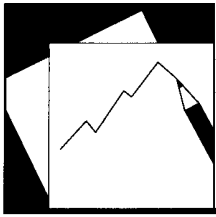


# Working Paper

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## Financial Intermediation Costs in Low-Income Countries: The Role of Regulatory, Institutional, and Macroeconomic Factors

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## IMF Working Paper

Fiscal Affairs Department and Strategy, Policy, and Review Department

### **Financial Intermediation Costs in Low-Income Countries: The Role of Regulatory, Institutional, and Macroeconomic Factors**

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#### Abstract

We analyze factors driving persistently higher financial intermediation costs in low-income countries (LICs) relative to emerging market (EMs) country comparators. Using the net interest margin as a proxy for financial intermediation costs at the bank level, we find that within LICs a substantial part of the variation in interest margins can be explained by bank-specific factors: margins tend to increase with higher riskiness of credit portfolio, lower bank capitalization, and smaller bank size. Overall, we find that concentrated market structures and lack of competition in LICs banking systems and institutional weaknesses constitute the key impediments preventing financial intermediation costs from declining. Our results provide strong evidence that policies aimed at fostering banking competition and strengthening institutional frameworks can reduce intermediation costs in LICs.

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## I. INTRODUCTION

The net interest margin, measured as a difference between lending and deposit rates, is a commonly accepted measure of how costly bank intermediation services are for a society. Research shows that the cost of financial intermediation has important repercussions for economic performance (Jayaratne and Strahan, 1996; Rajan and Zingales, 1998; Beck, et al., 2000). The importance of the bank interest margin as a measure of financial intermediation costs is particularly pertinent for low-income countries (LICs), where in the absence of developed stock markets firms largely depend on bank financing as a source of external funding.

High financial intermediation costs may constitute an important impediment for financial deepening in LICs. The persistence of high margins might be symptomatic of a number of systemic problems, such as: lack of competition, perceived market and credit risks, bank unsoundness, scale diseconomies constrained by small markets, high operating costs due to low efficiency, unfavorable institutional environment, and existence of various regulatory constraints distorting financial market activity.

The main objective of this paper is to examine the influence of market concentration, bank regulations, institutional development, and macroeconomic environment on bank margins across a broad cross-section of LICs and emerging economies (Ems), while controlling for bank-specific factors. We use bank-level data on 359 commercial banks in 48 LICs, and 2535 commercial banks in 67 EMs for the period 1996-2010. For both groups of countries, the sample includes great diversity in terms of financial intermediation costs, bank characteristics, as well as regulation, institutional, and macroeconomic environments. The comparison of results across the two groups of countries helps identify key environmental factors that put upward pressure on financial intermediation costs. Based on the results of the analysis, we provide policy recommendations for reducing financial intermediation costs in LICs and contributing to further financial deepening.

Estimation results suggest that concentrated market structures and lack of competition in LICs' banking systems remain key impediments preventing financial intermediation costs from declining. In this respect, relaxing restrictions to bank entry could help in reducing the cost of financial intermediation in LICs. Low institutional capacity also plays a prominent role in boosting margins. Within LICs, bank-specific characteristics explain a substantial part of variation in interest margins. Specifically, margins tend to increase with higher riskiness of credit portfolio, lower bank capitalization, and smaller bank size.

The rest of the paper is structured as follows. Section II decomposes the interest margin in LICs' banks into its cost and profit components. Section III introduces an econometric specification based on a behavioral model of profit optimizing bank, and evaluates the importance of bank-specific and country-specific determinants of the margin (macroeconomic, institutional, and regulatory environment). Section IV presents robustness check results. The last section concludes.

## II. INTEREST MARGIN DECOMPOSITION

### A. Conceptual Framework

We decompose the interest margin based on the methodology proposed in Randall (1998). The income statement of banks defines profit as interest income (II), plus non-interest income (NII), minus interest expense (IP), minus operating costs (OC), and minus provision for loan losses (Prov). After rearranging this identity, the net interest revenue can be expressed as:

$$II-IP=OC+Prov+P-NII$$

Dividing this expression by the interest bearing liabilities (D), and using average interest bearing assets (L) and total assets (A), we obtain the following expression:

$$\frac{II}{L} \frac{L}{D} - \frac{IP}{D} = \frac{OC}{D} + \frac{Pr ov}{D} + \frac{P}{A} \frac{A}{D} - \frac{NII}{D}$$

Assuming that banks invest one minus reserve requirement ratio ( $\rho$ ) part of their interest bearing liabilities into interest bearing assets, and defining the interest margin as the difference between implicit deposit rate ( $II/L$ ) and implicit deposit rate ( $IP/D$ ), the above expression can be written as:

$$i_L - i_D = \rho * i_L + \frac{OC}{D} + \frac{Pr ov}{D} + ROA * \frac{A}{D} - \frac{NII}{D} + \varepsilon \quad (1)$$

where  $ROA = P/A$  denotes bank profitability, and the error term  $\varepsilon$  results from combining flow (income statement) and stock (balance sheet) data, as well as making the simplifying assumption about the reserve requirement holdings by banks. The above expression decomposes the margin into the following cost and profit components:

- *Reserve requirement costs:*  $\rho * i_L$ . High reserve requirements impose additional costs on banks, since they have to pay a market interest rate to depositors but have to hold a fraction of these deposits in the central bank either at zero rate (non-remunerated reserves) or at a rate lower than the market rate (remunerated reserves). Banks normally prefer to pass these additional costs on to their customers by widening the margin.
- *Operational costs:*  $OC/D$ . This determinant measures the impact of bank efficiency on the margin. More efficient banks are able to maintain lower operational costs relative to their less efficient counterparts. Therefore, they can operate at lower margins and still secure the same level of profitability as their less efficient peers.

- *Loan loss provision costs: Prov/D*. This determinant proxies the impact of credit risk on the margin. Banks with riskier lending portfolio are required to transfer a larger amount of funds to maintain adequate loan loss provision reserves, which weighs on the margin.
- *Profitability: ROA\*A/D*. This factor defines part of the margin that banks add up to their costs to maintain an adequate level of profitability. In banking industries featuring low degree of competition, banks have the power to demand profitability rates that exceed the normal level by widening the margin.
- *Non-interest income: NII/D (with negative sign)*. Banks earning funds from non-traditional banking activities (such as, fee-based activities, licensing, insurance, etc.) may maintain an adequate level of profitability while operating at lower margins. This explains why this factor enters the above decomposition with a negative sign.

## B. Decomposition Results

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 359 commercial banks in 48 LICs and 2535 commercial banks in 67 EMs for the period 1996-2010. When selecting the sample of banks, we excluded countries with less than 10 observations. We also cleaned up the data from entries with obvious errors and extreme observations (e.g., negative incomes, equity exceeding assets, etc.).

We start by analyzing median implicit interest margins ( $i_L - i_D$ ) across different countries and regions. Using medians, rather than means, makes comparison across countries robust to outliers and extreme observations.

Figure 1 reports the percentile distribution of interest margins in EMs and LICs. The figure shows that at 11 percent, the median spread in LICs is about 100 basis points higher compared to the median spread for EMs. The Mann-Whitney test statistic of -6.36 suggests that the difference in medians is significant at the 1 percent confidence level. Moreover, both the 25<sup>th</sup> and 75<sup>th</sup> percentiles of the interest margin distribution in LICs exceed those for EMs by approximately same amount, implying that the entire distribution of spreads in LICs is shifted upwards relative to the one for EMs. Overall, these statistics suggest that financial intermediation costs in LICs as a whole exceed those in EMs, potentially creating impediments for the expansion of financial deepening in LICs.

To explore key determinants driving higher intermediation costs in LICs, in Figure 2 we report the percentile distribution of selected interest margin determinants from the decomposition (1). Eyeballing the charts suggests that the key factor driving high interest margins in LICs compared to EMs is relatively higher profitability, which could be driven by

differences in the degree of competition in banking systems. Another factor is the relatively higher share of loan loss reserves, which indicates that LICs banks operate in an environment characterized by higher credit risk. Interestingly, median operating costs in LICs are slightly lower compared to the ones in EMs. This finding could indicate that the median bank in LICs is no less efficient than its EMs comparator. However, this result can also indicate that LICs banks possess higher market power and are able to reduce operating costs (e.g., employee salaries) to secure higher profits. Similarly, LICs banks earn slightly higher non-interest revenues. According to specification (1), this should not exert an upward pressure on the margins.

Figure 3 reports country-specific median spreads in EMs and LICs. In EMs, the median spread ranges from about 5 percent in Tunisia to 30 percent in Paraguay, while in LICs the spread ranges from about 5 percent in Bangladesh to more than 35 percent in Yemen. The wide variation of spreads across countries confirms our prior that country-specific factors, such as banking regulation, and institutional and macroeconomic environment, may have an important bearing on financial intermediation costs in addition to bank-specific factors. We analyze the impact of country-specific factors in the next section.

### **III. ECONOMETRIC ANALYSIS OF BANK- AND COUNTRY-SPECIFIC DETERMINANTS OF INTEREST MARGINS**

Although the accounting framework developed in the previous section allows us to analyze the determinants of the margin by decomposing them into cost and profit components, it is not based on the behavioral model of a profit maximizing bank. Consequently, it does not explicitly incorporate the role of competitiveness and other country-specific variables and cannot provide an answer on how the spread would respond to changes of determinants at the margin. Therefore, we complement our analysis using econometric methods.

#### **A. Model Specification**

Empirical analysis of interest margin determinants is frequently performed within the theoretical framework of the dealership model introduced by Ho and Saunders (1981), and extended by Allen (1988), Angbazo (1997), and Maudos and Fernandez de Guevara (2004). The main assumption behind this model is that the bank serves as a risk-averse dealer in the deposit and loan markets, bearing the risk of refinancing due to possible mismatches between the arrival of deposits and demand for loans. The most recent framework for the bank dealership model is provided by 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 risk, liquidity, and the size of bank



operations. Barajas et al. (2000) and Beck and Hesse (2009) are examples of single-country empirical studies employing this approach for Colombia and Uganda, respectively.

The dealership model, however, cannot be directly applied to study interest margin determinants in a cross-country setting, since it does not account for differences in the macroeconomic, institutional, and regulatory environment in which banks operate. Therefore, cross-country studies of the determinants of interest margins typically augment the theoretically motivated bank-specific determinants by relevant country-specific variables (see fore.g., Brock and Rojas-Suarez, 2000; Claessens et al., 2001; and Demirguc-Kunt et al., 2004). More recently, the augmented dealership model was used to examine interest margin determinants in Central and Eastern European (Poghosyan, 2010), and Russian (Fungacova and Poghosyan, 2011) banking industries.

The empirical specification of the augmented dealership model takes the following form:

$$\text{Margin}_{ijt} = \alpha_i + \sum_{n=1}^N \beta_n B_{nijt-1} + \sum_{m=1}^M \gamma_m M_{mijt} + \sum_{k=1}^K \lambda_k I_{kijt} + \sum_{l=1}^L \eta_l R_{lijt} + TE_t + \varepsilon_{ijt} \quad (2)$$

where  $i, j$  and  $t$  indices stand for bank, country and time, respectively, *Margin* is the interest margin,  $B$  is a vector of bank-specific (theoretically-motivated) determinants, while  $M$ ,  $I$ , and  $R$  are vectors of macroeconomic, institutional, and regulatory determinants, respectively, and  $\varepsilon_{ijt}$  is an i.i.d. random error. 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  $TE$ . All bank-specific explanatory variables are taken with a lag to alleviate simultaneity problems.

## B. Variables

### Dependent variable

*Net interest margin* is calculated as the ratio of total interest revenues and interest bearing assets net of the ratio of total interest expenditures and interest bearing liabilities. It measures the gap between implicit earnings of the bank from interest bearing activities and the implicit costs incurred for attracting interest bearing funds. Thus, the net interest margin represents the charge required by the bank for providing financial intermediation services. As such, a larger charge may discourage bank clients from using their services, resulting in lower financial deepening.

### Bank-specific determinants (B)

A number of bank-specific variables are considered in the literature.

- *Market concentration* is captured by the Herfindahl index, measured as the sum of squares of individual bank market shares for each country. Total assets are used as a measure of banking activity. The theoretical literature does not provide an unequivocal answer on the relationship between market concentration and the interest margin. On the one hand, high concentration may increase the market power of banks, allowing them to require higher margins for their intermediation services. On the other hand, high concentration may stem from the survival of most efficient banks that incur lower intermediation costs and can charge lower margins (efficient-structure hypothesis).
- *Operating costs* are measured as the ratio of operating expenses to total assets. Less efficient banks, incurring larger operating costs, are expected to pass them on to their customers through higher margins. Some studies use this indicator as a dependent variable to analyze determinants of efficiency of financial intermediation services (see, e.g., Demirguc-Kunt et al., 2004).
- *Risk aversion* is proxied by the equity-to-total assets ratio, with a higher ratio implying higher risk aversion for banks. The relationship between this variable and the margin is ambiguous. On the one hand, well-capitalized banks may be perceived as relatively safe by depositors, which would reduce their funding costs and boost margins. On the other hand, higher risk aversion may stimulate banks to allocate their funds to less-risky activities with low return, resulting in lower margins.
- *Credit risk* is measured by the ratio of loan loss provisions to net loans.<sup>2</sup> The greater the credit risk associated with financial intermediation, the larger the margin required by the bank to participate in the project.
- *Liquidity* is measured by the ratio of liquid assets to total assets. More liquid banks are expected to have higher margins in order to compensate for the opportunity costs of holding extra liquidity.
- *Size of operations* is captured by the logarithm of total assets. In the presence of positive scale effects, larger banks are expected to operate at lower margins.

### **Macroeconomic determinants (M)**

- *Economic activity* is measured by the rate of real GDP growth. Margins are expected to decline in times of higher economic growth, as banks have more investment

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<sup>2</sup> Due to the 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 the credit risk is still an improvement compared to the ratio of loans to total assets used by Maudos and Fernandez de Guevara (2004).

opportunities during the economic boom, and are expected to increase their deposit rates to attract more funds necessary to finance new projects.

- *Inflation* is captured by the percentage change of the CPI index. Higher inflation introduces economic uncertainty and is expected to widen margins.

### **Institutional determinants (I)**

Various proxies of institutional development are considered:

- *KKZ index* is an aggregate index of the level of institutional development compiled by Kaufmann et al. (2002). It is a composite of country scores in the areas of voice and accountability, political stability, government effectiveness, regulatory burden, rule of law, and freedom from graft. A higher index value indicates better institutional quality and is expected to be associated with lower margins.
- *Rule of law* is an index capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, compiled by Kaufmann et al. (2002). The index covers areas of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. A higher index value indicates better rules of law and is expected to be associated with lower margin.
- *Control of corruption* is an index capturing the extent to which public power is exercised for private gain, compiled by Kaufmann et al. (2002). The index covers areas of petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. A higher index value indicates better governance environment and is expected to be associated with lower margin.
- *Regulatory quality* is an index capturing perceptions of the ability of the government to formulate and implement sound public policies and regulations, compiled by Kaufmann et al. (2002). The index covers general aspects of government regulation in all areas of economy (not only banking) that permit and promote private sector development. A higher index value indicates better rules of law and is expected to be associated with lower margin.

### **Regulatory determinants (R)**

Three variables are considered as proxies of regulatory quality in an economy:

- *Fraction of entry denied* is calculated as the fraction of bank entry applications denied. This data is extracted from three waves of surveys on banking regulation conducted by the World Bank in 1999, 2003, and 2008, documented in Barth et al.

(2001, 2004). On average, the share of denied entries is larger in LICs (71 percent) compared to EMs (39 percent), which is an indication of lower competition in LICs banking systems.<sup>3</sup>

- *Activity restrictions* proxy the degree to which banks face regulatory restrictions on activities in securities markets, insurance, real estate, and owning shares in non-financial firms. The source of the data is Barth et al. (2001, 2004). The index is calculated as the average scale of restrictions across four types of activities, where unrestricted activities are scaled 1, restricted activities are scaled 2, and prohibition of activities is scaled 3. Higher values of this average indicator (ranging from 1 to 2.5) indicate greater restrictions. Activity restrictions may have an important impact on bank efficiency by limiting scope economies. As a result, we expect to obtain a positive association between this indicator and interest margins.
- *Reserve requirements* is a dummy variable taking value one if there are reserve requirements in the country, and zero otherwise. About 57 percent of LICs have reserve requirements, compared to 82 percent in EMs. Since reserve requirements are typically not remunerated or are remunerated at below market rates, these regulations impose a tax on a bank. To the extent that banks pass on this tax to their customers, the presence of high reserve requirements would boost margins.

Table 1 provides description of all variables and their sources.

### C. Descriptive Statistics

Table 2 provides descriptive statistics of interest margins and their determinants for LICs and EMs. The descriptive statistics once again indicate interest margins are larger in the median LIC compared to the median EM. It is also evident that LICs feature more concentrated banking industries (median Herfindahl index is 21.4 in LICs compared to 13.7 in EMs), lower capitalization (10.2 against 12.2 in EMs), smaller banks, higher credit risk (1.1 against 1.0 in EMs), higher opportunity costs (liquidity ratio is 27.7 against 25.4 in EMs). All these factors may put upward pressure on financial intermediation costs in LICs.

Table 3 shows the correlation matrix of dependent and explanatory variables in LICs and EMs. In both cases, the bilateral correlation between different variables is reasonably small suggesting that the explanatory power of individual determinants of the margin can be distinguished when explaining the total variation of the latter.

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<sup>3</sup> However, a problem with this variable is that many countries report absence of applications, which by itself may indicate the presence of entry barriers. Following Demirguc-Kunt et al. (2004), we replace missing observations with 1 in those countries that received zero applications and we obtain similar results.

## D. Results

### Bank-specific determinants

Table 4 presents the regression results using only bank-specific determinants and market concentration for LICs and EMs banks. The number of observations, number of banks, and Rsq for each regression are presented at the bottom of the table. For all regressions, we present both *coefficient estimates* and their *economic magnitudes* measured as the response of the margin to a one standard deviation increase in the explanatory variable.

We first consider the *bank-specific determinants*. With a very few exceptions, the signs and significance of coefficient estimates are remarkably similar across LICs and EMs, but the economic magnitudes differ. Estimation results suggest that *larger banks* tend to have lower margins. This finding is consistent with theories emphasizing the importance of scale effects for financial intermediation costs. The economic magnitude of this variable is the largest among bank-specific determinants, suggesting that a standard deviation increase in log of total assets in LICs (1.4) and EMs (2.2) reduces the margin by 1.9 and 5.0 percentage points, respectively.<sup>4</sup> Consistent with the opportunity costs hypothesis, a higher fraction of *liquid assets* boosts bank margins, as banks compensate extra costs associated with holding liquid funds by charging higher margins. *More risk averse/better capitalized* banks require lower margin. This can be explained by the reluctance of risk-averse banks to get involved in more profitable but riskier lending activities. As expected, higher *credit risk* is associated with larger margins, as banks require higher profits to compensate for risk. Finally, less efficient banks exhibiting larger *operating costs* charge higher margins.

Next, we turn to *market concentration*. As shown in columns (1) and (2) in Table 4, market concentration enters positively and significantly in both LIC and EM specifications. However, when time fixed effects are included in columns (3) and (4) to control for global effects influencing margins in all banks, the impact of market concentration becomes insignificant in EMs, while the impact remains significant in LICs. This finding implies that low degree of market competition, as evidenced by descriptive statistics, has a particularly pronounced positive effect on the cost of financial intermediation in LICs. The economic magnitude of this variable is also sizeable, suggesting that a standard deviation increase in market concentration in LICs (23.6) raises the margin by 1.6 percentage point.

### Macroeconomic determinants

Table 5 evaluates the impact of the macroeconomic environment. Columns (1)-(3) report results for LICs, while columns (4)-(6) for EMs. Two results stand out. First, macroeconomic variables have no significant impact on interest margins in LICs, neither individually nor

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<sup>4</sup> The impact is somewhat lower when time fixed effects are included in the specification.

jointly. This is in stark contrast with EMs, where higher inflation has a significant and positive impact on margins, while higher output growth tends to reduce margins. With all bank-specific determinants remaining significant in both groups of countries, this result suggests that risks associated with macroeconomic fluctuations in LICs are already factored in bank-specific determinants of the margin. On the other hand, macroeconomic fluctuations create additional uncertainty in EMs and influence the margins beyond bank-specific factors. The economic magnitude of macroeconomic determinants in EMs is sizeable, suggesting that a standard deviation increase in output growth (4.8) reduces the margin by 1.9 percentage points, while a standard deviation increase in inflation (16.8) raises the margin by 2.5 percentage points.

Second, the positive impact of market concentration remains significant in LICs, while the impact turns insignificant in EMs. The economic magnitude of the impact also remains sizeable (1.8). This finding confirms the previous result on the more pronounced impact of market concentration on interest margins in LICs. It appears that macroeconomic fluctuations are more a dominant factor affecting interest margins than market concentration, as in the presence of macroeconomic controls market concentration has no additional explanatory power.

### **Institutional determinants**

Table 6 evaluates the impact of the institutional environment, when controlling for bank-specific determinants and market concentration. The reported results document a strong association between institutional characteristics and interest margins. Countries with an institutional environment more conducive to business activity tend to have lower margins. All four proxies for institutional quality—the composite *KKZ index*, *rule of law*, *control of corruption*, and *regulatory quality*—have a negative and significant impact on margins in both LICs and EMs.

Interestingly, the impact of market concentration turns insignificant when any of the institutional variables is included in the specification. Unlike in the case of the inclusion of macroeconomic controls, this time market concentration loses its significance in both LICs and EMs samples. This result suggests that poor market institutions—which proxy for the deficiencies in informational, contractual, and enforcement frameworks—lower market competition. Broad national approaches to competition and property rights are key in explaining the efficiency and cost of financial intermediation. Once we account for these broad national institutions, market competition itself has no additional explanatory power.

It is also remarkable that the economic impact of the institutional characteristics dominates that of other determinants. The economic magnitude is particularly pronounced in the case of the composite *KKZ index*: a standard deviation increase in the *KKZ index* reduces the margin by 4.1 and 6.9 percentage points in LICs and EMs, respectively. For example, if the

composite KKZ index in Ghana (0.06) would have increased to reach the level of KKZ in South Africa (0.41), the margins in Ghana would be pushed down by 3.3 percentage points. In addition, inclusion of the institutional characteristics diminishes the impact of some bank-specific controls. This is particularly true for operational costs (bank efficiency) and bank size (scale effects) variables, with both becoming insignificant in the LICs and EMs samples. Once again, this result confirms the importance of the institutional setting for explaining economic efficiency throughout the economy (including banking industry). Once institutional characteristics are controlled for, bank-specific measures of efficiency and scale economies are no longer important in explaining the margins, as envisaged by the theoretical models (e.g., the dealership model).

### **Regulatory determinants**

In Table 7, we report results assessing the impact of the regulatory environment, controlling for bank-specific determinants and market concentration. First, we find a strong positive association between *fraction of bank entries denied* and the margin in both LICs and EMs. A standard deviation increase in this variable results in a 1.6 and 1.9 percentage points increase in LICs and EMs margins, respectively. This finding confirms our prior that restricting bank entry protects incumbent banks and allows them to enjoy larger margins.

Second, restrictions on *non-traditional banking activities*, such as securities underwriting, insurance, real estate, and ownership in non-financial firms, do not have a significant impact on bank interest margins in LICs. This result could be driven by the embryonic state of the stock market and other segments of the non-bank financial sector in LICs, which makes the impact of these restrictions negligible. In the same vein, the interest margin in LICs does not seem to be affected by the presence of *reserve requirements*.

Both results are in sharp contrast with the EMs specification, where restrictions on non-bank financial activities and the presence of reserve requirements have a significant positive impact on margins. The economic magnitude of these determinants (1.7 and 0.9 percentage points, respectively) is also sizeable. The relatively more developed non-bank financial sector in EMs and relatively more competitive environment increase the importance of these types of regulatory restrictions for margins.

Finally, similar to the specification with macro variables, introduction of regulatory determinants washes away the significance of market concentration in EMs specifications, while concentration remains a significant factor in all LICs specifications. This finding confirms our previous result on the dominant importance of market structure for interest margins in LICs. For EMs, the insignificant effect of market concentration after controlling for the regulatory environment might indicate that market concentration is largely affected by

regulatory constraints, which play broader role in affecting the margin. Once these national regulations are accounted for, market concentration does not have any additional explanatory power.

#### IV. ROBUSTNESS CHECKS

We conducted a number of robustness checks. The purpose of this exercise is to further explore whether the positive relationship between market concentration and interest margins in LICs holds when using different definitions of market concentration and breakdowns of the sample.

First, we replace concentration index by the market share of bank assets. Unlike concentration, market share is a bank specific variable that measures the relative size of each bank in the country. Similarly to market concentration, a higher share would allow a bank to exercise market power and secure higher margins. The results (reported in Table 8) confirm the previous findings, with market share entering the specification with a highly significant positive coefficient. Replacing market concentration with bank-specific market shares does not affect the main results for other country-specific variables: macro variables remain insignificant, while all institutional indices and one regulatory variable (fraction of entries denied) remain positive and highly significant. It is also noteworthy that, unlike the results reported in Table 6, the significance of market share does not vanish in the specification with institutional variables, once again signifying the importance of bank market power for margins.

Second, we used total loans and customer deposits for calculating market concentration, instead of total assets. These alternative proxies for market concentration are particularly relevant for LICs, where banks tend to not fully engage in financial intermediation activities, and the relationship between total assets and loans and deposits is muted. For instance, some LICs banks heavily engage in financing of government debt, which constitutes substantial share of bank assets. As a result, an increase in bank assets would not necessarily lead to an expansion in lending. Similarly, some banks heavily rely on government deposits as a source of funding, which distorts the relationship between total liabilities and customer deposits. Tables 9 and 10 report results from specifications with total loans and customer deposits based measures of market concentration, respectively. The estimations suggest that the coefficient remains positive and significant for these alternative measures of market concentration. These results confirm our main finding that interest margins tend to be larger in countries with more concentrated banking industries, regardless of whether the concentration is measured on the assets or liabilities side.

Third, we explore regional dimension of the impact of market concentration. For this purpose, we add interaction terms of market concentration with four regional dummies for Asia, Commonwealth of Independent States (CIS), Middle-East and North Africa (MENA),



and Sub-Saharan Africa (leaving Latin America and the Caribbean as a comparator). The results (reported in Table 11) suggest that relative to the Western Hemisphere region, the impact of market concentration on margins is significantly larger in CIS region. In some specification, we find a lightly lower impact for Asia (columns 8, 11, and 12) and MENA (columns 2, 10, 11, 12) regions, but significance of these coefficients is only marginal (10 percent confidence level). The interaction terms of Africa are insignificant, suggesting that the impact is comparable to that in the Western Hemisphere region.

Finally, Table 12 presents results from cross-country comparisons by averaging bank-level data in each country for each year. The dependent variable is the average net interest margin in each country for each year. These regressions eliminate bank-specific heterogeneity. We use country fixed effects to control for country-specific unobserved heterogeneity. Overall, the country-level regressions confirm our main result on the positive impact of market concentration. Some of the environmental variables, such as inflation and reserve requirement ratio, however come out significant and with unexpected signs, while the impact of other environmental variables remains unchanged.

## V. CONCLUSIONS

This paper examined the determinants of interest margin in LICs and EMs, given the importance of high financial intermediation costs as an impediment for financial deepening in LICs. The paper adopts two complementary approaches to explore interest margin determinants: (i) an accounting framework for decomposing the interest margin into its cost and profit components; and (ii) econometric specification based on the behavioral (dealership) model of profit maximizing banks.

The analysis provides evidence on the significantly higher interest margins in LICs compared to EMs. Decomposition of the margins into their cost and profit components indicates that higher median margin in LICs is mainly explained by greater profitability of banks (which may be due to less competitive environment) and higher credit risk (which may reflect a weaker environment).

The econometric analysis further highlights differences between LICs and EMs banks. Compared to EMs, margins in LICs banks appear to be more responsive to the market structure, suggesting that promoting banking competition can be an important tool to reduce interest margins in LICs. Furthermore, the positive impact of market structure on LICs margins is robust to different measures of market concentration. On the other hand, margins in LICs banks are less responsive to the macroeconomic and regulatory environment compared to their EMs peers. In both groups of countries, the institutional setting appears to have a dominant impact on margins, overshadowing that of market concentration and many bank-specific controls. Finally, bank characteristics explain a substantial part of within-country variation in interest margins once country-specific determinants are accounted for.

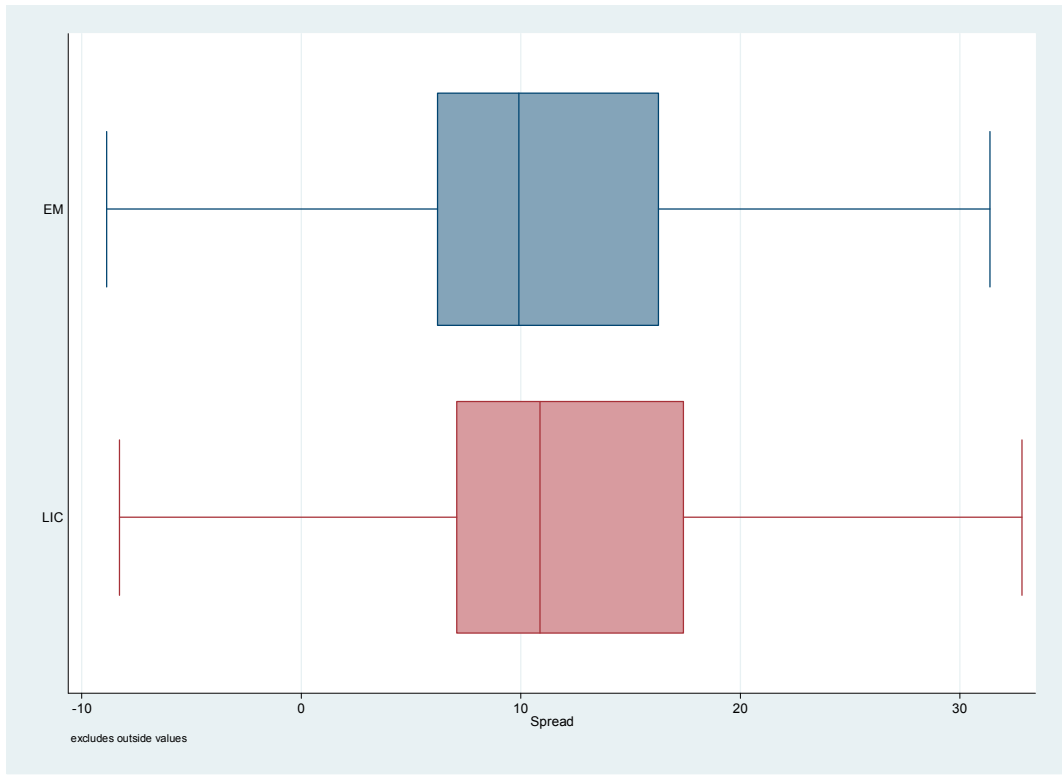
Specifically, margins in both LICs and EMs increase with higher riskiness of credit portfolio, lower bank capitalization, and smaller bank size.

Taken together, these findings provide strong evidence that there is large scope to reduce interest margins in LICs through policies aimed at fostering banking competition. On the regulatory side, relaxing restrictions to bank entry could help in lowering intermediation costs. More important, improvements in the informational, contractual and enforcement frameworks could play a key role in lowering interest margins in LICs.

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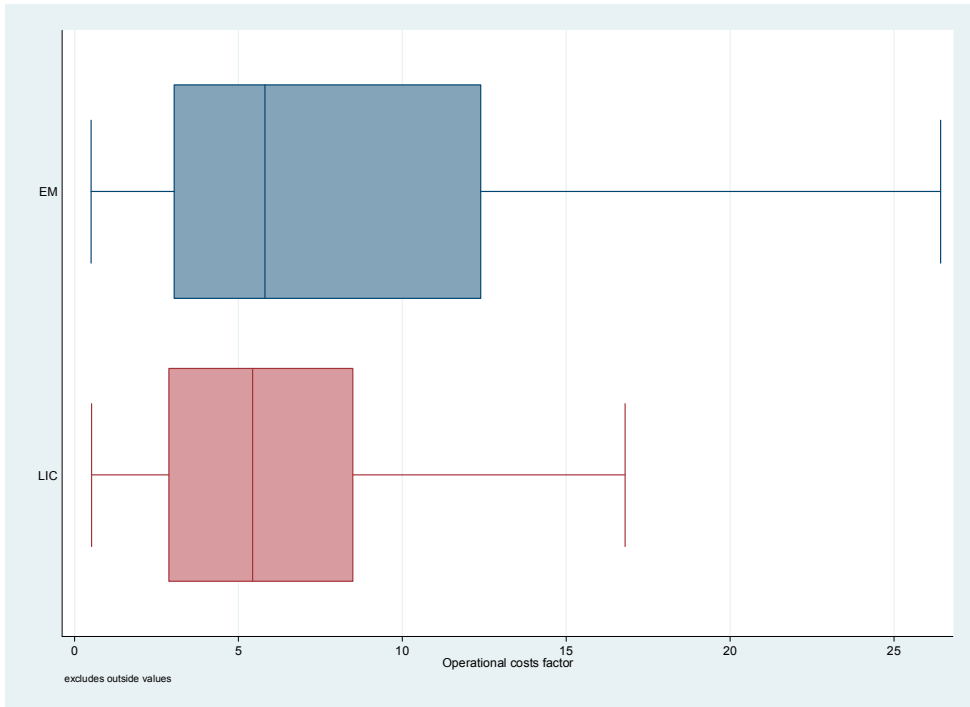
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**Figure 1. Comparison of Implicit Net Interest Margins in LICs and EMs**

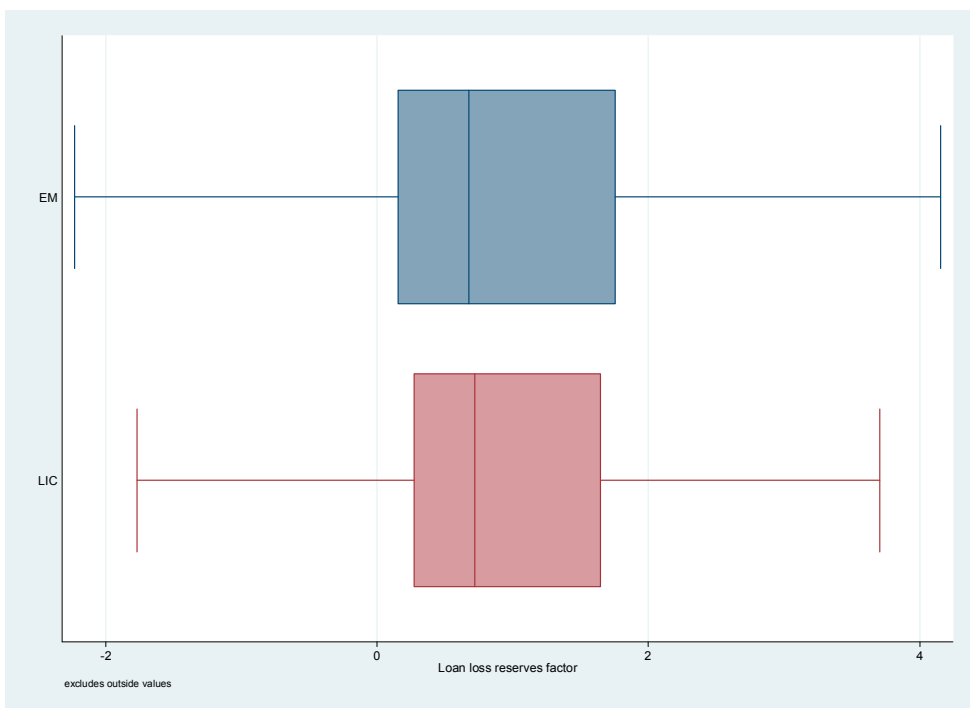
Note: The whiskers of the plot indicate the minimum and maximum values of interest margins for each country group. The edges of the box denote 25<sup>th</sup> and 75<sup>th</sup> percentiles of the distribution, while the line splitting the box denotes the median.

**Figure 2. Percentile Distribution of Net Interest Margin Determinants in LICs and EMs**

**Operational costs**

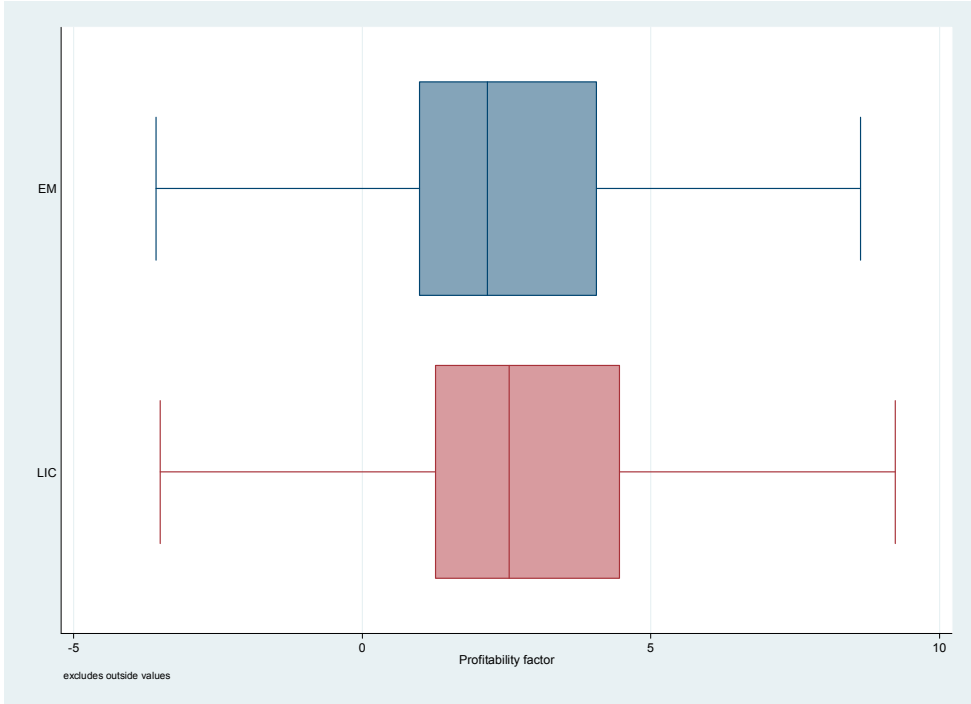


**Loan loss provisions**

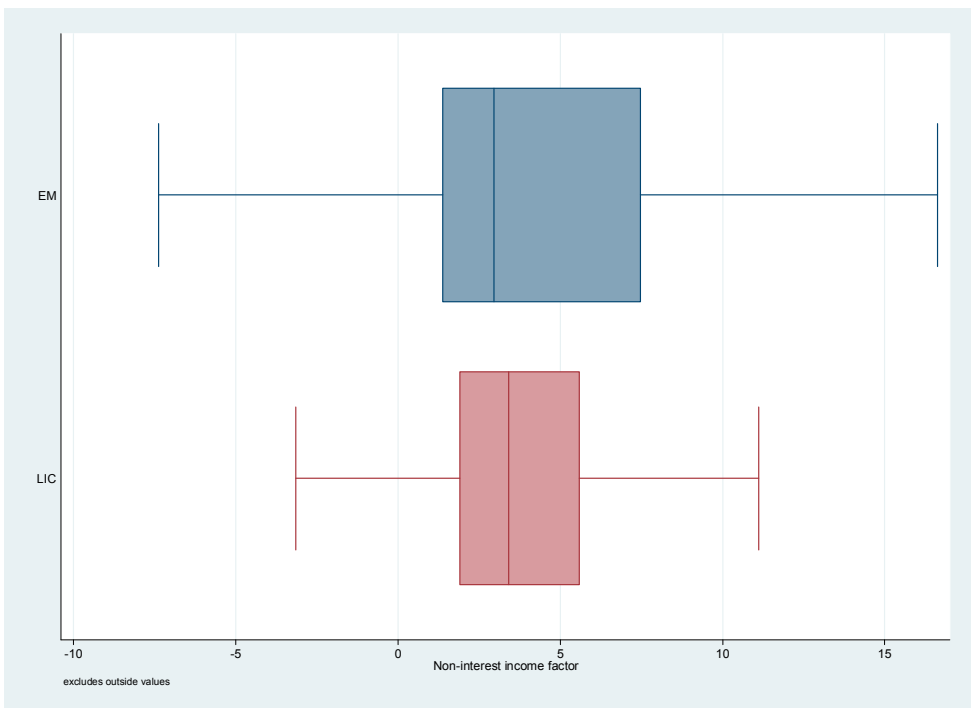


**Figure 2. Percentile Distribution of Net Interest Margin Determinants in LICs and Ems (concl'd)**

**Profitability**

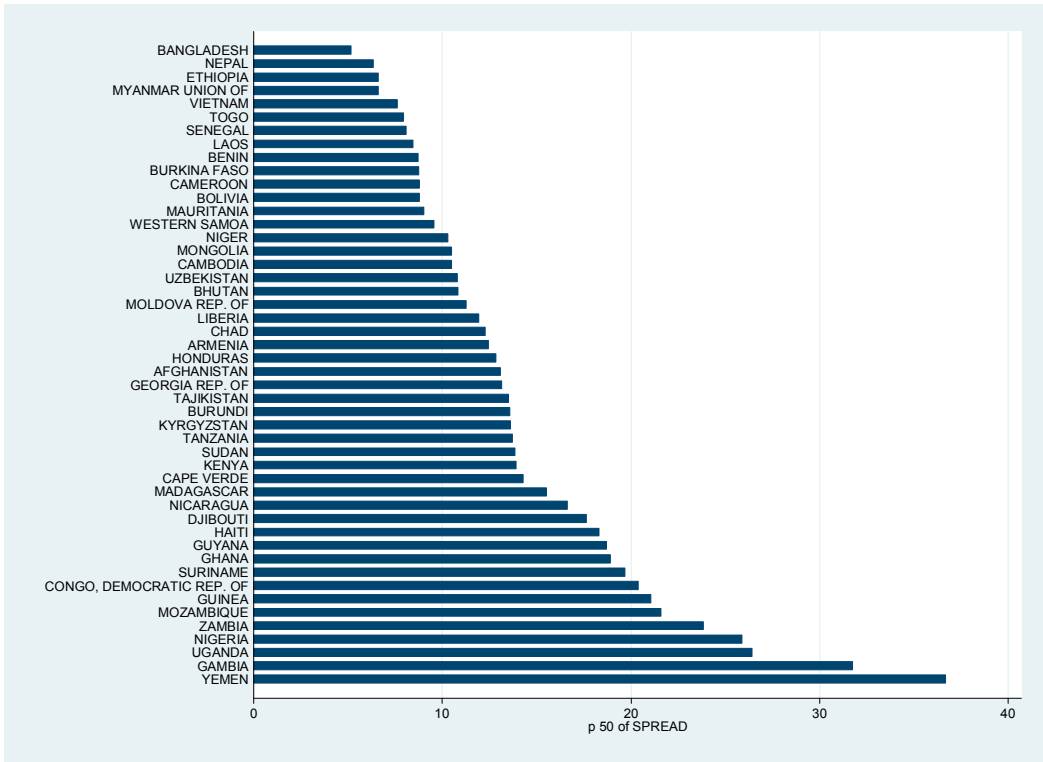


**Non-interest income**

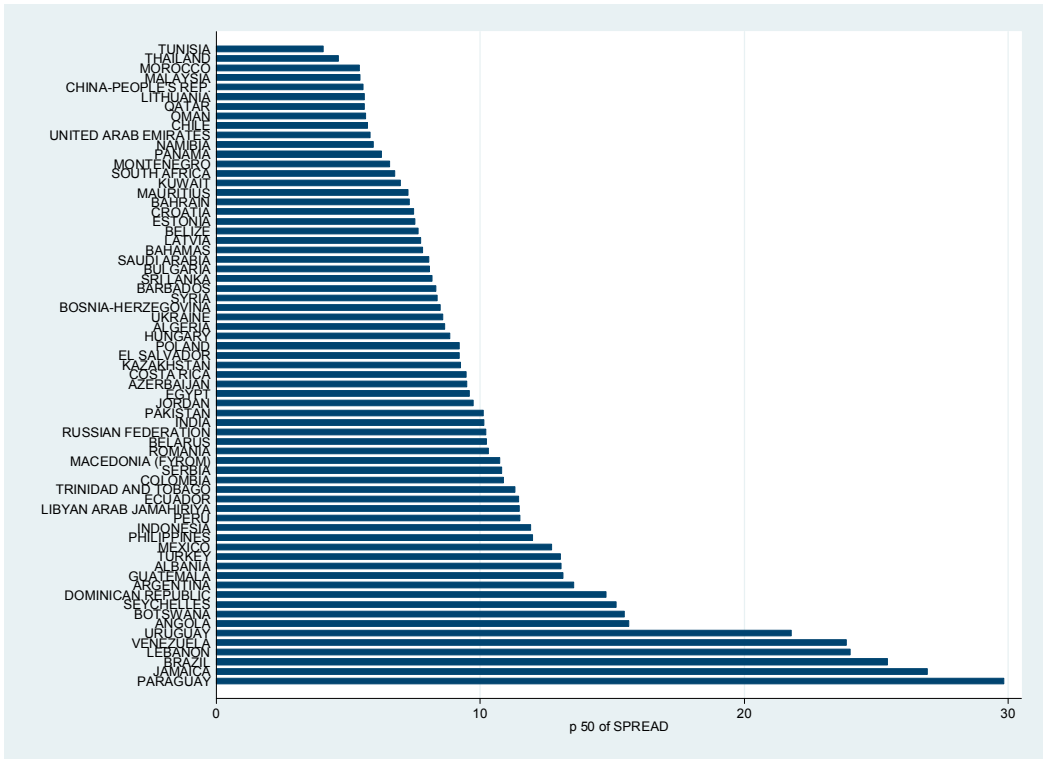


**Figure 3. Median Interest Margins in LICs and EMs by Countries**

**LICs**



**EMs**





**Table 1. Variable Definition and Sources**

Variables	Definition	Source
Net interest margin	Difference between the ratio of total interest revenues and interest bearing assets, and the ratio of total interest expenditures and interest bearing liabilities	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
Credit risk	Ratio of loan loss provisions to total loans	BankScope
Liquidity	Ratio of liquid reserves to total assets	BankScope
Size of operations	Logarithm of total loans	BankScope
Real GDP growth	Real GDP growth rate	IMF, WEO
Inflation	Percentage change in consumer price index	IMF, WEO
KKZ index	Composite of country scores in the areas of voice and accountability, political stability, government effectiveness, regulatory burden, rule of law, and freedom from graft.	Kaufmann et al. (2002)
Rule of law	Index covers areas of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Kaufmann et al. (2002)
Control of corruption	Index covers areas of petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Kaufmann et al. (2002)
Regulatory quality	Index covers general aspects of government regulation in all areas of economy (not only banking) that permit and promote private sector development.	Kaufmann et al. (2002)
Fraction of entries denied	Fraction of bank entry applications denied.	Barth et al. (2001, 2004)
Activity restrictions	Composite of restrictions across four types of activities: securities markets, insurance, real estate, and shares in non-financial firms.	Barth et al. (2001, 2004)
Reserve requirements	Dummy taking the value of 1 if a country has reserve requirements.	Barth et al. (2001, 2004)

**Table 2. Descriptive Statistics**

Variables	LICs			EMs		
	Mean	Median	St. dev.	Mean	Median	St. dev.
Net interest margin	14.7	10.9	14.6	15.4	9.9	21.1
Market concentration	30.9	21.0	24.0	17.1	13.3	13.5
Operating costs	5.0	4.3	5.3	9.0	4.3	18.8
Risk aversion	15.0	10.2	63.9	16.8	12.2	30.2
Credit risk	2.2	1.1	5.3	2.2	1.0	8.7
Liquidity	33.2	27.7	27.8	30.9	25.4	42.4
Size of operations	12.3	12.2	1.5	13.0	13.0	2.3
Real GDP growth	5.3	5.6	3.5	4.8	5.1	4.8
Inflation	9.3	7.1	21.0	7.8	5.5	16.8
KKZ index	-0.7	-0.6	0.4	-0.3	-0.4	0.5
Rule of law	-0.7	-0.8	0.4	-0.4	-0.6	0.6
Control of corruption	-0.7	-0.8	0.4	-0.4	-0.5	0.6
Regulatory quality	-0.6	-0.5	0.5	-0.1	-0.3	0.5
Fraction of entries denied	71.3	100.0	41.5	39.2	21.1	37.7
Activity restrictions	1.3	1.3	0.4	1.3	1.0	0.3
Reserve requirements	0.6	1.0	0.5	0.8	1.0	0.4

**Table 3. Correlations Matrix**

LIcs	Net interest margin	Market concentration	Operating costs	Risk aversion	Credit risk	Opportunity costs of bank reserves	Size of operations	Real GDP growth	Inflation	KKZ index	Rule of law	Control of corruption	Regulatory quality	Fraction of entries denied	Activity restrictions	Reserve requirements
Net interest margin	1.00															
Market concentration	0.15	1.00														
Operating costs	0.14	0.15	1.00													
Risk aversion	0.01	0.07	0.87	1.00												
Credit risk	0.21	0.10	0.12	-0.01	1.00											
Opportunity costs of bank res	0.21	0.22	0.71	0.73	0.00	1.00										
Size of operations	-0.13	-0.21	-0.29	-0.21	-0.10	-0.22	1.00									
Real GDP growth	0.10	-0.16	0.10	0.09	-0.09	0.17	0.11	1.00								
Inflation	0.04	0.06	0.04	-0.02	0.01	0.02	0.03	-0.14	1.00							
KKZ index	-0.06	-0.13	-0.04	0.04	-0.14	-0.08	-0.02	0.02	-0.19	1.00						
Rule of law	-0.10	-0.05	-0.08	0.03	-0.18	-0.06	0.02	0.01	-0.17	0.91	1.00					
Control of corruption	-0.09	-0.07	-0.03	0.02	-0.08	-0.08	-0.09	-0.09	-0.14	0.82	0.80	1.00				
Regulatory quality	-0.03	-0.17	0.01	0.07	-0.07	-0.05	-0.06	0.05	-0.23	0.85	0.75	0.64	1.00			
Fraction of entries denied	-0.15	0.10	-0.15	-0.07	0.00	0.01	0.13	0.02	0.04	-0.31	-0.19	-0.25	-0.23	1.00		
Activity restrictions	0.16	-0.01	0.05	0.00	0.01	-0.05	0.02	0.03	-0.03	0.09	-0.02	0.01	0.03	-0.43	1.00	
Reserve requirements	0.17	-0.12	0.14	0.05	-0.01	0.01	-0.02	0.09	-0.04	0.23	0.05	0.12	0.18	-0.78	0.53	1.00

EMs	Net interest margin	Market concentration	Operating costs	Risk aversion	Credit risk	Opportunity costs of bank reserves	Size of operations	Real GDP growth	Inflation	KKZ index	Rule of law	Control of corruption	Regulatory quality	Fraction of entries denied	Activity restrictions	Reserve requirements
Net interest margin	1.00															
Market concentration	-0.01	1.00														
Operating costs	0.19	-0.04	1.00													
Risk aversion	0.11	0.03	0.16	1.00												
Credit risk	0.17	0.00	0.09	0.10	1.00											
Opportunity costs of bank res	0.30	0.11	0.07	0.22	0.01	1.00										
Size of operations	-0.18	-0.14	-0.23	-0.51	-0.10	-0.19	1.00									
Real GDP growth	-0.18	0.01	-0.09	-0.03	-0.14	0.02	0.06	1.00								
Inflation	0.12	0.03	0.06	0.05	0.21	0.08	-0.12	-0.11	1.00							
KKZ index	0.00	0.15	-0.07	-0.01	-0.08	-0.03	0.13	-0.06	-0.25	1.00						
Rule of law	-0.09	0.16	-0.15	-0.11	-0.10	-0.06	0.27	0.01	-0.26	0.88	1.00					
Control of corruption	0.02	0.18	-0.08	0.00	-0.05	0.00	0.18	-0.04	-0.21	0.92	0.84	1.00				
Regulatory quality	-0.03	0.22	-0.10	-0.06	-0.09	-0.04	0.19	-0.05	-0.31	0.86	0.78	0.78	1.00			
Fraction of entries denied	-0.10	0.03	-0.02	-0.02	0.01	-0.02	0.04	0.07	0.15	-0.23	-0.07	-0.17	-0.27	1.00		
Activity restrictions	0.03	-0.03	0.00	0.01	0.02	-0.04	0.07	-0.09	0.05	0.03	0.06	0.08	-0.09	-0.25	1.00	
Reserve requirements	0.08	-0.11	0.00	0.00	0.00	-0.04	0.07	-0.04	-0.16	0.19	0.12	0.14	0.16	-0.67	0.33	1.00

**Table 4. Estimation Results Controlling for Bank-Specific Determinants**

	LICs	EMs	LICs	EMs	Economic Magnitude			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Market concentration	0.0698*** [0.017]	0.0852*** [0.020]	0.0626*** [0.018]	0.0240 [0.022]	1.6	1.2	1.5	0.3
Operating costs	0.1400 [0.095]	0.1206*** [0.020]	0.2536** [0.098]	0.1303*** [0.020]	0.8	1.6	1.4	1.7
Risk aversion	-0.0253*** [0.007]	-0.0656*** [0.010]	-0.0355*** [0.008]	-0.0663*** [0.010]	-1.5	-2.1	-2.1	-2.1
Credit risk	0.3091*** [0.034]	0.1276*** [0.018]	0.2864*** [0.034]	0.1166*** [0.018]	1.7	1.0	1.5	0.9
Liquidity	0.0480*** [0.013]	0.0264*** [0.007]	0.0649*** [0.013]	0.0322*** [0.007]	1.2	1.2	1.7	1.5
Size	-1.3495*** [0.291]	-2.2041*** [0.216]	-0.7934* [0.419]	-0.8595*** [0.299]	-1.9	-5.0	-1.1	-1.9
Constant	25.8169*** [4.006]	41.3708*** [3.050]	17.6929*** [5.752]	26.0285*** [3.964]				
Observations	2,187	11,446	2,187	11,446				
R-squared	0.105	0.036	0.125	0.059				
Number of banks	341	2,069	341	2,069				
Time FE	NO	NO	YES	YES				

Notes: Dependent variable is the net interest margin. All explanatory variables are taken with a lag. Estimations are performed using the fixed effects estimator. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively. Economic magnitude indicates response of the interest margin to one standard deviation change in explanatory variables.

**Table 5. Estimation Results Controlling for Macroeconomic Variables**

	LICs			EMs			Economic magnitude					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Market concentration	0.0755*** [0.019]	0.0768*** [0.019]	0.0769*** [0.019]	0.0033 [0.024]	-0.0206 [0.024]	-0.0258 [0.024]	1.8	1.8	1.8	0.0	-0.3	-0.4
Operating costs	0.2588** [0.102]	0.2633** [0.102]	0.2650*** [0.103]	0.1436*** [0.022]	0.1170*** [0.022]	0.1141*** [0.022]	1.4	1.4	1.5	1.9	1.5	1.5
Risk aversion	-0.0354*** [0.008]	-0.0357*** [0.008]	-0.0358*** [0.008]	-0.0933*** [0.019]	-0.0800*** [0.019]	-0.0879*** [0.019]	-2.1	-2.1	-2.1	-3.0	-2.6	-2.8
Credit risk	0.2908*** [0.035]	0.2899*** [0.035]	0.2897*** [0.035]	0.1184*** [0.020]	0.1044*** [0.020]	0.1017*** [0.020]	1.6	1.6	1.6	1.0	0.8	0.8
Liquidity	0.0631*** [0.014]	0.0627*** [0.014]	0.0626*** [0.014]	0.0664*** [0.009]	0.0576*** [0.009]	0.0634*** [0.009]	1.6	1.6	1.6	3.0	2.6	2.9
Size	-0.7869* [0.434]	-0.7993* [0.432]	-0.7898* [0.434]	-1.8814*** [0.370]	-1.0482*** [0.364]	-1.6534*** [0.369]	-1.1	-1.1	-1.1	-4.2	-2.4	-3.7
GDP growth	0.0144 [0.060]		0.0123 [0.060]	-0.4806*** [0.046]		-0.3890*** [0.046]	0.1		0.0	-2.3		-1.9
Inflation		-0.0066 [0.013]	-0.0064 [0.013]		0.1630*** [0.012]	0.1465*** [0.012]		-0.1	-0.1		2.7	2.5
Constant	17.4252*** [6.008]	17.6852*** [5.929]	17.4859*** [6.010]	42.7036*** [5.231]	28.0001*** [5.111]	38.2950*** [5.226]						
Observations	2,050	2,050	2,050	9,054	9,040	9,039						
R-squared	0.129	0.129	0.129	0.081	0.090	0.098						
Number of banks	317	317	317	1,230	1,230	1,230						

Notes: Dependent variable is the net interest margin. All explanatory variables (except macro) are taken with a lag. All specifications include bank and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively. Economic magnitude indicates response of the interest margin to one standard deviation change in explanatory variables.

**Table 6. Estimation Results Controlling for Institutional Variables**

	LICs			EMs				Economic magnitude								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Market concentration	0.0295 [0.022]	0.0328 [0.020]	0.0329* [0.020]	0.0275 [0.020]	-0.0368 [0.032]	-0.0117 [0.030]	-0.0082 [0.030]	0.0013 [0.030]	0.7	0.8	0.8	0.6	-0.5	-0.2	-0.1	0.0
Operating costs	-0.0595 [0.118]	-0.0104 [0.104]	-0.0266 [0.104]	-0.0003 [0.104]	0.0536** [0.023]	0.0569*** [0.021]	0.0529** [0.021]	0.0573*** [0.021]	-0.3	-0.1	-0.1	0.0	0.7	0.7	0.7	0.7
Risk aversion	-0.0111 [0.009]	-0.0154** [0.008]	-0.0149* [0.008]	-0.0154** [0.008]	-0.0498*** [0.011]	-0.0443*** [0.010]	-0.0437*** [0.010]	-0.0447*** [0.010]	-0.7	-0.9	-0.9	-0.9	-1.6	-1.4	-1.4	-1.4
Credit risk	0.3152*** [0.036]	0.3143*** [0.034]	0.3111*** [0.034]	0.3179*** [0.034]	0.0571** [0.022]	0.0611*** [0.020]	0.0630*** [0.020]	0.0633*** [0.020]	1.7	1.7	1.7	1.7	0.5	0.5	0.5	0.5
Liquidity	0.0609*** [0.016]	0.0636*** [0.014]	0.0663*** [0.014]	0.0635*** [0.014]	0.0290*** [0.008]	0.0264*** [0.007]	0.0265*** [0.007]	0.0264*** [0.007]	1.6	1.6	1.7	1.6	1.3	1.2	1.2	1.2
Size	-0.2295 [0.563]	-0.1388 [0.492]	-0.3474 [0.475]	0.1344 [0.495]	0.1286 [0.430]	0.1137 [0.365]	-0.1540 [0.357]	-0.1428 [0.365]	-0.3	-0.2	-0.5	0.2	0.3	0.3	-0.3	-0.3
KKZ index	-9.5314*** [1.701]				-13.6484*** [1.772]				-4.1				-6.9			
Rule of law		-3.0738*** [1.162]				-6.7963*** [1.254]				-1.4				-4.0		
Control of corruption			-4.1745*** [1.062]				-9.2760*** [1.187]				-1.8				-5.5	
Regulatory quality				-3.9389*** [0.941]				-1.8713** [0.929]				-1.8				-1.0
Constant	6.0794 [7.863]	9.4817 [6.222]	10.9154* [5.899]	6.6895 [6.147]	15.4242*** [5.661]	9.1520* [5.170]	10.6589** [5.032]	14.4938*** [5.100]								
Observations	1,397	1,684	1,684	1,684	7,403	9,019	9,019	9,019								
R-squared	0.157	0.135	0.140	0.141	0.062	0.053	0.057	0.050								
Number of banks	308	335	335	335	1,873	1,945	1,945	1,945								

Notes: Dependent variable is the net interest margin. All explanatory variables (except institutional) are taken with a lag. All specifications include bank and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively. Economic magnitude indicates response of the interest margin to one standard deviation change in explanatory variables.

**Table 7. Estimation Results Controlling for Regulatory Variables**

	LICs			EMs			Economic magnitude					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Market concentration	0.0804*** [0.024]	0.0629*** [0.018]	0.0629*** [0.018]	0.0108 [0.028]	0.0352 [0.022]	0.0279 [0.022]	1.9	1.5	1.5	0.1	0.5	0.4
Operating costs	0.2247 [0.138]	0.2579*** [0.099]	0.2526** [0.098]	0.0995*** [0.022]	0.1225*** [0.020]	0.1302*** [0.020]	1.2	1.4	1.4	1.3	1.6	1.7
Risk aversion	-0.0366*** [0.011]	-0.0354*** [0.008]	-0.0354*** [0.008]	-0.0701*** [0.011]	-0.0668*** [0.010]	-0.0669*** [0.010]	-2.2	-2.1	-2.1	-2.3	-2.2	-2.2
Credit risk	0.3284*** [0.044]	0.2851*** [0.034]	0.2854*** [0.034]	0.0523*** [0.020]	0.1346*** [0.021]	0.1182*** [0.018]	1.8	1.5	1.5	0.4	1.1	0.9
Liquidity	0.0834*** [0.021]	0.0632*** [0.014]	0.0649*** [0.013]	0.0396*** [0.008]	0.0346*** [0.007]	0.0328*** [0.007]	2.1	1.6	1.7	1.8	1.6	1.5
Size	-0.2319 [0.608]	-0.8006* [0.426]	-0.7904* [0.419]	-0.5175 [0.366]	-0.4495 [0.302]	-0.8546*** [0.298]	-0.3	-1.1	-1.1	-1.2	-1.0	-1.9
Fraction of entries denied	0.0381*** [0.010]			0.0503*** [0.008]			1.6			1.9		
Activity restrictions		1.1978 [0.753]			4.9698*** [0.665]			0.5			1.7	
Reserve requirements			-0.3869 [0.661]			2.4427*** [0.593]			-0.2			0.9
Constant	6.1788 [8.412]	16.2053*** [5.955]	17.9296*** [5.768]	22.9781*** [4.767]	13.3962*** [4.190]	24.4972*** [3.978]						
Observations	1,366	2,155	2,187	8,079	11,097	11,446						
R-squared	0.142	0.129	0.125	0.055	0.063	0.061						
Number of banks	278	341	341	1,760	2,055	2,069						

Notes: Dependent variable is the net interest margin. All explanatory variables (except regulatory) are taken with a lag. All specifications include bank and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively. Economic magnitude indicates response of the interest margin to one standard deviation change in explanatory variables.

**Table 8. Robustness Check for LICs: Using Market Share Instead of Market Concentration for LICs**

	Bank-Specific		Macro			Institutions			Regulation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market share	0.1172*** [0.018]	0.1120*** [0.018]	0.1404*** [0.020]	0.1401*** [0.020]	0.1404*** [0.020]	0.0992*** [0.025]	0.0938*** [0.022]	0.0968*** [0.022]	0.0866*** [0.022]	0.1568*** [0.026]	0.1089*** [0.018]	0.1121*** [0.018]
Operating costs	0.1351 [0.094]	0.2400** [0.098]	0.2345** [0.101]	0.2373** [0.102]	0.2348** [0.102]	-0.0601 [0.117]	-0.011 [0.103]	-0.027 [0.103]	-0.0022 [0.103]	0.1971 [0.136]	0.2454** [0.099]	0.2391** [0.098]
Risk aversion	-0.0248*** [0.007]	-0.0337*** [0.008]	-0.0328*** [0.008]	-0.0330*** [0.008]	-0.0328*** [0.008]	-0.011 [0.009]	-0.0151* [0.008]	-0.0147* [0.008]	-0.0152** [0.008]	-0.0323*** [0.011]	-0.0338*** [0.008]	-0.0337*** [0.008]
Credit risk	0.3115*** [0.034]	0.2893*** [0.034]	0.2952*** [0.035]	0.2948*** [0.035]	0.2951*** [0.035]	0.3151*** [0.036]	0.3145*** [0.034]	0.3116*** [0.033]	0.3176*** [0.033]	0.3404*** [0.043]	0.2884*** [0.034]	0.2884*** [0.034]
Liquidity	0.0506*** [0.013]	0.0631*** [0.013]	0.0611*** [0.014]	0.0609*** [0.014]	0.0611*** [0.014]	0.0600*** [0.016]	0.0623*** [0.014]	0.0651*** [0.014]	0.0622*** [0.014]	0.0749*** [0.020]	0.0619*** [0.014]	0.0631*** [0.013]
Size	-1.6759*** [0.262]	-1.1589*** [0.416]	-1.2491*** [0.432]	-1.2354*** [0.429]	-1.2493*** [0.432]	-0.5918 [0.565]	-0.5038 [0.493]	-0.689 [0.475]	-0.2276 [0.499]	-0.6895 [0.606]	-1.1445*** [0.423]	-1.1568*** [0.417]
GDP growth			-0.0173 [0.059]		-0.0174 [0.060]							
Inflation				0.0000 [0.012]	-0.0003 [0.012]							
KKZ index						-8.8885*** [1.698]						
Rule of law							-2.7831** [1.157]					
Control of corruption								-4.1712*** [1.055]				
Regulatory quality									-3.5589*** [0.942]			
Fraction of entries denied										0.0344*** [0.010]		
Activity restrictions											1.2024 [0.747]	
Reserve requirements												-0.3613 [0.657]
Constant	29.4961*** [3.475]	21.6368*** [5.650]	22.8305*** [5.905]	22.5573*** [5.832]	22.8362*** [5.911]	10.3111 [7.809]	12.9854* [6.836]	14.3830** [6.415]	9.7247 [6.785]	11.3847 [8.318]	19.8995*** [5.870]	21.8707*** [5.667]
Observations	2,187	2,187	2,050	2,050	2,050	1,397	1,684	1,684	1,684	1,366	2,155	2,187
R-squared	0.119	0.137	0.145	0.145	0.145	0.167	0.145	0.151	0.15	0.161	0.14	0.137
Number of banks	341	341	317	317	317	308	335	335	335	278	341	341

Notes: Dependent variable is the net interest margin. All explanatory variables (except regulatory) are taken with a lag. All specifications include bank- and time-fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively.



**Table 9. Robustness Check for LICs: Using Loan Market Concentration**

	Bank-Specific		Macro			Institutions			Regulation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market concentration (loans)	0.0890*** [0.017]	0.0795*** [0.018]	0.0944*** [0.019]	0.0944*** [0.019]	0.0954*** [0.019]	0.0504** [0.022]	0.0499** [0.020]	0.0493** [0.020]	0.0431** [0.020]	0.0909*** [0.023]	0.0886*** [0.018]	0.0793*** [0.018]
Operating costs	0.1497 [0.095]	0.2510** [0.098]	0.2558** [0.102]	0.2572** [0.102]	0.2616** [0.102]	-0.0626 [0.118]	-0.0132 [0.104]	-0.0292 [0.104]	-0.0032 [0.104]	0.2170 [0.137]	0.2531** [0.099]	0.2505** [0.098]
Risk aversion	-0.0262*** [0.007]	-0.0353*** [0.008]	-0.0353*** [0.008]	-0.0353*** [0.008]	-0.0356*** [0.008]	-0.0112 [0.009]	-0.0152** [0.008]	-0.0148* [0.008]	-0.0153** [0.008]	-0.0361*** [0.011]	-0.0351*** [0.008]	-0.0352*** [0.008]
Credit risk	0.3087*** [0.034]	0.2870*** [0.034]	0.2910*** [0.035]	0.2906*** [0.035]	0.2900*** [0.035]	0.3171*** [0.036]	0.3152*** [0.034]	0.3120*** [0.034]	0.3184*** [0.034]	0.3304*** [0.044]	0.2853*** [0.034]	0.2864*** [0.034]
Liquidity	0.0524*** [0.013]	0.0670*** [0.013]	0.0655*** [0.014]	0.0655*** [0.014]	0.0651*** [0.014]	0.0629*** [0.016]	0.0651*** [0.014]	0.0677*** [0.014]	0.0647*** [0.014]	0.0861*** [0.021]	0.0653*** [0.014]	0.0670*** [0.013]
Size	-1.2354*** [0.287]	-0.7501* [0.418]	-0.7232* [0.434]	-0.7537* [0.431]	-0.7263* [0.434]	-0.1777 [0.563]	-0.0995 [0.492]	-0.3083 [0.474]	0.1554 [0.495]	-0.1787 [0.607]	-0.7538* [0.424]	-0.7490* [0.418]
GDP growth			0.0354 [0.060]		0.0337 [0.060]							
Inflation				-0.0064 [0.013]	-0.0060 [0.013]							
KKZ index						-9.4556*** [1.696]						
Rule of law							-3.0528*** [1.160]					
Control of corruption								-4.1406*** [1.061]				
Regulatory quality									-3.8344*** [0.942]			
Fraction of entries denied										0.0343*** [0.010]		
Activity restrictions											1.2214 [0.749]	
Reserve requirements												-0.2400 [0.660]
Constant	23.6515*** [3.957]	16.6662*** [5.742]	16.0142*** [6.007]	16.6550*** [5.920]	16.0796*** [6.010]	4.9477 [7.865]	7.9169 [6.893]	9.9131 [6.496]	5.0265 [6.803]	5.3570 [8.406]	14.9029** [5.939]	16.8305*** [5.761]
Observations	2,187	2,187	2,050	2,050	2,050	1,397	1,684	1,684	1,684	1,366	2,155	2,187
R-squared	0.111	0.129	0.134	0.134	0.134	0.160	0.137	0.142	0.143	0.145	0.135	0.129
Number of banks	341	341	317	317	317	308	335	335	335	278	341	341

Notes: Dependent variable is the net interest margin. All explanatory variables (except regulatory) are taken with a lag. All specifications include bank and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively.

**Table 10. Robustness Check for LICs: Using Deposit Market Concentration**

	Bank-Specific		Macro			Institutions			Regulation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market concentration (deposits)	0.0648***	0.0536***	0.0648***	0.0655***	0.0656***	0.0363*	0.0342*	0.0333*	0.0267	0.0702***	0.0566***	0.0539***
	[0.017]	[0.018]	[0.019]	[0.019]	[0.019]	[0.022]	[0.020]	[0.019]	[0.020]	[0.024]	[0.018]	[0.018]
Operating costs	0.1495	0.2559***	0.2586**	0.2615**	0.2629**	-0.0618	-0.0114	-0.0273	-0.0009	0.2255	0.2600***	0.2550***
	[0.095]	[0.098]	[0.102]	[0.103]	[0.103]	[0.118]	[0.104]	[0.104]	[0.104]	[0.138]	[0.099]	[0.099]
Risk aversion	-0.0261***	-0.0354***	-0.0352***	-0.0354***	-0.0355***	-0.0112	-0.0153**	-0.0149*	-0.0154**	-0.0362***	-0.0354***	-0.0354***
	[0.007]	[0.008]	[0.008]	[0.008]	[0.008]	[0.009]	[0.008]	[0.008]	[0.008]	[0.011]	[0.008]	[0.008]
Credit risk	0.3099***	0.2877***	0.2921***	0.2916***	0.2914***	0.3159***	0.3151***	0.3119***	0.3185***	0.3299***	0.2863***	0.2867***
	[0.034]	[0.034]	[0.035]	[0.035]	[0.035]	[0.036]	[0.034]	[0.034]	[0.034]	[0.044]	[0.034]	[0.034]
Liquidity	0.0494***	0.0651***	0.0633***	0.0631***	0.0630***	0.0618***	0.0640***	0.0667***	0.0638***	0.0825***	0.0633***	0.0650***
	[0.013]	[0.013]	[0.014]	[0.014]	[0.014]	[0.016]	[0.014]	[0.014]	[0.014]	[0.021]	[0.014]	[0.013]
Size	-1.3773***	-0.8031*	-0.7971*	-0.8077*	-0.7993*	-0.2161	-0.1320	-0.3425	0.1310	-0.2126	-0.8053*	-0.8002*
	[0.291]	[0.419]	[0.435]	[0.433]	[0.435]	[0.563]	[0.492]	[0.475]	[0.495]	[0.608]	[0.426]	[0.420]
GDP growth			0.0122		0.0107							
			[0.060]		[0.060]							
Inflation				-0.0046	-0.0045							
				[0.013]	[0.013]							
KKZ index						-9.5487***						
						[1.698]						
Rule of law							-3.0648***					
							[1.162]					
Control of corruption								-4.1472***				
								[1.063]				
Regulatory quality									-3.9006***			
									[0.944]			
Fraction of entries denied										0.0377***		
										[0.010]		
Activity restrictions											1.2566*	
											[0.753]	
Reserve requirements												-0.3780
												[0.662]
Constant	26.1693***	18.0110***	17.7742***	17.9958***	17.8222***	5.7103	8.7197	10.7490*	5.7011	6.2381	16.3150***	18.2423***
	[4.019]	[5.760]	[6.018]	[5.940]	[6.021]	[7.864]	[6.895]	[6.498]	[6.804]	[8.426]	[5.963]	[5.775]
Observations	2,187	2,187	2,050	2,050	2,050	1,397	1,684	1,684	1,684	1,366	2,155	2,187
R-squared	0.104	0.123	0.127	0.127	0.127	0.158	0.135	0.140	0.141	0.140	0.128	0.124
Number of banks	341	341	317	317	317	308	335	335	335	278	341	341

Notes: Dependent variable is the net interest margin. All explanatory variables (except regulatory) are taken with a lag. All specifications include bank and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively.

**Table 11. Robustness Check for LICs: Using Interaction of Market Concentration with Regional Dummies**

	Bank-Specific		Macro			Institutions			Regulation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market concentration	0.1511	0.1524	0.1242	0.1246	0.1253	0.1287	0.1568	0.1941	0.1289	0.5833	0.1652	0.1620
	[0.129]	[0.128]	[0.134]	[0.134]	[0.134]	[0.145]	[0.138]	[0.138]	[0.138]	[0.392]	[0.130]	[0.129]
Market concentration * Asia	-0.2123	-0.2132	-0.1992	-0.1986	-0.2004	-0.1745	-0.2075	-0.2503*	-0.1742	-0.6186	-0.2323*	-0.2225*
	[0.132]	[0.132]	[0.138]	[0.138]	[0.138]	[0.151]	[0.142]	[0.142]	[0.142]	[0.394]	[0.133]	[0.133]
Market concentration * CIS	0.2739**	0.2630**	0.3457**	0.3444**	0.3449**	0.1668	0.1535	0.1095	0.1702	0.0261	0.2447*	0.2536*
	[0.132]	[0.132]	[0.138]	[0.138]	[0.138]	[0.150]	[0.143]	[0.142]	[0.142]	[0.394]	[0.133]	[0.132]
Market concentration * MENA	-0.2118	-0.2515*	-0.2227	-0.2237	-0.2237	-0.1590	-0.1887	-0.2338	-0.1658	-0.6638*	-0.2767*	-0.2573*
	[0.141]	[0.141]	[0.146]	[0.146]	[0.146]	[0.159]	[0.152]	[0.151]	[0.151]	[0.398]	[0.143]	[0.141]
Market concentration * Africa	-0.1581	-0.1735	-0.1387	-0.1367	-0.1388	-0.1725	-0.1934	-0.2244	-0.1708	-0.6400	-0.1798	-0.1837
	[0.130]	[0.129]	[0.135]	[0.135]	[0.135]	[0.147]	[0.139]	[0.139]	[0.139]	[0.392]	[0.131]	[0.130]
Operating costs	0.1147	0.2372**	0.2485**	0.2569***	0.2511**	-0.0371	0.0114	-0.0075	0.0222	0.2049	0.2405**	0.2361**
	[0.092]	[0.095]	[0.097]	[0.098]	[0.098]	[0.116]	[0.102]	[0.102]	[0.102]	[0.128]	[0.096]	[0.095]
Risk aversion	-0.0306***	-0.0401***	-0.0418***	-0.0422***	-0.0419***	-0.0164*	-0.0208***	-0.0201***	-0.0209***	-0.0410***	-0.0401***	-0.0400***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.009]	[0.008]	[0.008]	[0.008]	[0.010]	[0.007]	[0.007]
Credit risk	0.3117***	0.2885***	0.2974***	0.2961***	0.2969***	0.3172***	0.3159***	0.3122***	0.3189***	0.3278***	0.2870***	0.2874***
	[0.033]	[0.033]	[0.033]	[0.033]	[0.033]	[0.035]	[0.033]	[0.033]	[0.033]	[0.040]	[0.033]	[0.033]
Liquidity	0.0498***	0.0637***	0.0644***	0.0637***	0.0642***	0.0590***	0.0614***	0.0639***	0.0610***	0.0670***	0.0628***	0.0637***
	[0.012]	[0.013]	[0.013]	[0.013]	[0.013]	[0.015]	[0.014]	[0.014]	[0.014]	[0.019]	[0.013]	[0.013]
Size	-1.2629***	-0.3413	-0.3937	-0.3630	-0.3959	0.0988	0.2350	0.0079	0.4425	0.0261	-0.3339	-0.3395
	[0.287]	[0.409]	[0.421]	[0.419]	[0.421]	[0.564]	[0.493]	[0.476]	[0.497]	[0.569]	[0.416]	[0.409]
GDP growth			-0.0425		-0.0433							
			[0.057]		[0.058]							
Inflation				-0.0023	-0.0028							
				[0.012]	[0.012]							
KKZ index						-8.8052***						
						[1.697]						
Rule of law							-3.1112***					
							[1.143]					
Control of corruption								-3.8575***				
								[1.041]				
Regulatory quality									-3.5259***			
									[0.934]			
Fraction of entries denied										0.0229**		
										[0.010]		
Activity restrictions											1.1962	
											[0.734]	
Reserve requirements												-0.4139
												[0.643]
Constant	25.0997***	12.0246**	13.0397**	12.3814**	13.0749**	2.2001	3.7167	6.0635	1.6718	3.4138	10.2482*	12.2675**
	[3.980]	[5.635]	[5.827]	[5.757]	[5.831]	[7.906]	[6.923]	[6.544]	[6.849]	[7.927]	[5.861]	[5.648]
Observations	2,187	2,187	2,050	2,050	2,050	1,397	1,684	1,684	1,684	1,366	2,155	2,187
R-squared	0.176	0.196	0.212	0.212	0.212	0.196	0.178	0.181	0.182	0.274	0.198	0.196
Number of banks	341	341	317	317	317	308	335	335	335	278	341	341

Notes: Dependent variable is the net interest margin. All explanatory variables (except regulatory) are taken with a lag. All specifications include country and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively.

**Table 12. Robustness Check for LICs: Using Annual Average Variables**

	Bank-Specific		Macro			Institutions			Regulation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market concentration	0.1353*** [0.027]	0.1075*** [0.031]	0.1298*** [0.037]	0.1428*** [0.037]	0.1426*** [0.037]	0.0583 [0.037]	0.0666** [0.033]	0.0621* [0.033]	0.0501 [0.033]	0.1398*** [0.042]	0.1061*** [0.031]	0.1088*** [0.030]
Operating costs	0.4312 [0.265]	0.6311** [0.281]	0.6049* [0.337]	0.7926** [0.340]	0.7533** [0.344]	-0.2032 [0.310]	-0.0746 [0.281]	-0.0899 [0.280]	-0.0990 [0.279]	0.4716 [0.361]	0.6020** [0.283]	0.6471** [0.279]
Risk aversion	-0.0918*** [0.022]	-0.1115*** [0.023]	-0.1096*** [0.027]	-0.1151*** [0.027]	-0.1133*** [0.027]	-0.0597** [0.025]	-0.0615*** [0.022]	-0.0614*** [0.022]	-0.0596*** [0.022]	-0.0977*** [0.029]	-0.1096*** [0.023]	-0.1108*** [0.023]
Credit risk	0.2373** [0.112]	0.2401** [0.115]	0.2654** [0.134]	0.2120 [0.136]	0.2173 [0.136]	0.3600*** [0.115]	0.3240*** [0.107]	0.3248*** [0.106]	0.3485*** [0.106]	0.3600** [0.142]	0.2473** [0.115]	0.1993* [0.115]
Liquidity	0.0704* [0.041]	0.1205*** [0.045]	0.1235** [0.058]	0.0926 [0.058]	0.0982* [0.059]	0.1950*** [0.053]	0.1722*** [0.047]	0.1792*** [0.047]	0.1789*** [0.046]	0.1462** [0.061]	0.1215*** [0.046]	0.1198*** [0.045]
Size	-0.6354 [0.783]	0.9284 [1.075]	0.9451 [1.270]	0.9214 [1.260]	0.8475 [1.266]	0.3276 [1.228]	0.2838 [1.109]	0.2804 [1.102]	0.3893 [1.097]	1.8775 [1.417]	0.7206 [1.084]	1.3319 [1.078]
GDP growth			-0.0843 [0.178]		-0.1266 [0.178]							
Inflation				-0.0354* [0.019]	-0.0370** [0.019]							
KKZ index						-11.4354*** [3.842]						
Rule of law							-1.4856 [2.730]					
Control of corruption								-3.4409 [2.502]				
Regulatory quality									-5.4008** [2.262]			
Fraction of entries denied										0.1226*** [0.024]		
Activity restrictions											2.9477* [1.580]	
Reserve requirements												-3.9865*** [1.478]
Constant	13.4001 [10.495]	-3.8194 [13.208]	-7.5353 [17.172]	-7.6994 [16.950]	-6.0645 [17.118]	-4.3411 [15.244]	2.1672 [14.792]	0.9527 [14.551]	-0.7140 [14.434]	-27.3995 [17.261]	-5.0307 [13.358]	-7.5584 [13.191]
Observations	523	523	410	410	410	337	382	382	382	367	516	523
R-squared	0.129	0.162	0.178	0.186	0.187	0.189	0.165	0.169	0.179	0.242	0.170	0.175
Number of countries	48	48	34	34	34	48	47	47	47	48	48	48

Notes: Dependent variable is the net interest margin. All explanatory variables (except regulatory) are taken with a lag. All specifications include country and time fixed effects. \*, \*\*, and \*\*\* denote significance at 1, 5, and 10 percent confidence levels, respectively.