Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Foreign bank entry and bank competition: 
Cross-country heterogeneity

Haiyan Yin

Indiana University South Bend, 1700 Mishawaka Ave., South Bend, IN 46634, USA

ARTICLE INFO

JEL classification: 
F36 
F65 
G21

Keywords: 
Foreign bank entry 
Competition 
Bank regulations 
Cross-country heterogeneity

ABSTRACT

This study investigates the impact of foreign bank entry on bank competition in the host countries. Using data for 148 countries over 1987–2015, I find that although on average an increase in the number of foreign banks is associated with more competition in the host country, competition increases in developed but decreases in developing countries. Stringent capital requirements, higher market entry barriers, and effective credit information sharing can mitigate the impact of foreign bank entry, while better supervision and external governance strengthen the link between foreign bank presence and competition. The findings justify the regulations on bank capital adequacy and call for an effective credit information sharing mechanism.

1. Introduction

The benefits and costs of globalization have been in debate for years, and the U.S.-China trade dispute since 2018 and the recent breakout of the global Covid-19 crisis provide further momentum to rethink them. According to the KOF Swiss Economic Institute, the globalization index has increased by about 45% in the past 30 years.\(^1\) Following this general trend, many banks are expanding their business to other countries to “follow their clients” or seek more profitability or diversification. Foreign bank assets account for 42% of total bank assets in the host countries in 2013, and the average proportion of foreign banks in host countries increased from 29% in 1995 to 48% in 2013.\(^2\) The global financial crisis originating from the United States in 2008 has heightened the interest of researchers, bank supervisors, and government officials in the impact of this globalization of the banking sector.

It is often argued that the entry of foreign banks increases competition in the host country, which in turn changes the behavior and performance of incumbent local banks. To protect domestic banks from foreign competition, most if not all countries are cautious in liberalizing their banking sector and have various restrictions in place to limit foreign presence. This study tries to answer the question, does foreign bank entry really increase bank competition in the host country? What role does the bank regulatory and institutional framework play in this relationship? Studies investigating this link are mostly regional or country specific, and no consensus has been reached. The present study covers 148 developed and developing countries over 1987–2015,\(^3\) exploring factors that may contribute to the heterogeneity among them in the effect of foreign bank entry on competition.

\(^{1}\) Calculated by the author with data obtained from https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html, retrieved April 13, 2020.

\(^{2}\) Calculated by the author with data provided by Claessens and Van Horen (2014).

\(^{3}\) According to the World Bank’s income classifications, developed economies include high and upper middle income economies, while developing economies include lower middle and low income economies.
The remainder of the paper is organized as follows. Section 2 reviews the literature, Section 3 describes the data and method, Section 4 discusses the empirical results, and Section 5 concludes.

2. Literature review

The impact of foreign banks on host countries has been examined from different perspectives. Some studies investigate how bank performance (e.g., profitability, efficiency, net interest margin) is affected by foreign bank entry. Claessens et al. (2001), examining 80 countries from 1988 to 1995, find that the presence of foreign banks reduces the profitability and net interest margin of domestic banks. Ghosh (2016), looking at 169 nations over 1998–2013, observes that foreign bank presence is associated with lower profit efficiency but higher cost efficiency. Most other studies focus on a specific nation. Sturm and Williams (2004) investigate the impact of foreign bank entry on bank efficiency in Australia and find that bank efficiency increased during the post deregulation period of 1988–2001; they argue that the competition resulting from the diversity in bank types is important in prompting efficiency improvements. Berger, Hasan, and Zhou (2009) study the relationship between bank ownership and efficiency in China and find that foreign banks are most efficient. They suggest that minority foreign ownership of the largest four state-owned banks in China will likely improve performance significantly.\(^4\)

Another strand of studies focuses on the impact of bank globalization on financial stability. Using detailed data on U.S. banks, Cetorelli and Goldberg (2012) find that the existence of an active internal capital market in global banks contributes to the international propagation of shocks. Yin (2019), looking at 129 countries over 1995–2013, observes increased bank risk in countries that host foreign banks. Chen et al. (2017), studying 32 emerging economies over 2000–2013, find that foreign-owned banks take on more risk than their domestic counterparts. Analyzing bank-level data from 35 emerging countries over 2000–2014, Wu et al. (2017) observe that foreign bank presence increases the risk of domestic banks. However, Zhu and Yang (2016) find that foreign acquisition reduces the risk taking of state-owned banks in China. Other studies examine the impact of bank globalization on other aspects of the host country economy, such as employment (e.g., BIS, 2006), macroeconomic growth (e.g., Borensztein et al., 1998), and institutional development (e.g., Mishkin, 2007).

Intuitively, one would expect foreign bank entry to increase host country competition, and researchers frequently claim that this is one channel through which foreign banks affect the performance of domestic banks. However, this channel is not sufficiently scrutinized in the literature, and no consensus has been reached from the limited evidence. Among the few studies, Jeon et al. (2011) find that foreign bank penetration enhances bank competition, measured with Panzar-Rosse (1987) H statistics, in Asia and Latin America over 1997–2008. Bremus (2015) both theoretically and empirically analyzes the effect of international banking on market structures in the banking industry in OECD countries over 1995–2009, and finds that both cross-border lending and bank foreign direct investment reduce bank concentration and increase the contestability of the host countries. In contrast, Yeyati and Micco (2007) examine the impact of the accelerated foreign penetration in Latin American countries in the 1990s and find that it decreased competition there. Country case studies also find conflicting evidence. Moguillansky et al. (2004) argue that foreign bank entry may not stimulate competition because foreign banks adopt rent-seeking strategies when entering the Mexican market through mergers and acquisitions. Mulyaningsih et al. (2015) observe that foreign banks, particularly foreign de novo banks, behave more competitively than local banks in the Indonesian banking market, and their penetration is therefore important in creating a contestable market. This conflicting evidence warrants another study.

3. Data and method

3.1. Data

The bank-level data I use are retrieved from Bankscope and screened with the following criteria. (1) To avoid double counting, if consolidated and unconsolidated information are both reported in the dataset, I include only the consolidated information. (2) I keep only countries with at least 50 bank-year observations and at least 5 banks in a given year. (3) I keep only commercial banks, savings banks, and cooperative banks, representing about 71%, 14%, and 15% of the sample respectively. (4) I calculate a control variable for bank risk (the Z score), I use only banks with at least four consecutive years of data. (5) I exclude observations that lack information for basic variables or have obvious data errors (e.g., negative values for total assets, loans, overhead costs, etc.). The final sample comprises 23,175 banks in 148 countries over 1987–2015. To mitigate the impact of outliers I winsorize all variables at the 1% level. While most variables are ratios, the bank-level variables expressed as amounts are in million U.S. dollars.

The country-level data include information about foreign bank presence, macroeconomic condition, market structure, governance, economic cycle, and regulatory and institutional framework. Since the availability of these data varies, the year and bank coverage of the final dataset changes with the variables included in the regressions.

3.2. Baseline model

This cross-country study provides insight into the average relationship between foreign bank entry and host countries’ bank

\(^4\) More country case studies on bank efficiency include those of Barajas et al. (2000) for Colombia, Crystal et al. (2001) for Latin America, and Unite and Sullivan (2001) for Philippines.
competition for the set of countries under investigation. The basic model is specified as follows:

\[ \text{Competition}_{ijt} = c + \beta \cdot \text{foreign presence}_{ijt} + \gamma \cdot X_{ijt-1} + \theta \cdot Y_{ijt} + \text{year dummies} + \epsilon_{ijt}, \]  

(1)

where \( i, j, t \) index bank, country, and time respectively. The vector \( X_{ijt-1} \) represents a series of bank-specific variables, including bank size, capital adequacy, asset structure, risk, asset growth, profitability, and efficiency. \( Y_{ijt} \) is a vector of country-specific variables, including measures of market structure (the Herfindahl-Hirschman index or HHI), financial development (stock market capitalization), macroeconomic conditions (GDP per capita and GDP growth), and governance (rule of law). To mitigate the potential endogeneity issue, I use 1-year lag terms for all bank-level variables.\(^5\) \( \beta \) measures the link between foreign bank presence and host country bank competition. The error term is clustered at bank level, and year fixed effect is included in the regressions.

3.3. Measurement of variables

3.3.1. Banking market competition measure

Some studies use concentration as an inverse measure of competition. This practice is based on the structure conduct performance (SCP) hypothesis, which argues that greater concentration in the market fosters collusion among banks, reducing competition. Some examples include the \( n \)-bank concentration ratio (the market share of the \( n \) largest banks) and the HHI (the sum of the squares of bank market shares).

Instead of inferring the competitive conduct of banks from the analysis of market structure, other studies gauge market competition with the elasticity of output price to marginal costs (the Lerner index), the elasticity of revenue to marginal costs (Panzar-Rosse (1987) \( H \) statistics), or the elasticity of profits to marginal costs (the Boone indicator).\(^6\)

In this paper, I use the Lerner index, which measures a bank’s market power by calculating the deviation between output price and marginal costs, with higher values indicating higher market power of a bank and less bank competition. Compared to the HHI, \( n \)-bank concentration ratio, \( H \) statistics, and Boone indicator, the Lerner index has several advantages. First, it varies at the bank level across time, while all the other competition measures (except bank market share) gauge bank industry competition at the country level. Second, as Beck et al. (2013) argue, “the Lerner index captures both the impact of pricing power on the asset and funding side of the bank.” Third, unlike market share or the market concentration measures of competition, the Lerner index need not define the market geographically, an advantage that is especially important now that banks are expanding their businesses across borders. In addition, although studies espousing the SCP hypothesis use bank concentration as a proxy for bank competition (e.g., Jiménez et al., 2013), Schaeck et al. (2009) point out that competition and concentration capture different characteristics of banking systems.

The Lerner index is calculated as follows:

\[ \text{Lerner}_{it} = \frac{P_{it} - MC_{it}}{P_{it}}, \]  

(2)

where \( i \) and \( t \) index bank and year, respectively. \( P_{it} \) is the price of bank \( i \) at time \( t \), and is estimated as the ratio of total operating income to total assets, whereas \( MC_{it} \), the marginal costs of bank \( i \) at time \( t \), is obtained from an estimated translog cost function with respect to output. I follow the literature (e.g., Anginer et al., 2014; Beck et al., 2013; Berger, Klapper, & Turk-Ariss, 2009) and model the total operating cost of running the bank as a function of a single, aggregate output proxy, \( Q_{it} \), and three input prices, \( w_{jt} \), with \( j \in \{1, 2, 3\} \). The translog cost function is specified as follows:

\[ \ln C_{it} = \alpha_0 + \alpha_1 \ln Q_{it} + \alpha_2 \left( \ln Q_{it} \right)^2 + \sum_{j=1}^{3} \beta_j \ln w_{jt} + \sum_{k=1}^{3} \gamma_k \ln w_{jt} \ln Q_{it} + \sum_{j=1}^{3} \delta_j \ln w_{jt} + \epsilon_{it}, \]  

(3)

where \( C_{it} \) measures total operating costs (total interest and noninterest expenses),\(^7\) and \( Q_{it} \) represents a proxy for bank output (total assets). The three input prices \( w_{jt} \) include the price of fixed assets (\( w_1 = \frac{\text{noninterest expenses}}{\text{total assets}} \)), the price of labor (\( w_2 = \frac{\text{personnel expenses}}{\text{total assets}} \)), and the price of borrowed funds (\( w_3 = \frac{\text{interest expenses}}{\text{total deposits/money market funding}} \)). I estimate the cost function for each country separately over the sample period to reflect potential differences in technology and/or institutional environment. Time dummies and bank specialization dummies are also included to capture technological progress and business cycle variations, and the unobserved features associated with different bank types. In addition, the following restrictions are imposed to ensure homogeneity of degree one in input prices:

\(^5\) The results remain the same with 1-year lag terms for the country-level variables, which do not change substantially from the year before.

\(^6\) See Anginer et al. (2014), Berger et al. (2009b), and Demirguc-Kunt and Martínez Pería (2010) for the use of the Lerner index; Jeon et al. (2011) for the use of Panzar-Rosse (1987) \( H \) statistics; and Boone (2001), Boone et al. (2005), and Schaeck and Ghak (2014) for the use of the Boone indicator.

\(^7\) Noninterest expenses include personnel expenses, trading expenses, commission and fee expenses, other administrative expenses, and other operating expenses.
The marginal cost is then obtained as follows:

$$MC_i = \frac{\partial C_{it}}{\partial Q_{it}} = \frac{C_{it}}{Q_{it}} \left( \alpha_i + 2\alpha_i \ln Q_{it} + \sum_{j=1}^{3} \gamma_{jk} w_{jt} \right)$$

(4)

With the marginal cost obtained from model (4), the Lerner index is calculated with the formula specified in model (2).

### 3.3.2. Measurement of foreign bank entry

I measure the degree of foreign bank presence with two alternative variables: the number and the assets of foreign banks, as percentages of the total number and total assets of banks in the given country, respectively. Here foreign banks are defined as banks with at least 50% of their shares owned by foreigners. Claessens and Van Horen (2014) compile the data, which cover 1995–2013 for foreign bank numbers and 2004–2013 for foreign bank assets.

### 3.3.3. Control variables

I first control for bank-specific characteristics that may have some impact on bank market power. Bank assets (i.e., the natural logarithm of total assets) is used to measure bank size to reflect economies of scale, as larger banks may have higher market power. Capital asset ratio proxies for capital adequacy, loan share (i.e., loans-to-assets ratio) for bank asset structure and business orientation, Z score for bank risk, the percentage annual growth in total assets for asset growth, return on assets for profitability, and overhead costs (i.e., the ratio of noninterest costs to average assets) for bank efficiency.

The Z score for bank \(i\) in year \(t\) is constructed as \(Z_{it} = \frac{ROA_i - CAR_i}{\sigma_{ROA}}\), where \(ROA_i\) represents return on assets for bank \(i\) in year \(t\), \(CAR_i\) capital-to-asset ratio for bank \(i\) in year \(t\), and \(\sigma_{ROA}\) standard deviation of return on assets for bank \(i\), which is calculated only for banks with at least four consecutive years of data.

Second, the market structure of a banking system can be a determinant of bank market power, and market concentration is a common measure of market structure. Banks are expected to have larger market power in a more concentrated banking market. I control for market structure with a concentration measure, HHI, defined as the sum of the squared market shares of total assets held by each bank in the host countries’ banking market, with higher value indicating more concentration.

Third, I use stock market capitalization to measure the development of the stock market and the general level of financial development in a country (see, e.g., Rajan & Zingales, 2003). Stock market capitalization is defined as the value of listed shares as a fraction of GDP. As the stock market substitutes for banks in providing financing services, banks tend to have less market power in countries with more developed stock markets.

Fourth, I use GDP per capita and GDP growth rate to control for the economic condition of the host country. Fifth, I also control for a country’s legal environment and governance with rule of law, which captures perceptions of the extent to which agents have confidence in and abide by the rules of society. By construction, rule of law ranges from approximately 2.5 to 2.5, with higher values representing stronger governance. Last, I include a crisis dummy in the regressions to take into consideration the economic cycle. It takes on the value one if a systemic crisis is observed in a particular year or zero otherwise. Anginer et al. (2014) observe that bank price power is procyclical: the Lerner index declined after the onset of the global financial crisis, perhaps because bank profits eroded during the crisis. Variable definitions and data sources are reported in Table 1, and the summary statistics of the variables are displayed in Table 2.

The dependent variable, the Lerner index, ranges from −0.947 to 0.579, with a mean of 0.157. On average, 23.19% of the banks in the host countries are foreign banks, and they account for 16.204% of total bank assets. The logarithm of bank assets in million U.S. dollars ranges from 2.031 to 11.21, with a mean of 6.274. The average capital asset ratio and loan share are 10.322% and 58.7%, respectively. The Z score for the measure of bank insolvency risk ranges from 1.667 to 231.738, with an average of 38.619. Over the sample period, the average growth rate of bank assets is 9.009%, return on assets 60.8%, and overhead cost 4.333% of bank assets. The bank concentration measure HHI averages 0.128. The average stock market capitalization is 68.548%, ranging from 0.345% to 570.155%. Over the sample period, the average GDP per capita of all the countries in the sample is 32,094 U.S. dollars, and the average GDP growth rate is 1.822%. Rule of law averages 1.083, and the economic cycle crisis dummy averages 0.434.

### 4. Empirical results

#### 4.1. Baseline results on the link between foreign bank presence and bank competition

To find the average relationship between foreign bank presence and bank competition in the host countries, I run regressions of bank market power (i.e., the Lerner index) on foreign bank numbers and foreign bank assets, controlling for the bank- and country-level variables as model (1) specifies. Since my focus is on the impact of foreign bank presence on domestic banks, the regression

\[ 3 \beta_i = 1, \sum_{j=1}^{3} \gamma_j = 0, \text{and} \forall k \in \{1, 2, 3\} : \sum_{j=1}^{3} \beta_{jk} = 0. \]
The results reported in Table 3 below are calculated with domestic banks only.

Columns 1–3 of Table 3 display the regression results with foreign bank numbers and columns 4–6 with foreign bank assets. Column 1 of Table 3 reveals that an increase in the number of foreign banks is associated with a decrease in bank market power, suggesting more competition in the host countries. The same relationship appears in column 2 for developed countries. However, the evidence for developing countries in column 3 is the opposite—the number of foreign banks is positively associated with the Lerner index, indicating that foreign bank entry reduces bank competition in developing countries. With foreign bank assets as a proxy for foreign bank

| Variables                        | Definition                                                                 | Data source                                                                 |
|----------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Dependent variable               | The Lerner index measures a bank’s market power by calculating the deviation between output price and marginal cost, with higher values indicating higher market power of a bank and less bank competition. | Calculated with data from Bankscope                                         |
| Bank globalization measures      | Foreign bank assets: The percentage of the total banking assets that are held by foreign banks | World Bank Global Financial Development Database (GFDD)                     |
|                                  | Foreign bank numbers: The number of foreign-owned banks as a percentage of the total number of banks in an economy |                                                                            |
| Bank characteristics             | Bank assets: The logarithm of bank assets in million U.S. dollars, to proxy for bank size | Bankscope                                                                  |
|                                  | Capital asset ratio: Ratio of equity capital to bank assets, to measure capital adequacy |                                                                            |
|                                  | Loan share: The ratio of loans to total assets, to proxy for a bank’s business orientation |                                                                            |
|                                  | Z score: A measure of bank risk. It is calculated with $Z_i = (\text{ROA}_i + \text{CAR}_i) / \sigma_{\text{ROA}_i}$, where ROA$_i$ represents return on assets for bank $i$ in year $t$, CAR$_i$ capital asset ratio for bank $i$ in year $t$, and $\sigma_{\text{ROA}_i}$ standard deviation of return on assets for bank $i$. | Calculated with data from Bankscope                                         |
|                                  | Asset growth: Percentage annual growth in bank total assets | Bankscope                                                                  |
|                                  | Overhead costs: Noninterest expense as a percentage of total assets, a measure of bank efficiency |                                                                            |
| Macroeconomic variables          | GDP per capita: A country’s GDP per capita in thousands 2005 constant U.S. dollars | World Bank World Development Indicators (WDI)                              |
|                                  | GDP growth: The growth rate of a country’s GDP in percentage |                                                                            |
| Market structure and financial development variables | HHI: Herfindahl-Hirschman index, defined as the sum of the squares of bank market shares, a measure of bank market concentration | Calculated with data from Bankscope                                         |
|                                  | Stock market capitalization: The value of listed shares as a share of GDP | World Bank Global Financial Development Database (GFDD)                     |
| Legal environment variable       | Rule of law: Perceptions of the extent to which agents have confidence in and abide by the rules of society | World Bank Worldwide Governance Indicators (WGI)                            |
| Regulatory and institutional variables | Activity restrictions: Range of fee-generating activities banks can participate in; ranges from 3 to 12, with higher values indicating more restrictive regulations. | Bank Regulation and Supervision Database, Barth et al. (2008) and Cihak Demirgüç-Kunt, Pería, and Mohseni-Cheraghlou (2012), Barth et al. (2013) |
|                                  | Capital stringency: The strength of capital regulation in a country; ranges from 0 to 10, with higher value indicating greater stringency. |                                                                            |
|                                  | Multiple supervisors: Dummy equal to one when there are multiple supervisors |                                                                            |
|                                  | External governance: The effectiveness of external audits, the transparency of financial statements and evaluations by rating agencies, and incentives for creditors to monitor bank performance; ranges from 0 to 19, with higher value indicating better governance. |                                                                            |
|                                  | Government banks: Percentage of government-owned banks in the banking system |                                                                            |
|                                  | Limitations on foreign banks: Whether foreign banks may own domestic banks and whether foreign banks may enter a country’s banking industry; ranges from 0 to 4, with lower value indicating greater stringency. |                                                                            |
|                                  | Applications denied: The fraction of the applications to enter banking that are denied |                                                                            |
|                                  | Depth of information sharing: Strength of the information content of the credit bureaus; ranges from 0 to 8, with a higher value indicating that more information is available. | Doing Business database (DB)                                               |
| Economic cycle variable          | Crisis: Dummy equal to one when a systemic crisis is observed in a particular year, and zero otherwise | World Bank Global Financial Development Database (GFDD)                     |
transfer may increase the market power of banks in the host countries. Numerous studies have found that foreign participation im-

proves bank efficiency (e.g., Berger, Hasan, & Zhou, 2009; Bonin et al., 2005; Sturm & Williams, 2004). Lastly, some cross-country

studies find that foreign banks have relatively higher interest margins and profitability and lower overhead costs in developing
countries (Demirgüç-Kunt & Huizinga, 1999; Micco et al., 2007). The data employed in the present study also show that the net interest

presence, although column 4 does not show significant impact for all countries, columns 5 and 6 do show that foreign bank presence is

significantly associated with more competition in developed, but lower competition in developing countries. Specifically, the estimates

presented in column 1 with all countries included imply that on average a 1% increase in the proportion of foreign banks reduces the

Lerner index by 0.1%. With the same 1% increase in foreign bank numbers, column 2 shows a 0.15% decrease in the Lerner index for
developed countries, while column 3 indicates a 0.24% increase for developing countries. The impact of foreign bank assets is much

smaller. Columns 5 and 6 show that a 1% increase in foreign bank assets is associated with a 0.05% reduction and a 0.09% increase in

the Lerner index for developed and developing countries, respectively.

When foreign banks establish wholly new operations in the host country, their entry tends to increase the number of competitors

and consequently the degree of competition. However, when foreign banks merge with or acquire local banks, their entry increases

foreign bank assets but not necessarily the number of banks in the host countries. In some cases, the resulting consolidation could even

reduce the number of banks in a country and decrease competition. Therefore, it comes as no surprise that foreign bank numbers exert

a more prominent impact on bank competition than foreign bank assets.

The evidence that foreign bank entry into developing countries is associated with higher market power of incumbent domestic

banks seems counterintuitive, but there are a few plausible explanations. First, foreign banks enter developing countries with innova-
tive services, generally at lower cost than domestic banks. Therefore, foreign bank entry often creates great competitive pressure on

local banks to consolidate to reach a scale at which they can compete with the foreign banks (Litan et al., 2004). Such consolidation

could reduce bank competition in the host country. Second, global banks and local banks have different customer bases. Global banks

tend to focus on the largest corporate customers that need sophisticated fee-generating services such as security underwriting, der-

ivative trading, foreign exchange trading and risk management, and cross-border mergers and acquisitions, along with some tradi-
tional banking services, while local banks’ main customers are individuals and small and medium-sized enterprises. Therefore, foreign

banks tend to complement the banking services of the locally oriented domestic banks instead of replacing them (Litan et al., 2004).

Third, foreign banks tend to rely more heavily on money market funding while local banks use the money market less. As a result,

foreign banks may not need to compete with local banks head to head for deposits, and their cost structure could be very different as

well. Fourth, very often foreign banks enter developing countries with banking problems by purchasing an existing bank or forming a

joint venture, which does not increase the number of banks in the country. For example, Kubo (2006) finds that after the Asian

financial crisis, the increase in foreign ownership did not increase competition; indeed, various models in this study show declines in

competition. Levy-Yeyati and Micco (2007) conclude that foreign bank presence weakens competition in Latin America countries.

Fifth, foreign banks, particularly those from advanced economies, may bring in more sophisticated banking techniques and technology

that reduce the cost of financial intermediation (Caprio & Honohan, 1999; Levine, 1996), and may also bring in more efficient

management skills, which are transferred to domestic banks through knowledge spillover within the banking industry. This resource

transfer may increase the market power of banks in the host countries. Numerous studies have found that foreign participation im-

proves bank efficiency (e.g., Berger, Hasan, & Zhou, 2009; Bonin et al., 2005; Sturm & Williams, 2004). Lastly, some cross-country

studies find that foreign banks have relatively higher interest margins and profitability and lower overhead costs in developing
countries (Demirgüç-Kunt & Huizinga, 1999; Micco et al., 2007). The data employed in the present study also show that the net interest

Table 2
Summary statistics of variables.

| Variable                    | No. of observations | Mean          | Standard deviation | Minimum | Maximum |
|-----------------------------|---------------------|---------------|--------------------|---------|---------|
| Lerner index                | 99,953              | 0.157         | 0.186              | −0.947  | 0.579   |
| Foreign bank numbers        | 102,007             | 23.190        | 17.283             | 0       | 96      |
| Foreign bank assets         | 73,074              | 16.204        | 15.166             | 1       | 11      |
| Bank assets                 | 101,476             | 6.274         | 1.722              | 2.031   | 11.210  |
| Capital asset ratio         | 100,972             | 10.322        | 7.715              | 2.050   | 77      |
| Loan share                  | 101,337             | 0.587         | 0.175              | 0.0001  | 0.922   |
| Z score                     | 95,915              | 38.619        | 36.834             | 1.667   | 231.738 |
| Asset growth                | 94,935              | 9.009         | 18.722             | −30.100 | 142.200 |
| Return on assets            | 100,532             | 0.608         | 1.155              | −5.840  | 6.680   |
| Overhead costs              | 100,450             | 4.333         | 4.606              | 0.340   | 43.490  |
| HHI                         | 102,007             | 0.128         | 0.150              | 0.013   | 0.99999 |
| Stock market capitalization | 89,557              | 68.548        | 43.534             | 0.345   | 570.155 |
| GDP per capita              | 101,716             | 32.094        | 15.984             | 0.215   | 86.127  |
| GDP growth                  | 101,903             | 1.822         | 3.128              | −14.814 | 34.500  |
| Rule of law                 | 99,523              | 1.083         | 0.910              | −1.842  | 1.9996  |
| Crisis                      | 80,881              | 0.434         | 0.496              | 0       | 1       |
| Activity restrictions       | 101,624             | 6.588         | 1.892              | 3.333   | 12      |
| Capital stringency          | 95,948              | 6.933         | 0.924              | 2       | 10      |
| Multiple supervisors        | 101,553             | 0.510         | 0.434              | 0       | 1       |
| External governance         | 68,792              | 13.852        | 1.904              | 9       | 17.5    |
| Limitations on foreign banks| 101,161             | 3.889         | 0.325              | 2       | 4       |
| Applications denied         | 91,486              | 0.045         | 0.114              | 0       | 0.893   |
| Government banks            | 101,381             | 19.764        | 20.050             | 0       | 92.890  |
| Depth of information sharing| 101,741             | 7.234         | 1.427              | 0       | 8       |

Notes: Although most variables are in ratios or indexes, bank assets is the logarithm of bank assets in million U.S. dollars, and GDP per capita is in thousand U.S. dollars. Detailed definitions of variables and data sources are shown in Table 1.
Table 3
Foreign bank presence and bank competition.

| Dependent variable: Lerner index | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|-----|-----|-----|-----|-----|-----|
| Foreign bank numbers            | −0.0010*** | −0.0015** | 0.0024*** | −0.0000 | −0.0005** | 0.0009* |
|                                  | (0.0001)  | (0.0001) | (0.0005) | (0.0002) | (0.0002) | (0.0005) |
| Foreign bank assets              | 0.0186*** | 0.0171*** | 0.0573*** | 0.0236**  | 0.0229**  | 0.0506*** |
|                                  | (0.0010)  | (0.0010) | (0.0063) | (0.0010) | (0.0010) | (0.0064) |
| Bank assets                      | 0.0009*** | 0.0006**  | 0.0038**  | 0.0004   | 0.0002   | 0.0036**  |
|                                  | (0.0003)  | (0.0003) | (0.0016) | (0.0003) | (0.0003) | (0.0015) |
| Capital asset ratio              | 0.1467*** | 0.1437*** | 0.1424*** | 0.1889*** | 0.1939*** | 0.0894*** |
|                                  | (0.0083)  | (0.0084) | (0.0493) | (0.0092) | (0.0094) | (0.0505) |
| Loan share                       | 0.0001*** | 0.0000    | 0.0007    | 0.0002**  | 0.0002**  | 0.0004    |
|                                  | (0.0000)  | (0.0000) | (0.0005) | (0.0000) | (0.0000) | (0.0005) |
| Z score                          | 0.0000    | 0.0001**  | −0.0002   | 0.0001    | 0.0012**  | −0.0005** |
|                                  | (0.0000)  | (0.0000) | (0.0002) | (0.0001) | (0.0001) | (0.0002) |
| Asset growth                     | 0.0618*** | 0.0624*** | 0.0502*** | 0.0655*** | 0.0656*** | 0.0593*** |
|                                  | (0.0014)  | (0.0014) | (0.0087) | (0.0015) | (0.0015) | (0.0099) |
| Return on assets                 | −0.0076*** | −0.0089** | −0.0006 | −0.0075** | −0.0083** | 0.0000 |
|                                  | (0.0005)  | (0.0005) | (0.0027) | (0.0004) | (0.0005) | (0.0025) |
| Overhead costs                   | 0.0627*** | 0.0584*** | −0.0578*  | 0.0281**  | 0.1400    | −0.0540 |
|                                  | (0.0112)  | (0.0116) | (0.0332) | (0.0123) | (0.0138) | (0.0346) |
| Stock market capitalization      | −0.0002**  | −0.0000   | −0.0000   | −0.0003** | −0.0002** | −0.0006** |
|                                  | (0.0000)  | (0.0000) | (0.0003) | (0.0000) | (0.0000) | (0.0003) |
| GDP per capita                   | 0.0013*** | −0.0002   | −0.0053   | 0.0006**  | −0.0004   | 0.0035** |
|                                  | (0.0003)  | (0.0002) | (0.0229) | (0.0003) | (0.0002) | (0.0087) |
| GDP growth                       | −0.0014** | 0.0020*** | −0.0032   | −0.0010   | 0.0010    | −0.0031 |
|                                  | (0.0007)  | (0.0006) | (0.0020) | (0.0006) | (0.0006) | (0.0025) |
| Rule of law                      | −0.0306*** | −0.0184*** | −0.2496*** | −0.0240**  | −0.0147*** | −0.1908*** |
|                                  | (0.0040)  | (0.0039) | (0.0255) | (0.0042) | (0.0044) | (0.0246) |
| Crisis                           | −0.0156*** | −0.0128** | −0.1260*** | −0.0118** | −0.0295*** | −0.1275*** |
|                                  | (0.0041)  | (0.0041) | (0.0335) | (0.0047) | (0.0053) | (0.0101) |
| N                                | 56.762     | 55.378    | 138.2     | 39.417    | 38.414    | 106.3 |
| R-sq                             | 0.242      | 0.251     | 0.676     | 0.277     | 0.281     | 0.487 |
| Year fixed effect?               | Yes        | Yes       | Yes       | Yes       | Yes       | Yes   |
| Clustering                       | Bank       | Bank      | Bank      | Bank      | Bank      | Bank   |

Notes: All regressions control for bank characteristics and for macroeconomic, market structure, legal environment, and economic cycle variables with year fixed effects and clustering at bank level. To mitigate the potential endogeneity issues in determining the degree of bank competition, 1-year lag terms for all bank characteristic variables are used in the regressions. According to the World Bank’s income classifications, developed countries include high-income and upper-middle-income countries, while developing countries include lower-middle-income and low-income ones. Variable definitions and data sources are reported in Table 1. Standard errors are given in parentheses.

* Significance at 10%.
** Significance at 5%.
*** Significance at 1%.

Margins of foreign banks in developing countries are significantly larger than those of the incumbent domestic banks, and the case is the opposite for developed countries. Therefore, it is likely that pricing by large multinational banks legitimates increased spreads that benefit local banks.

The bank characteristic variables also show significant relationships with bank market power. First, larger banks have higher market power, reflecting their economy of scale. Second, the capital asset ratio is positively associated with the Lerner index, in line with Jeon et al.’s (2011) observation that competition is less intense in markets dominated by well-capitalized banks. Third, the coefficients on loan share and Z score are always positive and mostly significant, indicating that banks that focus on traditional loan-making and those with less solvency risk tend to have more market power. Fourth, the coefficients of asset growth are positive and significant in all regressions in Table 3, providing strong evidence that banks that grow faster have more market power. Fifth, return on assets is positively associated with market power. Last, the negative and statistically significant coefficients of overhead costs suggest that less efficient banks have lower market power.

As a measure of market structure, the HHI is positively associated with bank market power overall and for developed countries, indicating that a more concentrated market dominated by a few large banks tends to be less competitive. However, there is weak evidence to the contrary for developing countries. The negative and significant coefficients of stock market capitalization seem to suggest that a more developed substitute for bank credit makes banks lose market power and increases competition in the banking industry. This is opposite to the evidence found by Jeon et al. (2011) from the emerging Asian and Latin American banking markets. With all countries included, columns 1 and 4 show a positive relationship between GDP per capita and bank market power; nevertheless, no significant relationship appears for developed countries, and only a weak positive relationship emerges for developing countries when foreign bank assets proxy for foreign bank presence in column 6. There is no clear relationship between GDP growth and market power, with a negative coefficient for all countries in column 1, a positive coefficient for developed countries in column 2, and a negative coefficient for developing countries in column 6.
and insignificant coefficients in other columns. Bank market power decreases as rule of law increases, indicating that competition is more intense in countries with better governance. The coefficients for the crisis dummy are all negative and significant, providing strong evidence of procyclicality in bank price power and corroborating the evidence documented by Anginer et al. (2014) that the Lerner index declined after the onset of the global financial crisis.

### 4.2. Conditional correlations between bank market power and foreign bank presence

The baseline results discussed above indicate that foreign bank presence increases competition in developed countries, but decreases it in developing ones. To examine this difference further, I modify the baseline model by removing the country-level control variables and run regressions for each country separately with model (5) as specified below:

\[
\text{Competition}_{i,t} = c + \beta_1 \text{foreign presence}_{i,t-1} + \gamma \cdot \text{X}_{i,t-1} + \text{year dummies} + \varepsilon_{i,t}. \tag{5}
\]

Variable definitions are the same as those in model (1), and the coefficient of interest is \(\beta_1\), which represents the impact of foreign bank presence on bank competition of country \(j\). Figs. 1 and 2 display the conditional correlations between foreign bank presence measures and bank market power, given controls for bank characteristics.

Fig. 1 shows that the impact of foreign bank numbers on bank competition varies greatly across countries, ranging from \(-0.11\) for Egypt to \(0.13\) for Burkina Faso, and Fig. 2 shows that the impact of foreign bank assets ranges from \(-0.22\) for Serbia to \(0.09\) for Kuwait. This substantial variation explains why foreign bank assets do not significantly influence the Lerner index when all countries are included in the sample (i.e., in column 4 of Table 3): the negative and positive effects cancel each other out.

### 4.3. Heterogeneous effects of foreign bank presence on competition

Jointly, Table 3 and Figs. 1 and 2 imply that the relationship between foreign bank presence and competition may depend on country-level factors beyond the country’s level of economic development. In this section, I explore these potential factors.

#### 4.3.1. Foreign bank presence and competition, with controls for bank regulatory and institutional framework

The regulatory and institutional framework in which banks operate can influence the degree of bank competition and the link between competition and foreign bank presence. I reexamine the relationship while controlling for various factors considered in other studies (e.g., Yin, 2019): bank regulation (activity restrictions, capital stringency), supervision (multiple bank supervisors, external governance), market entry policy (limitations on foreign banks, applications denied), bank market structure (government banks), and institutional development (the depth of information sharing). The data are retrieved from various databases of the World Bank. 

Table 1 defines these variables and lists data sources, and Table 2 displays their summary statistics.

Table 4 shows the averages of the regulatory and institutional variables by income group. \(t\)-Tests show that all these variables differ significantly between developed and developing countries. On average, developing countries have greater activity restrictions and more stringent capital requirements, but their supervision is weaker than in developed countries: fewer developing-country banks have multiple supervisors, and they have less external governance. Developing countries tend to put more limitations on foreign banks and deny more applications. They also have more government-owned bank assets. Their credit registries contain less information than those in developed countries. Do these differences affect the relationship between foreign bank entry and competition?

Table 5 shows the correlation matrix of the bank regulatory and institutional variables. All these variables are significantly correlated with each other. For example, multiple supervisors and external governance both measure the effectiveness of bank supervision and governance, and thus are positively correlated.

Given these correlations, to minimize the effect of multicollinearity, I add the regulatory and institutional variables to the regressions one by one as well as all together, and report the estimates in Table 6. For brevity, the estimates for the other control variables are not reported.

Table 6 shows that the coefficients for foreign bank numbers are all negative and mostly significant at the 10% level or more, even after all the regulatory and institutional variables are added (column 9), providing further evidence that on average foreign bank entry increases bank competition in the host countries. Although the coefficient for activity restrictions is insignificant in column 1, it is positive and significant at the 1% level in the all-in-one regression in column 9, suggesting that the average bank market power is higher in countries with more activity restrictions. The negative and significant coefficients for capital stringency in columns 2 and 9 provide strong evidence that stringent capital requirements are associated with lower market power (i.e., more competition). The evidence concerning multiple supervisors is inconclusive, with opposite and significant coefficients in columns 3 and 9. Effective external governance is linked to more market power. The negative coefficients for applications denied suggest that bank market power is lower in countries with higher barriers to market entry. Similar relationships are found for the presence of government banks and for depth of information sharing.

---

9 Most of these variables are from four surveys released in 2001, 2003, 2007, and 2011. Since country-level regulations change slowly over time, in this study I use the average value of these variables from the four surveys.

10 Test results are not reported, but available upon request.

11 By construction, limitations on foreign banks gauge the number of activities that foreign banks are allowed to take. Therefore, a lower value of the variable indicates more restrictions on foreign banks.
4.3.2. Bank regulatory and institutional framework and the foreign bank presence–competition link

To elucidate how the bank regulatory and institutional framework of host countries influences the foreign bank entry–competition link, I add interaction terms between foreign bank numbers and the bank regulatory and institutional variables to the regressions and report the estimates in Table 7.

In Table 7, most of the coefficients for foreign bank numbers are negative except for columns 1, 4, and 5. The relationships are

Table 4
Summary statistics of bank regulatory and institutional variables by income group.

| Regulatory and institutional variables     | Developing countries | Developed countries | Overall   |
|-------------------------------------------|----------------------|---------------------|-----------|
| Activity restrictions                     | 8.206                | 6.519               | 6.594     |
| Capital stringency                        | 7.452                | 6.918               | 6.941     |
| Multiple supervisors                      | 0.020                | 0.540               | 0.517     |
| External governance                       | 13.776               | 13.860              | 13.856    |
| Limitations on foreign banks             | 3.635                | 3.902               | 3.891     |
| Applications denied                       | 0.358                | 0.034               | 0.044     |
| Government banks                          | 29.286               | 19.204              | 19.637    |
| Depth of information sharing              | 4.864                | 7.359               | 7.245     |

Notes: The differences in these variables between developed and developing countries are all statistically significant. Variable definitions and data sources are reported in Table 1.

4.3.2. Bank regulatory and institutional framework and the foreign bank presence–competition link

To elucidate how the bank regulatory and institutional framework of host countries influences the foreign bank entry–competition link, I add interaction terms between foreign bank numbers and the bank regulatory and institutional variables to the regressions and report the estimates in Table 7.

In Table 7, most of the coefficients for foreign bank numbers are negative except for columns 1, 4, and 5. The relationships are
generally the same as in Table 6 except for multiple supervisors, which is positively associated with market power in both column 3 and column 9, suggesting that bank market power tends to be higher in countries with more than one official supervisor. Columns 2 and 9 show strong evidence that stringent capital requirements mitigate the negative impact of foreign bank presence on market power. The negative coefficient for the interaction term of foreign bank numbers and multiple supervisors is significant at the 1% level in column 3, but the relationship turns insignificant in column 9, providing weak evidence that banks in countries with multiple supervisors lose more market power with foreign bank entry. A similar relationship is found for external governance. A higher proportion of applications denied (a measure of market entry barriers) mitigates the impact of foreign bank entry on bank market power. The coefficient for the interaction term in column 7 is positive and significant at the 1% level, suggesting that foreign bank entry imposes less impact on countries with more government-owned assets. However, the coefficient loses significance in column 9, probably owing to multicollinearity. The positive and significant coefficients for the interaction terms in columns 8 and 9 provide strong evidence that more effective information sharing can alleviate the impact of foreign bank entry. Table 7 does not show consistent evidence on whether (and how) limitations on foreign banks affect the relationship between foreign bank presence and host countries’ level of competition.

4.4. Robustness exercises

To check whether the main finding—that foreign bank entry increases bank competition in the host country—is robust across business cycles. I modify model (1) by adding an interaction term between foreign bank numbers and the crisis dummy. The regression results show the same negative coefficient for foreign bank numbers, supporting the previous evidence. The coefficient for the interaction term is negative and significant at the 1% level, implying that the impact of foreign bank entry on competition is more pronounced during crises.

In Tables 6 and 7, I use foreign bank numbers as the main proxy for foreign bank presence, because the data for numbers cover a longer time span (1995–2013) than the data for assets (2004–2013). To check robustness, I replicate the regressions of Tables 6 and 7 with foreign bank assets. The coefficients are less significant, a fact that is no surprise as it is in line with the evidence in Table 3. However, the relationships between the regulatory and institutional variables and bank market power are otherwise consistent with those reported in Table 6. Similarly, the evidence from replicating Table 7 while substituting foreign bank assets for foreign bank numbers is also consistent with that presented earlier, except that the variable for government-owned banks loses its significance.

5. Summary and conclusions

This study implies that foreign bank entry in the form of de novo investment that increases the number of banks also increases bank competition, but entry through mergers or acquisitions may not do so. Also, foreign bank presence increases competition in developed countries but decreases it in developing ones.

Of course, the host country’s regulatory and institutional environment matters: bank competition is higher in countries with fewer activity restrictions, more stringent capital requirements, more applications denied and more government-owned bank assets, and lower in countries that require multiple supervisors and/or external governance. Good sharing of credit information reduces

Note: Variable definitions and data sources are reported in Table 1. P values are in italics.

### Table 5
Correlation matrix of bank regulatory and institutional variables.

| Activity restrictions | Capital stringency | Multiple supervisors | External governance | Limitations on foreign banks | Applications denied | Government banks | Depth of information sharing |
|-----------------------|--------------------|----------------------|---------------------|-----------------------------|--------------------|-----------------|-----------------------------|
| Activity restrictions | 1                  |                      |                     |                             |                    |                 |                             |
| Capital stringency    | 0.259              | 1                    |                     |                             |                    |                 |                             |
| Multiple supervisors  | 0.0774             | 0.3157               | 1                   |                             |                    |                 |                             |
| External governance   | -0.2026            | -0.0501              | 0.5341              | 1                           |                    |                 |                             |
| Limitations on foreign banks | 0.0158 | -0.0175 | 0.3679 | 0.7089 | 1 |
| Applications denied   | 0.1993             | -0.1463              | -0.4519             | -0.247                      | -0.0874            | 1               |                             |
| Government banks      | -0.6025            | -0.1242              | -0.161              | -0.076                      | -0.2815            | 0.1479          | 1                           |
| Depth of information sharing | -0.0561 | 0.0865 | 0.6082 | 0.2143 | 0.2192 | -0.2485 | 0.1128 | 1 |

Note: Variable definitions and data sources are reported in Table 1. P values are in italics.

Results for robustness checks are not reported, but are available upon request.
Table 6
Foreign bank presence and bank competition, with controls for bank regulatory and institutional framework.

| Dependent variable: Lerner index | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       | (7)       | (8)       | (9)       |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Foreign bank numbers           | $-0.0010^{***}$ | $-0.0002$ | $-0.0005^{***}$ | $-0.0004^{**}$ | $-0.0010^{***}$ | $-0.0016^{***}$ | $-0.0011^{***}$ | $-0.0008^{***}$ | $-0.0008^{***}$ |
|                                 | (0.0001)  | (0.0001)  | (0.0001)  | (0.0002)  | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  | (0.0002)  |
| Activity restrictions          | $-0.0015$ | $-0.0437^{***}$ | $0.0190^{***}$ | $-0.0017$ | $-0.2590^{***}$ | $-0.0005^{***}$ | $-0.0137^{***}$ | $-0.0081^{***}$ |
|                                 | (0.0010)  | (0.0061)  | (0.0017)  | (0.0080)  | (0.0274)  | (0.0001)  | (0.0013)  | (0.0041)  |
| Capital stringency             | $-0.0326^{***}$ | $0.0326^{***}$ | $0.0326^{***}$ | $0.0215$ | $0.0190^{***}$ | $0.0084^{***}$ | $0.0022$ | $0.0022$ |
|                                 | (0.0023)  | (0.0023)  | (0.0023)  | (0.0030)  | (0.0017)  | (0.0027)  | (0.0119)  | (0.0119)  |
| Multiple supervisors           | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ | $-0.0437^{***}$ |
|                                 | (0.0023)  | (0.0023)  | (0.0023)  | (0.0023)  | (0.0023)  | (0.0023)  | (0.0023)  | (0.0023)  |
| External governance            | $-0.0017$ | $-0.0017$ | $-0.0017$ | $-0.0017$ | $-0.0017$ | $-0.0017$ | $-0.0017$ | $-0.0017$ | $-0.0017$ |
|                                 | (0.0080)  | (0.0080)  | (0.0080)  | (0.0080)  | (0.0080)  | (0.0080)  | (0.0080)  | (0.0080)  |
| Limitations on foreign banks   | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ | $-0.2590^{***}$ |
|                                 | (0.0274)  | (0.0274)  | (0.0274)  | (0.0274)  | (0.0274)  | (0.0274)  | (0.0274)  | (0.0274)  |
| Applications denied             | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ | $-0.0005^{***}$ |
|                                 | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  |
| Government banks                | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ | $-0.0137^{***}$ |
|                                 | (0.0013)  | (0.0013)  | (0.0013)  | (0.0013)  | (0.0013)  | (0.0013)  | (0.0013)  | (0.0013)  |
| Depth of information sharing    | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ | $-0.0081^{***}$ |
|                                 | (0.0041)  | (0.0041)  | (0.0041)  | (0.0041)  | (0.0041)  | (0.0041)  | (0.0041)  | (0.0041)  |
| N                               | 56,725    | 53,379    | 56,725    | 37,854    | 56,612    | 53,571    | 56,642    | 56,729    | 32,078    |
| R-sq                            | 0.242     | 0.264     | 0.244     | 0.165     | 0.243     | 0.255     | 0.244     | 0.245     | 0.196     |
| Year fixed effect?              | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
| Clustering                      | Bank      | Bank      | Bank      | Bank      | Bank      | Bank      | Bank      | Bank      | Bank      |

Note: All regressions control for bank characteristics and for macroeconomic, market structure, legal environment, economic cycle, and regulatory and institutional variables, with year fixed effects and clustering at bank level. To mitigate the potential endogeneity issues in determining the degree of bank competition, 1-year lag terms for all bank characteristic variables are used in the regressions. Results for the control variables are suppressed for brevity. Variable definitions and data sources are reported in Table 1. Standard errors appear in parentheses.

** Significance at 5%.

*** Significance at 1%.
### Table 7
Forex bank presence, bank competition, and the regulatory and institutional framework.

| Dependent variable: Lerner index | (1)         | (2)         | (3)         | (4)         | (5)         | (6)         | (7)         | (8)         | (9)         |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Foreign bank numbers            | 0.0032 ***  | -0.0054 *** | -0.0000     | 0.0089 ***  | 0.0047 ***  | -0.0021 *** | -0.0019 *** | -0.0015 *** | -0.0104 *** |
|                                  | (0.0006)    | (0.0007)    | (0.0002)    | (0.0017)    | (0.0016)    | (0.0002)    | (0.0001)    | (0.0002)    | (0.0031)    |
| Activity restrictions           | 0.0102 ***  |             |             |             |             |             |             |             |             |
|                                  | (0.0022)    |             |             |             |             |             |             |             |             |
| Foreign bank numbers × activity restrictions | -0.0000 *** |             |             |             |             |             |             |             |             |
|                                  | (0.0001)    |             |             |             |             |             |             |             |             |
| Capital stringency              |             | -0.0466 *** |             |             |             |             |             |             | -0.0417 *** |
|                                  |             | (0.0029)    |             |             |             |             |             |             | (0.0051)    |
| Foreign bank numbers × capital stringency | 0.0008 *** |             |             |             |             |             |             |             | 0.0008 ***  |
|                                  | (0.0001)    |             |             |             |             |             |             |             | (0.0002)    |
| Multiple supervisors            |             |             | 0.0178      |             |             |             |             |             |             |
|                                  |             |             | (0.0123)    |             |             |             |             |             |             |
| Foreign bank numbers × multiple supervisors | -0.0027 *** |             |             |             |             |             |             |             | -0.0004     |
|                                  |             |             | (0.0004)    |             |             |             |             |             | (0.0012)    |
| External governance             |             |             |             | 0.0346 ***  |             |             |             |             |             |
|                                  |             |             |             | (0.0033)    |             |             |             |             |             |
| Foreign bank numbers × external governance | -0.0007 *** |             |             |             |             |             |             |             | -0.0004 *** |
|                                  |             |             | (0.0001)    |             |             |             |             |             | (0.0042)    |
| Limitations on foreign banks    |             |             |             |             | 0.0284 ***  |             |             |             | -0.0460 *** |
|                                  |             |             |             |             | (0.0116)    |             |             |             | (0.0200)    |
| Foreign bank numbers × limitations on foreign banks | -0.0014 *** |             |             |             |             |             |             |             | 0.0017 ***  |
|                                  |             |             | (0.0004)    |             |             |             |             |             | (0.0006)    |
| Applications denied             |             |             |             |             |             | -0.4251 *** |             |             | -0.1866 *** |
|                                  |             |             |             |             |             | (0.0331)    |             |             | (0.0669)    |
| Foreign bank numbers × applications denied | 0.0087 *** |             |             |             |             |             |             |             | 0.0040 ***  |
|                                  |             |             | (0.0008)    |             |             |             |             |             | (0.0014)    |
| Government banks                |             |             |             |             |             |             | -0.0020 *** |             | -0.0013 *** |
|                                  |             |             |             |             |             |             | (0.0002)    |             | (0.0006)    |
| Foreign bank numbers × government banks | 0.0001 *** |             |             |             |             |             |             |             | 0.0000      |
|                                  |             |             |             |             |             |             | (0.0000)    |             | (0.0000)    |
| Depth of information sharing    |             |             |             |             |             |             |             | -0.0182 *** | -0.0208 *** |
|                                  |             |             |             |             |             |             |             | (0.0024)    | (0.0066)    |
| Foreign bank numbers × depth of information sharing | 0.0001 *** |             |             |             |             |             |             |             | 0.0002 ***  |
|                                  |             |             |             |             |             |             |             |             | (0.0001)    |
| N                                | 56,725      | 53,379      | 56,725      | 37,854      | 56,612      | 53,571      | 56,642      | 56,729      | 32,078      |
| R-sq                            | 0.245       | 0.267       | 0.247       | 0.169       | 0.243       | 0.260       | 0.250       | 0.245       | 0.206       |
| Year fixed effect?              | Yes         | Yes         | Yes         | Yes         | Yes         | Yes         | Yes         | Yes         | Yes         |
| Clustering                      | Bank        | Bank        | Bank        | Bank        | Bank        | Bank        | Bank        | Bank        | Bank        |

Notes: All regressions control for bank characteristics and for macroeconomic, market structure, legal environment, economic cycle, regulatory and institutional variables, and the interactions between the regulatory/institutional variables and foreign bank numbers, with year fixed effects and clustering at bank level. To mitigate the potential endogeneity issues in determining the degree of bank competition, 1-year lag terms for all bank characteristic variables are used in the regressions. Results for the control variables are suppressed for brevity. Variable definitions and data sources are reported in Table 1. Standard errors appear in parentheses.

* Significance at 10%.
** Significance at 5%.
*** Significance at 1%.
information asymmetry and increases bank competition. The regulatory and institutional environment also affects the impact of foreign bank entry on competition. I find strong evidence that stringent capital requirements, higher market entry barriers, and more effective information sharing can all mitigate the impact of foreign bank entry on competition in the host countries. On the other hand, foreign bank presence exerts a more pronounced impact on bank competition in countries with more effective supervision and external governance. The economic cycle also plays a role: foreign banks have more impact during crises.

Besides the major findings above, evidence shows that larger banks have more market power, reflecting economies of scale. Banks also have higher market power if they hold more capital, focus on traditional loan business, have less insolvency risk, and are more profitable. Less efficient banks with more overhead costs tend to have lower market power. In general, the banking system is more competitive in countries with a more developed financial market and better governance, and during financial crises.

The findings from this study have important policy implications. First, the finding that bank market power is less affected by foreign bank entry under more stringent capital requirements provides additional justification for these regulations, which are mostly aimed at ensuring financial stability. Second, the evidence that foreign bank entry has less impact on the banks of countries with higher market entry barriers implies that such barriers help the extant banks survive the increased competition. Third, this study supports the importance of developing an effective credit information sharing system, which increases banking competition but also alleviates the impact of foreign banks on the incumbent domestic banks.

Declaration of competing interest

None.

Acknowledgements

This work was supported by a Faculty Development Research Fellowship provided by the Judd Leighton School of Business and Economics of Indiana University South Bend, South Bend, Indiana.

References

Anginer, D., Demirgüç-Kunt, A., & Zhu, M. (2014). How does competition affect bank systemic risk? Journal of Financial Intermediation, 23(1), 1–26.

Barajas, A., Steiner, R., & Salazar, N. (2000). The impact of liberalization and foreign investment in Colombia’s financial sector. Journal of Development Economics, 63 (1), 157–196.

Barth, J. R., Caprio, G. J., & Levine, R. (2008). Bank regulations are changing: For better or worse? Comparative Economic Studies, 50, 537–563.

Barth, J. R., Caprio, G. J., & Levine, R. (2013). Bank regulation and supervision in 180 countries from 1999 to 2011. Journal of Financial Economic Policy, 5(2), 111–219.

Beck, T., De Jonghe, O., & Schepens, G. (2013). Bank competition and stability: Cross-country heterogeneity. Journal of Financial Intermediation, 22(2), 218–244.

Berger, A. N., Hasan, I., & Zhou, M. (2009). Bank ownership and efficiency in China: What will happen in the world’s largest nation? Journal of Banking & Finance, 33 (1), 113–130.

Berger, A. N., Klapper, L. F., & Turk-Ariess, R. (2009). Bank competition and financial stability. Journal of Financial Services Research, 35(2), 99–118.

Bonin, J. P., Hasan, I., & Wachtel, P. (2005). Bank performance, efficiency and ownership in transition countries. Journal of Banking & Finance, 29(1), 31–53.

Boone, J. (2001). Intensity of competition and the incentive to innovate. International Journal of Industrial Organization, 19(5), 705–726.

Boone, J., Griffith, R., & Harrison, R. (2005). Measuring competition (research paper 022). Advanced Institute of Management.

Borensztein, E., De Gregorio, J., & Lee, J. W. (1998). How does foreign direct investment affect economic growth? Journal of International Economics, 45(1), 115–135.

Breux, F. M. (2015). Cross-border banking, bank market structures and market power: Theory and cross-country evidence. Journal of Banking & Finance, 50, 242–259.

Caprio, G., & Honohan, P. (1999). Restoring banking stability: Beyond supervised capital requirements. Journal of Economic Perspectives, 13(4), 43–64.

Cetorelli, N., & Goldberg, L. S. (2012). Banking globalization and monetary transmission. The Journal of Finance, 67(5), 1811–1843.

Chen, M., Wu, J., Jeon, B. N., & Wang, R. (2017). Do foreign banks take more risk? Evidence from emerging economies. Journal of Banking & Finance, 82, 20–39.

Chihak, M., Demirgüç-Kunt, A., Peria, M. S. M., & Mohseni-Cheraghlou, A. (2012). Bank regulation and supervision around the world: A crisis update (policy research working paper 6286). The World Bank.

Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. (2001). How does foreign entry affect domestic banking markets? Journal of Banking and Finance, 25, 891–911.

Claessens, S., & Van Horen, N. (2014). Foreign banks: Trends and impact. Journal of Money, Credit and Banking, 46(3), 295–326.

Crystal, J., Dages, B. G., & Goldberg, L. (2001). Does foreign ownership contribute to sounder banks? The Latin American experience. In R. Litan, & P. Masson (Eds.), Open doors: Foreign participation in financial systems in developing countries (pp. 217–266). Washington, DC: Brookings Institution Press.

Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence. The World Bank Economic Review, 13(2), 379–408.

Demirgüç-Kunt, A., & Martinez Pería, M. S. (2010). A framework for analyzing competition in the banking sector: An application to the case of Jordan (policy research working paper 5499). The World Bank.

Ghosh, A. (2016). Banking sector globalization and bank performance: A comparative analysis of low income countries with emerging markets and advanced economies. Review of Development Finance, 6(1), 58–70.

Jeon, B. N., Olivero, M. P., & Wu, J. (2011). Do foreign banks increase competition? Evidence from emerging Asian and Latin American banking markets. Journal of Banking & Finance, 35(4), 856–875.

Jiménez, G., Lopez, A. J., & Saurina, J. (2013). How does competition affect bank risk-taking? Journal of Financial Stability, 9(2), 185–195.

Kubo, R. (2006). The degree of competition in the Thai banking industry before and after the East Asian crisis. ASEM Economic Bulletin, 23(3), 325–340.

Levine, R. (1996). Foreign banks, financial development, and economic growth. In E. B. Claude (Ed.), International financial markets. Washington, DC: AEI Press.

Litan, R. E., Masson, P. R., & Pomerleano, M. (Eds.). (2004). Measuring competition (research paper 022). Advanced Institute of Management.

Miccio, A., Panizza, U., & Yanez, M. (2007). Bank ownership and performance. Does politics matter? Journal of Banking & Finance, 31(1), 219–241.

Mishkin, F. S. (2007). Is financial globalization beneficial? Journal of Money, Credit and Banking, 39(2–3), 259–294.

Moguillansky, G., Stuart, R., & Vergara, S. (2004). Foreign banks in Latin America: A paradoxical result. CEPAL Review, (82), 19–28.
Mulyaningi, T., Daly, A., & Miranti, R. (2015). Foreign participation and banking competition: Evidence from the Indonesian banking industry. *Journal of Financial Stability, 19*, 70–82.

Panzar, J. C., & Rosse, J. N. (1987). Testing for monopoly equilibrium. *Journal of Industrial Economics, 35*(4), 443–456.

Rajan, R. G., & Zingales, L. (2003). The great reversals: The politics of financial development in the twentieth century. *Journal of Financial Economics, 69*(1), 5–50.

Schaeck, K., & Cihak, M. (2014). Competition, efficiency, and stability in banking. *Financial Management, 43*(1), 215–241.

Schaeck, K., Cihak, M., & Wolfe, S. (2009). Are competitive banking systems more stable? *Journal of Money, Credit and Banking, 41*(4), 711–734.

Sturm, J. E., & Williams, B. (2004). Foreign bank entry, deregulation and bank efficiency: Lessons from the Australian experience. *Journal of Banking & Finance, 28*(7), 1775–1799.

Unite, A., & Sullivan, M. (2001). The impact of liberalization of foreign bank entry on the Philippine domestic banking market (PASCN discussion paper no. 2001-08). Makati City, Philippines: Philippine Institute for Development Studies. December.

Wu, J., Chen, M., Jeon, B. N., & Wang, R. (2017). Does foreign bank penetration affect the risk of domestic banks? Evidence from emerging economies. *Journal of Financial Stability, 31*, 45–61.

Yeyati, E. L., & Micco, A. (2007). Concentration and foreign penetration in Latin American banking sectors: Impact on competition and risk. *Journal of Banking & Finance, 31*(6), 1633–1647.

Yin, H. (2019). Bank globalization and financial stability: International evidence. *Research in International Business and Finance, 49*, 207–224.

Zhu, W., & Yang, J. (2016). State ownership, cross-border acquisition, and risk-taking: Evidence from China’s banking industry. *Journal of Banking & Finance, 71*, 133–153.