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Foreign Ownership and Market Power in Banking: Evidence from a World Sample

The nexus between ownership and competition in the banking sector is a major concern to policymakers around the world but one that is rarely comprehensively examined. For 131 countries and 13 years we match bank ownership with over 50,000 bank-year estimates of individual bank market power. We find that ownership does not explain market power at the individual bank level. However, at the country level, foreign bank ownership has a positive and significant impact on market power mainly because foreign banks enter through mergers or acquisitions and not through greenfield investments. The observed increases in market power primarily originate from decreases in the marginal cost.

JEL codes: D40, F23, G21
Keywords: bank market power, competition, foreign banks, world sample.

GLOBALIZATION IS CHANGING THE NATIONALITY of ownership of firms around the world in many sectors, and the banking sector is no exception. Claessens and Van Horen (2014) for example report that the percentage of foreign banks present in a country increased from on average 21% in 1995 to 35% in 2009,

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and that in certain developing countries this increase was even substantially higher. A first-order question that at once arises is how these changes in ownership affect market power in the local banking sector. To address this question we therefore construct a new data set that includes comprehensive bank-year estimates of market power of individual banks in most countries around the world, and we study the effects of foreign bank ownership on our newly constructed estimates of individual bank market power.

Our paper addresses two crucial questions at once. First, we investigate if the ownership status, that is, foreign or domestic, of individual banks affects their *own* market power. We call this the *direct impact* of (foreign) bank ownership. Theoretically, foreign banks could specialize in new and more specific products that are associated with higher prices and intermediation margins, or foreign banks could be the bearers of more cost-effective production technologies, increasing the price-cost margins (a traditional measure of market power). These (and other similar) forces would yield higher price-cost margins for foreign-owned banks. However, foreign banks entering a new banking market might also face an informational disadvantage that would force them to price their products more competitively compared to the existing local banks or be less cost effective for an initial period following their entry. So these forces would yield lower price-cost margins for foreign-owned banks. Therefore, the overall direct impact of foreign bank ownership on their market power is *a priori* ambiguous.

Second, we analyze the extent to which changes in foreign bank presence at the country (and year) level has an impact on the market power of all individual banks (which will comprise foreign and domestic publicly listed banks). That is we consider whether a banking system with a higher foreign bank presence in general induces changes in individual bank market power. We call this the *spillover effect*. More intense foreign bank presence can trigger increased competition through the entry of new banks (greenfield entry), which leads to more competitive pricing of the banking products even for local banks (e.g., through a price war). However, the overall spillover effect of increased foreign bank presence on price-cost margins could also be positive if foreign bank presence increases rapidly and higher cost efficiency does not materialize into more competitive pricing, especially given that foreign banks could monopoly price their new products.

To empirically identify the direct impact and the spillover effect we adopt a two-step procedure. First, we estimate the individual market power of virtually all publicly listed banks in the world for which financial statements are available and comparable. For our analysis, we rely on the Lerner index, which measures deviations of prices from marginal cost, and on the adjusted-Lerner index, which is similarly calculated but relaxes the assumption that banks function in a fully efficient manner. For the calculation of both indices we first estimate the marginal cost with a semiparametric technique that allows for greater flexibility in the production technology of banks compared to the extant parametric techniques. Thus, changes in the structure of the production technology across banks, countries, and time are better accounted for. In this way we improve on the estimation of marginal cost and provide a new

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index of market power for the maximum amount of time and number of banking systems possible. We also examine the sensitivity of our results to the use of other commonly used measures of market power (e.g., Lerner indices from other sources, the Boone indicator, etc.).

In the second step, we examine the relative importance of the aforementioned direct impact and spillover effect. Using the database constructed by Claessens and van Horen (2014) we classify all banks in our sample at each point in time as either domestic or foreign owned. Yet despite the relevant and dynamic character of our ownership classification we fail to find—in any of the empirical exercises we do—a statistically significant (and/or economically relevant) direct effect of foreign ownership. It seems indeed there is no difference in market power between domestic and foreign-owned banks.

Next, we aggregate foreign bank presence in each country and for each year. In this case, and even when controlling for the (seemingly irrelevant) direct impact, we find that higher foreign bank presence (at the country-year level) increases the market power of the average bank in the industry (whether it is domestic or foreign owned) in a statistically significant and robust manner. This effect is also economically relevant. For example, an increase in foreign bank presence from 17% in 1997 to 25% in 2009 (which is the increase observed for the average country in our baseline specification) results in an increase in the Lerner index by 0.07 points (for the average Lerner index in our sample of 0.22 this is equivalent to a 32% increase). These findings are not sensitive to the use of alternative specifications for the estimation of the Lerner index and to other commonly used measures of market power (e.g., the measurement of market power with a country-level Lerner index or a Boone indicator).

We also analyze some theoretically plausible heterogeneous effects in the identified positive relation between foreign bank presence and market power. We show that the positive effect of foreign bank presence on banks' market power is primarily due to their entry through a merger or acquisition rather than through a greenfield investment. Indeed, in our sample, two out of three foreign banks are established in the host country through a merger or acquisition, and this is seemingly the main channel leading to the positive spillover effect of foreign bank presence on banks' market power.

In addition, we find that the positive spillover effect of foreign bank ownership on the Lerner index is mainly due to the resultant lower marginal cost. In contrast, foreign bank presence does not have a statistically significant effect on the price component of the Lerner index, though this effect *per se* does contribute to the strong impact of foreign bank presence on the margin (gap) between price and marginal cost (and naturally on the Lerner index itself). Thus, higher foreign bank presence in a country increases the market power of banks by directly affecting the gap between output prices and marginal cost mainly through increases in the cost efficiency across banks. Importantly, this result is driven by the mode of foreign bank entry.

Our study is the first to investigate if and by how much foreign bank ownership affects individual bank market power, across certain bank and industry characteristics

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that may affect the relative importance of this effect. Our finding on the positive spillover effect contrasts with the only two existing empirical studies on this issue. Claessens and Laeven (2004) study a cross-sectional sample of 50 countries (with market power estimates averaged over the period 1994–2001) and Jeon, Olivero, and Wu (2011) study a country-year panel for the period 1997–2008 of Asian and Latin American countries. Both analyze the impact of foreign bank presence on bank competition at the country (and year) level. Both studies find a negative (positive) relation between foreign ownership and market power (competition).

There are a number of differentiating characteristics of our study *vis-à-vis* theirs that may help explain our unique findings. Most importantly based on our own estimates of individual bank market power and the foreign ownership data collected by Claessens and van Horen (2014) we can analyze the impact of a bank-level market power variable for a sample covering 131 countries over the period 1997–2009 (which compared to all existing studies guarantees us the broadest coverage). In contrast, existing studies focus on the relation between foreign bank entry and market power (competition) at the country or country-year level for a more limited number of countries. We take a number of steps (including the replication of the results of both previous studies) to show that level of the analysis and the sample coverage are the main reasons behind our finding of a positive correspondence between foreign bank presence at the country level and market power at the bank level.

The remainder of the paper is structured as follows. Section 1 provides the theoretical arguments linking foreign bank ownership with bank market power and the explicit paths that can influence this relation. Section 2 discusses the data set on the banks' market power along with the way this is estimated and also provides definitions and information on the foreign bank ownership and the control variables. Section 3 discusses the empirical identification procedure and the estimation results. Section 4 summarizes the results and provides policy implications.

1. THEORETICAL CONSIDERATIONS AND RELATED LITERATURE

There are two main channels through which foreign bank ownership may affect bank market power. First, foreign banks may have different levels of market power compared to domestic banks. We call this the *direct impact* of foreign ownership on market power. The second effect is related to the fact that foreign bank presence in the banking industry as a whole can cause changes to banks' market power, domestic and foreign. We call this the *spillover effect* of foreign bank presence on bank market power. We analyze the two effects by emphasizing their sources, as these are related to the pricing of banking products or to their marginal cost. Prices and costs may change due to the direct impact and the spillover effect, hence the price-cost margin (Lerner index), which is a common measure of market power, may be changing accordingly.

It is not *a priori* obvious whether the direct impact will be positive or negative. On the one hand, foreign banks have access to alternative sources of funds through their affiliates in their country of origin and could bring in more specialized and

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sophisticated banking products that are monopolistically priced. Furthermore, these banks are usually more cost-efficient (Bonin, Hasan, and Wachtel 2005, Degryse et al. 2012), as they have access to better technology, especially if their country of origin has a more developed banking sector compared to the one they penetrate (Claessens, Demirgüç-Kunt, and Huizinga 2001, and Micco, Panizza, and Yan 2007). On the other hand, foreign banks entering a new market may face an informational handicap (Bofondi and Gobbi 2006, Gormley 2010), at least in the initial period following their entry, that could force them to price their products more competitively so that they offer better loan terms to attract customers from existing banks (Sengupta 2007).[1] Such behavior would result in a lower price-cost margin.

The direction of the spillover effect is again *a priori* ambiguous. Foreign bank entry can stimulate competition in domestic markets in general and put downward pressure on prices (Levine 1996, Beck, Ioannidou, and Schafer 2012). This effect is likely to be particularly strong in the case of greenfield entry, which adds competitors, and less so in the case of acquisitions, where a foreign bank takes over an existing domestic bank. However, there are also forces leading to a positive relation between foreign bank presence and bank market power. First, if the efficiency advantage of foreign banks forces domestic banks to become more efficient themselves, this could lead to higher margins for all banks if the cost savings are not passed on through lower prices. The same effect could arise if foreign banks are able to exploit their superior know-how and come to dominate domestic markets in new innovative financial products. If this is accompanied by a large scale and rapid penetration of foreign banking, this mechanism will naturally result to a monopolistic behavior of many banks in the industry and the loss of competitive pricing of the monopolistic products, at least for some period of time.

Clearly, the nexus between foreign bank ownership and market power could be affected by a number of bank- and market-specific characteristics. At the bank level, a comparative advantage of the foreign banks usually comes from their access to capital from their parent companies in the origin country. Given that capital requirements are now in place in virtually all countries, this advantage of foreign banks can translate into a lower cost of capital and improved efficiency. However, if the capital market in the domestic banking system is deep and domestic banks are well capitalized, this will weaken the implied positive relation between foreign ownership and market power. The opposite effect could prevail if there is a big difference between foreign and domestic banks in the way they finance their own lending. Usually, domestic banks have established long-term relationships with their depositors and they tend to have higher deposits to assets ratios. In contrast, foreign banks have access to potentially less expensive liquid funds from their parent companies or the international interbank market.

As discussed above, a natural differentiating factor in the impact of foreign ownership on competition is the mode of foreign bank entry. Greenfield entry increases

1. Bofondi and Gobbi (2006) suggest that domestic banks have informational advantage with respect to their own costumers and the overall economic conditions of the local credit market.

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the number of banks in the domestic banking industry, which by itself promotes competition, whereas penetration through an acquisition leaves the number of banks unchanged (Martinez Peria and Mody, 2004). Van Tassel and Vishwasrao (2007) and Claeys and Hainz (2014) further highlight that a foreign bank enters through a greenfield investment only if its advantage in screening new applicant firms, due to, for example, better screening technology, compensates its disadvantage of having no information about incumbent firms. If a foreign bank enters *via* an acquisition, it acquires a credit portfolio that contains information about the quality of incumbent firms. In addition, the acquired bank can generate information by screening applicants and this generates an informational advantage for foreign banks entering *via* acquisitions. The mode of entry, thus, determines the distribution of information between foreign and domestic banks, which affects the degree of competition in the banking industry.

The empirical evidence on the influence of the mode of entry on various aspects of banking is substantial. For example, in Mexico during the so-called tequila crisis, foreign banks entered almost entirely through the acquisition of existing domestic banks, thus preserving the oligopolistic structure of the industry (Moguillansky, Stuart, and Vergara 2004). Also, Havrylchyk (2006) shows that Polish banks acquired by foreign banks do not show improvements in efficiency, whereas greenfield entrants tend to be more efficient than their domestic counterparts. Similarly, Peek, Rosengren, and Kasirye (1999) find that foreign banks entering the U.S. market tend to acquire poor-performing institutions and that the performance of these institutions does not substantially improve postacquisition. Finally, Lehner (2009) suggests that greenfield entry occurs mainly in developed countries, whereas in less developed countries entry by acquisition is more prevalent.

The relation between market power and foreign ownership can also be affected by a number of characteristics of the banking industry. Claessens, Demirgüç-Kunt, and Huizinga (2001) show that foreign banks have lower interest margins, overhead expenses, and profitability than domestic banks in developed countries, whereas the opposite is true in developing countries. Similarly, Lensink and Hermes (2004) find that foreign bank entry into less developed countries leads to higher costs and margins for the local banks, and Micco, Panizza, and Yan (2007) that foreign-owned banks in developing countries are more cost-efficient than private local banks. These studies suggest that the reasons for foreign entry, as well as the competitive and regulatory conditions found abroad, might differ significantly between developed and developing countries.

Besides the two papers that are directly relevant to our work (Claessens and Laeven 2004, Jeon, Olivero, and Wu 2011), our study is also related to two large, but rather separate, literatures: one on foreign bank participation and one on banking competition and market power. Claessens (2006) reviews and refines the full set of arguments linking the two literatures and identifies the limitations of the existing empirical evidence. Among other studies, Clarke et al. (2003), Beck, Ioannidou, and Schafer (2012), and Bruno and Hauswald (2013) find that foreign bank entry improves credit conditions for enterprises of all sizes, and Berger, Hasan, and Klapper (2004)

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suggest that a larger foreign bank presence leads to a greater availability of credit to SMEs (see also Giannetti and Ongena 2009, 2012).

Detragiache, Tressel, and Gupta (2008), Beck and Martinez Peria (2010), Gormley (2010), and Balmaceda, Fischer, and Ramirez (2014) offer a less positive view of foreign bank participation by highlighting that foreign banks tend to select borrowers with greater creditworthiness ("cherry pick"), whereas domestic banks are left with lower quality borrowers. This, in turn, can hurt the profitability of the domestic banks and their willingness to lend. Empirical research on the relative performance of domestic and foreign banks has produced contradictory results, with some studies finding that foreign banks do better and other studies reporting stronger performance of domestic banks; see Degryse and Ongena (2008) and Chen and Liao (2011) for reviews of this evidence.

2. VARIABLES AND DATA

The empirical model we use to study the relation between foreign bank ownership and bank market power is of the following form:

$$L_{itc} = \delta_0 + \delta_1 L_{i,t-1,c} + \varphi FO_{i,t-1,c} + \theta FP_{t-1,c} + \delta_2 B_{itc} + \delta_3 X_{t-1,c} + \varepsilon_{itc}. \quad (1)$$

In equation (1) the market power L of bank i at year t and country c is regressed on its annual lag, a dummy variable *foreign-owned* (*FO*) that is observed at the bank-country-year level and takes the value one when a bank is foreign owned and zero otherwise, an indicator *foreign presence* (*FP*) that is observed at the country-year level and measures the extent of foreign bank presence,[2] a vector of bank characteristics B observed at the bank-year level, and a vector of variables X observed at the country-year level. ε_{itc} is the stochastic disturbance.

Foreign-owned and *foreign presence* enter equation (1) with a one-year lag in our baseline specifications, and the same holds for all the variables observed at the country-year level. This timing is derived from the fact that country-level changes, like structural, regulatory, and macroeconomic developments, take time to reach the market and have a bearing on the market power of individual banks. In addition, modelling our two foreign ownership variables in this way mitigates the endogeneity problem stemming from reverse causality. In contrast, all the bank-level control variables B enter equation (1) contemporaneously. These variables have a direct and contemporaneous bearing on the cost structure and the pricing decisions of banks, as they describe individual bank strategies that can change in the short-term.

Our final data set includes bank-level data from 131 countries and spans the period 1997–2009 (due to the availability of data for foreign bank ownership). The rest of

2. Given that the correlation coefficient between the two variables is 0.50, we check whether our estimates suffer from multicollinearity problems. However, the variance inflation and other tests for collinearity imply that this is not the case and that an analysis including both variables is statistically meaningful.

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this section discusses our measures of bank market power, the foreign ownership variables, and the control variables used in our study. The correlation coefficients between the explanatory variables that were used as determinants of bank market power do not give rise to any multicollinearity concerns (further left unreported). In Table 1 we provide detailed definitions for the variables used to estimate equation (1) and in Table 2 we report summary statistics for these variables.

2.1 Measures of Market Power

The measurement of market power has received much attention in the economics literature since the importance of imperfectly competitive markets was first recognized in the 1930s. The Lerner (1934) index remains to this day a popular measure of market power (and of competition) thanks to its simplicity and transparency. It is defined as:

$$L_{itc} = \frac{P_{itc} - MC_{itc}}{P_{itc}}\ , \tag{2}$$

where P and MC are the price of bank output and the marginal cost of the production of this output. The Lerner index ranges between zero and one, with zero corresponding to perfect competition and larger values reflecting more market power (and less competition). The index can also be negative if $P < MC$, which is of course not sustainable in the long run.

The Lerner index measures departures from the competitive benchmark of marginal cost pricing. This makes it a simple and intuitively appealing index of market power. The index has also often been used as a measure of competition. Although the link between market power and competition might seem obvious, it has been shown that the Lerner index does not always point in the expected direction when competitive conditions change (Stiglitz 1989, Boone 2008). For this reason we interpret the Lerner index as primarily a measure of market power, with a further connection to competition a natural but not entirely uncontroversial possibility.

Alternative measures of market power and competition include the H-statistic (Panzar and Rosse 1987) and the profit elasticity (Griffith, Boone, and Harrison 2005). The H-statistic has been widely used in banking studies but has a shortcoming when it is used as a continuous measure of market power. As Bikker, Shaffer, and Spierdijk (2012) point out, the H-statistic maps the various degrees of market power only weakly and thus cannot be viewed as a continuous variable. The profit elasticity (or Boone indicator) is a relatively new concept that has been used in several recent studies but has also received some criticism. For example, Schiersch and Schmidt-Ehmcke (2010) show that it makes critical assumptions relative to firm size and to market definition.

Given that the alternative indices of market power and competition are still open to some critique, we favor the Lerner index and its variants as our proxy for market power. However, we also employ as robustness checks the H-statistic and the Boone indicator. The main reason for our choice is that the Lerner index allows for variation

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TABLE 1

VARIABLE DEFINITIONS AND SOURCES

Name	Description	Data Source
Panel A. Variables used in the analysis of market power		
Earning assets	Natural logarithm of deflated total earning assets (measure of a bank's output).	Bankscope
Price of output	Total income divided by total earning assets.	Bankscope
Expenses	Natural logarithm of deflated total interest expenses and total noninterest expenses (measure of a bank's total cost).	Bankscope
Price of borrowed funds	Natural logarithm of total interest expenses divided by total customer deposits and short-term funding.	Bankscope
Price of labor	Natural logarithm of personnel expenses divided by total assets.	Bankscope
Price of physical capital	Natural logarithm of overheads minus personnel expenses divided by fixed assets.	Bankscope
Price of financial capital	Natural logarithm of equity divided by total assets	Bankscope
Panel B. Variables used in the analysis of market power		
A. Dependent variable		
Lerner index	The ability of an individual bank to charge a price above marginal cost.	Own calculations
Average Lerner index	The Lerner index averaged by country and year	Own calculations
Adjusted-Lerner index	Variant of the Lerner index which allows for the possibility that firms do not choose the prices and input levels in a profit-maximizing way.	Own calculations
Dual-output Lerner	Variant of the Lerner index that adopts a dual-output cost function.	Own calculations
H-statistic	This is the Panzar and Rosse (1987) H-statistic measured by the elasticity of bank interest revenues to input prices. The H-statistic is estimated at the bank-year level using the same technique with the Lerner indices. Higher values reflect less market power.	Own calculations
Average H-statistic	The H-statistic averaged by country and year	Own calculations
Lerner World Bank	The Lerner index by country and year, where marginal cost is estimated with the usual parametric techniques and a translog cost function.	World Bank
Boone World Bank	The elasticity of profits to marginal costs by country and year, where marginal cost is estimated with the usual parametric techniques and a translog cost function.	World Bank
Price-cost margin	The price of output minus the marginal cost	Own calculation
B. Bank characteristics		
Deposits	Total customer deposits divided by total assets.	Bankscope
Capitalization	Equity capital divided by total assets.	Bankscope
Loans	Total loans divided by total assets.	Bankscope
Bank size	Natural logarithm of total assets.	Bankscope
C. Main explanatory variables		
Foreign-owned	Dummy variable equal to one if bank is foreign owned (50% or more of their assets)	Claessens and Van Horen (2014)
Foreign presence	The ratio of the number of foreign banks over the number of all banks.	Claessens and Van Horen (2014)
Foreign presence in terms of assets	The ratio of the assets of foreign banks over the total assets of all banks.	Claessens and Van Horen (2014)

(*Continued*)

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TABLE 1

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Name	Description	Data source
Panel B. Variables used in the analysis of market power		
Country mergers & acquisitions (M&As)	The ratio of the number of foreign-owned banks that enter via M&As over the number of foreign-owned banks (scaled from zero to one).	Claessens and Van Horen (2014)
Entry restrictions	The index measures the degree to which banks face entry restrictions in the banking market and is constructed by adding 1 if the answer is yes and 0 otherwise, for each one of the following twelve questions: (1) Is more than one license required (e.g., one for each banking activity)? (2) Which of the following are legally required to be submitted before issuance of the banking license: (a) draft bylaws (b) intended organizational chart (c) financial projections for first three years (d) financial information on main potential shareholders (e) background/experience of future board directors (f) background/experience of future senior managers (g) source of funds to be used as capital. (3) What were the primary reasons for denial of the applications: (a) capital amount or quality (b) banking skills (c) reputation (d) other? This index takes a value from 0 to 12, with larger values denoting more stringent entry restrictions.	Barth, Caprio, and Levine (2001, 2004, 2008) and Cihak, Demirgüç-Kunt, Martinez Peria, and Mohseni-Cheraghlou (2012), in the text labeled as *BCL2008*
Loan-loss provisions	Loan-loss provisions divided by total loans	Bankscope
Private ownership	The percentage of bank deposits held in privately owned banks were used to construct rating intervals. Countries with larger shares of privately held deposits received higher ratings.	Economic freedom of the world: 2012 Annual report
Herfindahl-Hirschman index	Hirschman-Herfindahl index of each bank's total earning assets (takes value from 0 to 1).	Own calculations
Activity restrictions	The score for this variable is determined on the basis of the level of regulatory restrictions on bank participation in: (1) securities activities, (2) insurance activities, (3) real estate activities, and (4) bank ownership of nonfinancial firms. These activities can be unrestricted, permitted, restricted or prohibited and on this basis the variable is assigned the values of 1, 2, 3, or 4, respectively. The index takes a value from 0 to 16, with larger values denoting more stringent activity restrictions.	Barth, Caprio, and Levine (2001, 2004, 2008) and Cihak, Demirgüç-Kunt, Martinez Peria, and Mohseni-Cheraghlou (2012), in the text labeled as *BCL2008*
Capital requirements	This variable is determined: (a) by adding 2, 1, or 0 if the answer is Basel II, Basel I, or other; in the question: Which is the regulatory capital adequacy regime?, (b) by adding 1 if the answer is yes and 0 otherwise in the questions: Does the ratio vary with market risk? Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities?, (c) by adding 1 if the answer is no and 0 otherwise in the questions: Can the initial or subsequent injections of capital be done with assets other than cash or government securities? Can initial disbursement of capital be done with borrowed funds? This index takes a value from 0 to 6, with larger values denoting more stringent capital requirements.	Barth, Caprio, and Levine (2001, 2004, 2008) and Cihak et al. (2012), in the text labeled as *BCL2008*
Supervisory power	Index of the powers of the supervisor of the banking sector, reflecting whether the supervisory agency has the authority to take specific actions to prevent and correct problems in the banking sector. Takes values from 0 to 14, with higher values reflecting more supervisory powers (see Barth, Caprio, and Levine, 2008).	Cihak, Demirgüç-Kunt, Martinez Peria, and Mohseni-Cheraghlou (2012), in the text labeled as *BCL2008*

(*Continued*)

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TABLE 1

CONTINUED

Name	Description	Data source
Panel B. Variables used in the analysis of market power		
Manufacturing	The sum of gross output minus the value of intermediate inputs used in the production of manufacturing goods.	World Development Indicators
Foreign direct investment	The net inflow of foreign direct investment.	World Development Indicators
Government spending	The level of government expenditures as a percentage of GDP.	Heritage Foundation
Financial freedom	Index of banking security and independence from government control. Larger values indicate more freedom.	Heritage Foundation
Trade freedom	A composite measure of the absence of tariff and nontariff barriers that affect imports and exports of goods and services. Larger values indicate more freedom.	Heritage Foundation
Ideology	The classification rule for the chief executive of each country is as follows: Right (1), Center (2), Left (3), No information (NA), No executive (NA).	Beck et al. (2001)
Polity	The polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic).	Polity IV
GDP per capita	Natural logarithm of GDP per capita.	World Development Indicators
Years of foreign ownership >40%	The number of consecutive years since when the foreign ownership variable reached a value of 40% or higher in a specific country (zero otherwise).	Own calculations
Years of foreign ownership >50%	The number of consecutive years since when the foreign ownership variable reached a value of 50% or higher in a specific country (zero otherwise).	Own calculations
D. Instrumental variable		
Entry restriction for foreign banks	This variable is determined by adding 1 if the answer is yes and 0 otherwise, for each one of the following four questions: Are foreign entities prohibited from entering through: (1) acquisition, (2) subsidiary, (3) branch and (4) joint venture. The index takes a value from 0 to 4, with larger values denoting more stringent entry restrictions for foreign banks.	Barth, Caprio, and Levine (2001, 2004, 2008) and Cihak, Demirgüç-Kunt, Martinez Peria, and Mohseni-Cheraghlou (2012), in the text labeled as *BCL2008*

at the bank level. This advantage increases the richness of our empirical analysis as it allows us to study both the direct impact and the spillover effect of foreign bank ownership and presence. Also, as Beck, De Jonghe, and Schepens (2013) readily argue, the Lerner index is a good proxy for current and future profits stemming from pricing power, while it is not constrained by the extent of the market. In contrast, other bank-level measures, such as the market share or Tobin's q, can lead to larger measurement error because they also capture to a greater extent the rents extracted from being too big to fail.[3] Moreover, the Lerner index captures both the impact of pricing power on the asset side of the banks' balance sheet and the elements associated with the cost efficiency on their liability side.

3. Even though to a lesser extent, this can also be the case for the Lerner index, in light of governments' policies toward too-big-to-fail banks, especially during times of financial turmoil.

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TABLE 2

SUMMARY STATISTICS

Variable	Level	Obs.	Mean	SD	Min.	Max.
Panel A. Variables used in the derivation of market power from 1997 to 2010						
Earning assets	Bank	89,514	11.71	2.02	6.83	21.38
Price of output	Bank	89,514	0.09	0.07	0.02	0.71
Expenses	Bank	89,514	8.85	1.93	4.55	18.41
Price of borrowed funds	Bank	89,514	–3.62	0.85	–8.79	0.03
Price of labor	Bank	89,514	–4.30	0.56	–7.18	–2.41
Price of physical capital	Bank	89,514	–0.10	0.92	–2.04	4.04
Price of financial capital	Bank	89,514	–2.50	0.59	–8.40	0.00
Marginal cost	Bank	89,514	0.07	0.06	0.01	1.75
Panel B. Variables used in the analysis of market power from 1997 to 2009						
Lerner index	Bank	80,506	0.22	0.11	–0.20	0.95
Lerner index with financial capital	Bank	80,557	0.22	0.12	–0.20	0.95
Adjusted-Lerner index	Bank	78,634	0.17	0.12	–0.20	0.95
Dual-output Lerner index	Bank	74,148	0.21	0.20	–11.54	0.95
H-statistic	Bank	81,906	0.23	0.22	–0.56	0.46
Lerner World Bank	Country	81,698	0.21	0.08	–1.61	0.82
Boone World Bank	Country	73,920	–0.05	0.10	–2.08	5.69
Average price	Bank	81,906	0.09	0.06	0.02	0.71
Marginal cost	Bank	81,906	0.07	0.06	0.01	1.75
Price-cost margin	Bank	81,906	0.02	0.02	–1.08	0.41
Deposits	Bank	81,906	0.69	0.20	0.00	1.00
Capitalization	Bank	81,906	0.10	0.08	0.00	1.00
Loans	Bank	81,839	0.61	0.19	0.00	9.36
Bank size	Bank	81,906	12.85	1.66	7.70	21.51
Loan-loss provisions	Bank	79,461	0.01	0.70	–5.70	180.54
Foreign-owned	Bank	81,906	0.08	0.27	0	1
Country M&As	Country	81,906	0.72	0.32	0	1
Foreign presence	Country	81,906	20.60	16.96	0	100
Foreign presence in terms of assets	Country	42,424	18.40	18.54	0	100
Entry restrictions	Country	81,181	7.56	1.96	0	12
GDP per capita	Country	81,864	10.10	0.82	6.10	11.21
Years of foreign ownership >40%	Country	81,906	0.59	2.13	0	13
Years of foreign ownership >50%	Country	81,906	0.39	1.70	0	13
Private ownership	Country	72,596	7.65	2.46	0	10
Herfindahl-Hirschman index	Country	81,906	0.09	0.14	0	1
Activity restrictions	Country	81,215	9.01	2.50	1	16
Capital requirements	Country	81,351	3.53	0.86	0	6
Supervisory power	Country	81,301	11.05	2.27	1	14
Manufacturing	Country	80,350	17.93	4.54	1.82	35.63
Foreign direct investment	Country	81,735	5.63	34.26	–15.03	564.92
Government spending	Country	81,649	50.82	21.00	0	99.30
Financial freedom	Country	81,649	64.18	18.57	10	90
Trade freedom	Country	81,649	77.75	9.93	0	95
Ideology	Country	77,899	1.64	1.07	0	3
Polity	Country	80,325	8.89	3.17	–10	10
Entry restrictions for foreign banks	Country	81,744	0.09	0.33	0	4

NOTE: The table reports summary statistics for the variables used in the empirical analysis. The variables are defined in Table 1.

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Computation of the Lerner index requires knowledge of the marginal cost. When such information is unavailable (as in most empirical data sets), the marginal cost can be estimated using econometric methods. A popular approach has been to estimate a translog cost function and take its derivative to obtain the marginal cost. Some recent work has shown that it is possible to improve on this methodology with semiparametric or nonparametric methods that allow for more flexibility in the functional form (McAllister and McManus 1993, Delis, Iosifidi, and Tsionas 2014). We follow this new literature and estimate the cost function using a partial linear smooth coefficient (PLSC) model. We provide all the details for the estimation of marginal cost and the data cleaning process in online Appendix A (https://sites.google.com/site/sotirioskokas/publications) and here we just outline the advantages of this approach.[4]

Most importantly, the semiparametric nature of the method implies that no assumption regarding the functional form of the cost equation is made globally. An assumption is just made "in local neighborhoods of observations." This is important as it is usually quite difficult for the researcher to be certain about the validity of the chosen functional form. In their survey paper, Reiss and Wolak (2007) are very skeptical about using a specific functional form to estimate a cost equation without a prior analysis of the data, because an "incorrect" cost equation can bias the estimation and inference of marginal cost in an unknown direction and with an unknown magnitude. The flexibility of the semiparametric technique also allows using large international samples of banks from different countries, without being concerned that certain banking markets in different countries or banks within the same country face or adopt different production technologies. Hence, this approach takes into account the heterogeneity in the production technology across banks, countries, and time. Delis (2012), Wheelock and Wilson (2012), and Delis, Iosifidi, and Tsionas (2014) show that estimation of marginal cost using semiparametric and nonparametric methods produces significantly better results (in terms of lower bias) than parametric techniques and commonly used functional forms like the translog.

The data used for the estimation of the Lerner index are from Bankscope and require an advanced cleaning process to avoid including duplicates in our sample. This literally involves examining each bank one by one and in many instances collecting information from the banks' websites, for example, to examine the history of bank operation and ownership, the existence of subsidiaries with the same names with the parent bank, and the occurrence of M&As during our sample period. We provide all the details of this intensive data collection and processing in online Appendix A (https://sites.google.com/site/sotirioskokas/publications).

We also use two variants of the traditional Lerner index. The first is the efficiency-adjusted Lerner index, which takes the form:

$$adj.-Lerner_{itc} = \frac{\Pi_{itc} + TC_{itc} - MC_{itc} \cdot Q_{itc}}{\Pi_{itc} + TC_{itc}}, \tag{3}$$

4. We check the robustness of our results by using the translog model. We find some deviations in our results that are in line with the study of Delis, Iosifidi, and Tsionas (2014). However, our main results on the effect of foreign bank presence on bank market power are qualitatively similar.

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where Π is the banks' profit and Q is the banks' output, measured by the banks' total earning assets. This index allows for the possibility that firms do not choose the prices and input levels in a profit-maximizing way. For the estimation of this index we use the exact same procedure as Koetter, Kolari, and Spierdijk (2012).

The second variant of the Lerner index adopts a dual-output cost function. Specifically, many banks have a significant volume of off-balance sheet items that can be considered as a distinct output besides the total earning assets that are used as our main output. The off-balance sheet items are produced using essentially the same inputs with the single-output model of the bank and, thus, the single-output model may be missing some important information. For the estimated dual-output cost function and its derivative, see online Appendix A (https://sites.google.com/site/sotirioskokas/publications).

In online Appendix B (https://sites.google.com/site/sotirioskokas/publications), we report the weighted mean values of the estimated Lerner index by country and year, with market shares as the weights. The equivalent estimates for the adjusted-Lerner index and the dual-output Lerner index are available on request. These values are effectively a new worldwide index of banking-sector competition, with larger coverage compared to existing literature. The weighted mean values are 0.27, 0.17, and 0.22 for the Lerner index, the adjusted-Lerner index, and the Lerner index with two outputs, respectively. The Lerner index ranges between –0.12 in Ecuador in 1998 and 0.82 (close to monopoly) in Cuba in 1997. The adjusted-Lerner index ranges between –0.18 in Paraguay in 2002 and 0.82 in Cuba in 1997. We omit the discussion for the Lerner index for the two-output case, as the results on this index are very similar to the other two Lerner indices.[5]

In Figure 1, we show the time trend in average bank competition for each of the three indices. In broad terms, all indices identify similar trends in competition for the 148 economies over time. More precisely, average bank market power peaks in 2003–2004, declines in the period 2007–2008, and increases again in 2009 and 2010. This pattern may reflect the sharp increase in financial globalization before the financial crisis of 2007 and related reforms that are likely to have led to higher market power through cross-border M&As and increased efficiency, without an accompanying reduction in the lending rate. Evidently, the start of the global financial crisis coincides with a decrease in the market power. This may be related to capital losses and nonperforming loans suffered by many banks, which reduced efficiency, or to the rising informational asymmetry costs faced by banks during crises (e.g., adverse selection and moral hazard) that sharply increase the real cost of lending.

2.2 Foreign Bank Ownership

Information for foreign bank ownership is from the database of Claessens and van Horen (2014). As we follow their approach in our own data processing to estimate

5. Our country averages for the Lerner index are very close to the equivalent from the World Bank (overall averages are 0.22 and 0.21, respectively). Even though there are some relatively minor differences between the countries, the correlation coefficient between the two is as high as 0.67. Most countries with high (low) Lerner indices based on our estimates also have high (low) Lerner indices in the respective indices of the World Bank. Sensitivity analysis using the World Bank estimates confirms the main findings of our study.

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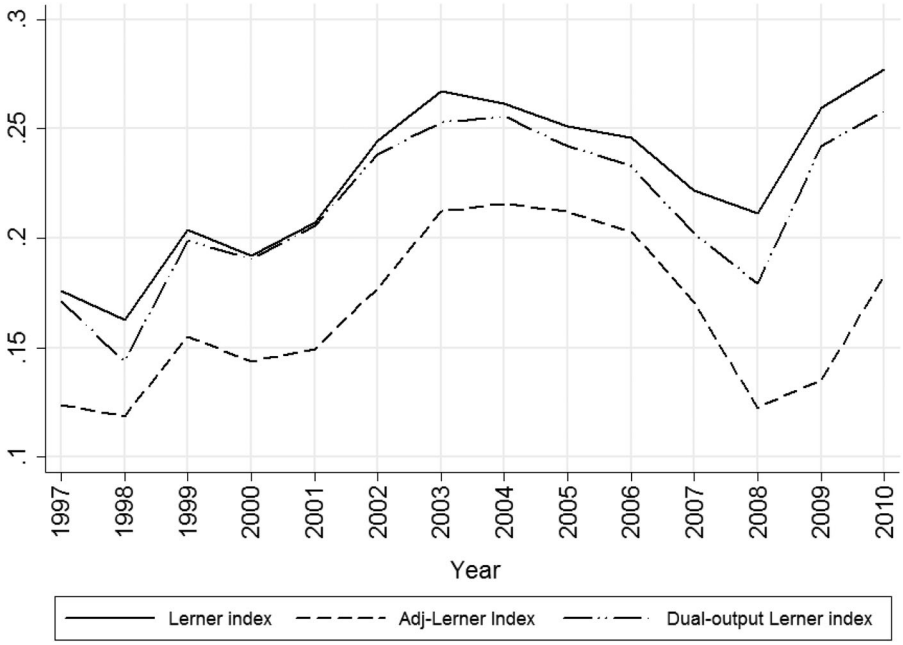

FIG. 1. Evolution of the Average Lerner Indices by Year.

bank market power, we have an almost identical sample of banks that we identify as foreign or domestic owned. Foreign-owned banks are identified as those with 50% or more of their shares owned by foreigners, and we use this information to construct the *foreign-owned* dummy variable. This variable identifies the direct effect of foreign ownership on the market power of individual banks.

For the country-level *foreign presence*, Claessens and van Horen (2014) construct two indices. The first index is defined as the percentage of foreign banks among total banks in a country (*foreign presence*) and covers the period 1995–2009. The second is defined as the percentage of foreign bank assets among total bank assets (*foreign presence in terms of assets)*. Even though the second index can be argued to describe foreign bank presence somewhat better, it is only available for the 2004–2009 period because of missing information on bank assets for a large number of banks before 2004. The correlation coefficient between the two indices for the period 2004–2009 is as high as 81.1%. Thus, the large time span of the data set makes the use of the first index optimal for our study, whereas the index based on the market share of foreign banks is used in a sensitivity analysis.

By using *foreign presence* in the same equation with *foreign owned* we are able to identify the separate impact of the two on banks' market power. Figure 2 presents a scatter plot of the Lerner index against *foreign presence* and the associated regression line. The regression line has a positive slope that is statistically significant at the

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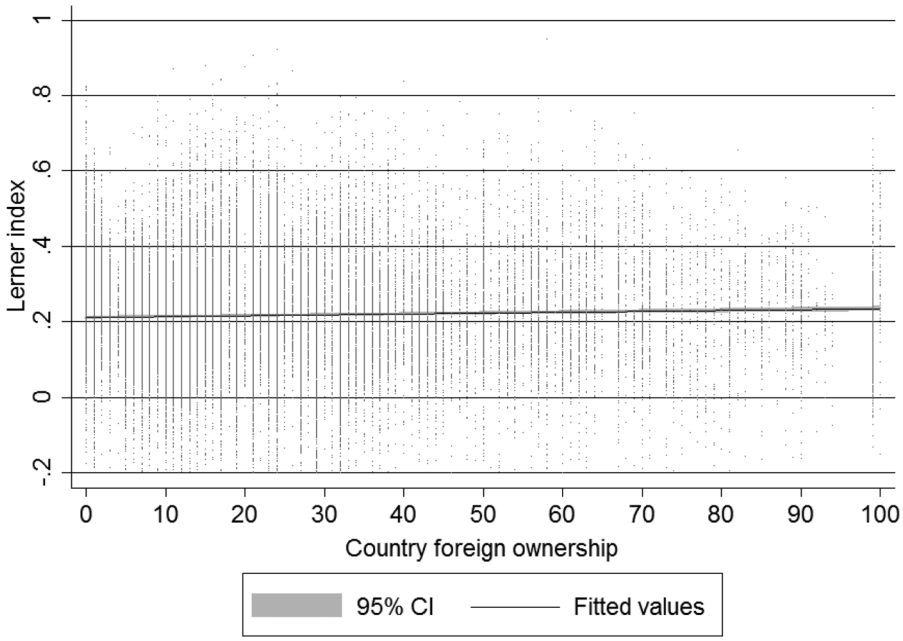

FIG. 2. Foreign Bank Presence and Banks' Market Power.

1% level. It remains to be examined whether this relation continues to hold when controlling for *foreign owned* and whether it can be interpreted as causal.

2.3 Control Variables

Consistent with previous studies, we include several control variables that are drawn from the literature on the determinants of bank competition to rule out other possible explanations for our results (e.g., Claessens and Laeven, 2004, Beck, Demirgüç-Kunt, and Levine 2006, Delis 2012). The bank-specific variables (indicated as B_{itc} in equation (1)) include the ratio of customer deposits to total assets (termed *deposits*) to control for the level of bank deposits supporting total assets, the ratio of the book value of equity capital to total assets (*capitalization*) to control for bank capitalization, the ratio of loans to total assets (*loans*) to control for bank specialization (also used as a crude measure of liquidity), and the natural logarithm of real total assets (*bank size*) to measure bank size. Delis (2012) shows that well-capitalized and larger banks are able to set higher margins or to have access to cheaper sources of funds due to scale economies and lower informational asymmetries. In contrast, a higher deposits ratio implies higher cost of intermediated funds and, thus, lower market power (especially in normal economic periods). In turn, *loans* is a

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measure of bank specialization, with a higher ratio relating to banks that focus on the traditional activity of credit provision.

We additionally assess the robustness of our results to the use of other measures of bank liquidity (liquid assets divided by total assets) and credit risk (nonperforming loans divided by total loans or loan-loss provisions divided by total loans), but we did not find significant changes in our results. It should be noted that the sample is smaller when including the last two variables, due to missing data, and that the definition of liquid assets in Bankscope sometimes differs across countries.

For the country-level characteristics we use a wide set of structural, regulatory, institutional, and macroeconomic variables. First, we use the entry restrictions index, which measures the degree to which all banks in a country face entry barriers. We construct this index using information from the studies of Barth, Caprio, and Levine (2008), Cihak et al. (2012), and previous versions of the former study (henceforth jointly indicated as *BCL2008*; details are provided in Table 1). This index takes a value from zero to 12, with larger values denoting more stringent entry restrictions.

We also use the relative share of privately owned banks versus that of the publicly owned banks (constructed in terms of deposits). This allows avoiding to falsely attribute the impact of foreign bank ownership (which usually corresponds to private ownership) to the associated impact of private ownership on banks' market power. We note that poorer countries are associated with higher levels of public ownership of banks, which is consistent with the findings of La Porta, Lopez de Silanes, and Shleifer (2002). Further, we use the Herfindahl-Hirschman index, which is defined as the ratio of the sum of squared market shares of each bank in the industry. Market concentration measures, such as the Herfindahl-Hirschman index, have been considered in the past as measures of competition (Cetorelli and Strahan 2006). There is now consensus that these indices are not accurate proxies of competition, but they are nonetheless useful control variables as they reflect important industry characteristics (Claessens and Laeven 2004, Beck, Demirgüç-Kunt, and Levine 2006).

Another important set of characteristics that can potentially influence the relation between market power and foreign bank ownership relates to the regulatory framework in which banks operate (Claessens and Laeven 2004, Beck, Demirgüç-Kunt, and Levine 2006). We use three indices obtained (once more) from BCL2008. These indices represent activity restrictions, capital requirements, and supervisory power. Explicit definitions of these indices are provided in Table 1. For a literature review of the relation between bank competition and regulation, see, for example, Degryse and Ongena (2008).

Moreover, we control for the impact of the macroeconomic environment common to all banks that can potentially affect competitive conditions. We use the share of the manufacturing sector relative to GDP (*manufacturing*) and the net inflow of foreign direct investment (*FDI*). Cetorelli and Strahan (2006) suggest that the manufacturing sector is highly bank dependent and the conditions in this industry can affect the market power of banks through demand-and-supply forces. Clarke et al. (2003) provide evidence suggesting that foreign banks follow their clients abroad. Thus, the

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effect of foreign bank ownership on the banks' market power might be overestimated when the net inflow of *FDI* and *manufacturing* are excluded from the analysis.

In addition, we use information from the Heritage Foundation on the size of the public sector, as measured by the ratio of government spending to GDP (*government spending*). Following the reasoning of La Porta, Lopez de Silanes, and Shleifer (2002), countries with a larger public sector are relatively inefficient, governments are interventionist, and protection of property rights is poor. Thus, we could observe a positive link between this measure of government size and banks' market power.

Along the same lines, we use the *financial freedom index* and the *trade freedom index* from the Heritage Foundation. The financial freedom index measures independence from government control and interference in the financial sector. Higher values for this index reflect greater financial liberalization.[6] The trade freedom index is a composite measure of the absence of tariff and nontariff barriers that affect imports and exports of goods and services, with higher values indicating more freedom to trade internationally.

We also control for the prevailing political ideology and freedom using the *ideology of chief executives* variable (left, center, or right) from Beck et al. (2001) (updated until 2012) and the *polity* variable from the Polity IV project, respectively. These two variables are potentially important in explaining the competitive conditions in the banking sector, because banks operating in more democratic and more right-wing countries will have fewer restrictions that might not be captured by our regulatory variables. Finally, we control for the level of economic development by including the natural logarithm of *GDP per capita*, taken from the World Bank Indicators.[7]

3. FOREIGN BANK OWNERSHIP AND MARKET POWER: IDENTIFICATION AND RESULTS

3.1 Empirical Identification

Two important identification problems are the dynamic nature of bank market power and the potential endogeneity of the foreign ownership variables. Concerning the former, Berger et al. (2000) and Goddard, Molyneux, and Wilson (2004) suggest that even developed banking markets might be characterized by information opacity, networking, and relationship lending, all of which impede competition. These elements cause persistence in the cost structure, profitability, and market power of banks.

To account for these dynamics we include the first and/or the second lag of the dependent variable among the regressors and use the generalized method of moments (GMM) estimators for dynamic panels of Arellano and Bond (1991) and Blundell

6. An alternative index has been constructed by Abiad, Detragiache, and Tressel (2010), but its coverage ends in 2005.

7. We exhaustively control with more than 200 other variables taken from various databases. But we do not find any significant changes in the main results we report here. We therefore think our estimates are conservatively robust.

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and Bond (1998). In our analysis we use the two-step "difference" GMM estimator with robust standard errors corrected using the method of Windmeijer (2005).[8] The consistency of the GMM estimator depends on the assumption of the validity of the instruments and on the assumption that the error term does not exhibit serial correlation. To this end, we use two tests proposed by Arellano and Bond (1991) to evaluate these assumptions. The first is the Hansen test of over identifying restrictions, which tests the overall strength of the instruments. The second test examines the assumption of no serial correlation in the error terms.

Note that the error term obtained from the estimation of equation (1) is likely to be serially correlated due to the fact that the dependent variable is observed at the bank-country-year level and some of the explanatory variables are observed at the country-year level. This problem is comprehensively analyzed by Moulton (1990). Thus, estimation is carried out using standard errors clustered by country. We also experiment with country-specific year effects, but this increases the number of instruments in the GMM procedure asymptotically and causes the Hansen test to be equal to unity.

In estimating equation (1), endogeneity of the two foreign ownership variables can arise from reverse causality and omitted variable bias. Reverse causality could emerge from the preference of foreign-owned banks to enter with monopolistic products with high markups, so as to generate higher profits. In addition, it can arise if foreign banks acquire banks that already possess market power and continue similar practices. However, the monopolistic product explanation is more likely in our sample, given that the mean market power of the acquired banks (0.203) is on average lower than that of the nonacquired domestic banks (0.218). To alleviate these concerns of reverse causality, all the right-hand side variables except the bank characteristics are lagged once. This is intuitive statistically and theoretically. From a statistical viewpoint, the literature commonly (e.g., recently Beck, De Jonghe, and Schepens, 2013) employs lagged explanatory variables to mitigate endogeneity issues that emerge due to reverse causality. On the theoretical side, the banks are aware of their main balance-sheet characteristics when deciding on their cost structure and pricing policy (i.e., the components of the Lerner index).

In turn, the omitted variable bias could arise because there are some unobservable reasons affecting banks' market power and these may correlate with the choice of a bank to enter into a specific market (e.g., specific unobserved elements of the tax system, ability to carry out profit shifting and/or portfolio diversification). We assuage the omitted variable bias by using an IV-style instrumental variable. Specifically, we use the entry restrictions for foreign banks (*ERFB*) lagged once as an IV-style instrument. We construct this index with information from BCL2008 (see again Table 1 for details). This index ranges between zero and four inclusive, with higher values

8. We prefer the so-called difference over the "system" GMM estimator because the results on the specification tests (i.e., the Hansen tests of overidentifying restrictions and tests for serial correlation of the error terms) are better under the former method. Specifically, we find that the lagged differences used as instruments under the system GMM procedure are rather poor instrumental variables. For a similar application of GMM in the banking industry, see Bruno and Hauswald (2013).

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reflecting higher entry restrictions for foreign banks. We identify the two endogenous variables by using $ERFB_{t-1}$ and $ERFB_{t-2}$ as IV-style instruments.

Naturally, the entry restrictions for foreign banks affect foreign bank ownership and presence in each country: we hypothesize that foreign bank presence must be lower in countries with significant protection of the domestic banking sector. Further, it seems unlikely that these restrictions affect banks' market power directly. The only way that *ERFB* could be correlated with the Lerner indices is through common regulatory, institutional, and macroeconomic developments that tend to move together. However, as discussed in Section 2.3, in our empirical analysis we control for a number of such variables and most importantly for the general entry restrictions common to all banks, foreign owned or not. Thus, we distinguish between entry restrictions for foreign banks and general entry restrictions. We also control for year fixed effects, and other regulatory, macroeconomic, institutional, and political variables.[9]

Some of the control variables can also be considered as endogenous in equation (1) due to an omitted variable bias. Not recognizing these variables as such can bias the coefficient on the foreign ownership variable. GMM allows treating these variables as endogenous using lags of the instrumented variables as instruments (Bond 2002, Beck, Demirgüç-Kunt, and Levine 2006, Roodman 2009). We adopt this strategy despite its imperfections because finding solely economically motivated instruments for all potential endogenous control variables would be challenging. We choose the lag length of these instruments on the basis of the Hansen test of overidentifying restrictions.

In light of the above, the full set of the instrumental variables in the baseline specification includes the contemporaneous and the first lag of the entry restrictions for foreign banks as IV-style instruments, and, as GMM-style instruments, the third lag of the dependent variable, the first lags of the bank-specific control variables and the second to fourth lags of *entry restrictions*. In the specifications with additional controls we also add the second lags of these control variables as GMM-style instruments. Use of these instruments yields Hansen tests for the overall and IV-style instruments that do not reject the null of overidentifying restrictions. We also examine the sensitivity of our results with even fewer instruments to avoid the too-many instruments problem highlighted by Roodman (2009). Our results are essentially unchanged. We also confirm, using the second-order autocorrelation test (reported as AR2), that our estimated equations do not suffer from serial correlation.

3.2 Baseline Results

In Table 3 we report the baseline results from the estimation of equation (1). The Hansen tests (overall and IV style) show that the estimated equations are not

9. In online Appendix D (https://sites.google.com/site/sotirioskokas/publications) we run additional tests for the validity of the *ERFB* variable as an instrument as follows. First, we regress, using the fixed effects model, the two foreign ownership variables on the *ERFB* variable plus controls and we find that *ERFB* is negative and strongly statistically significant. Also, we regress, again with the fixed effects model, the market power variables on the *ERFB* plus the same controls, and we find that *ERFB* is statistically insignificant.

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TABLE 3

THE IMPACT OF FOREIGN BANK OWNERSHIP AND FOREIGN BANK PRESENCE ON MARKET POWER: BASELINE REGRESSIONS

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Dependent variable	Lerner	Lerner	Lerner with financial capital	Lerner with financial capital	Adj.-Lerner	Dual-output Lerner	Average Lerner	Lerner World Bank	Boone World Bank	H-statistic	Average H-statistic
Lagged dependent	0.467***	0.376**	0.508***	0.490***	0.607***	0.275***	0.367***	–0.361	0.314***	0.362***	0.717***
	(3.042)	(1.989)	(3.713)	(3.503)	(6.075)	(4.038)	(3.688)	(–1.425)	(4.758)	(6.262)	(7.464)
Deposits	–0.225	–0.332	–0.266	–0.291	–0.341*	–0.182	–0.408*	–0.349**	–0.030	0.259**	0.028
	(–1.160)	(–1.264)	(–1.334)	(–1.370)	(–1.796)	(–0.682)	(–1.862)	(–2.122)	(–0.285)	(2.086)	(0.269)
Capitalization	0.977***	1.073**			0.907***	1.209***	0.340**	0.565	0.048	0.120	0.129
	(3.900)	(2.438)			(4.020)	(4.405)	(2.232)	(0.916)	(0.387)	(0.506)	(0.819)
Loans	0.031	0.144	0.030	0.003	–0.032	0.061	–0.155	0.068	–0.210*	–0.184	–0.107
	(0.176)	(0.779)	(0.147)	(0.017)	(–0.149)	(0.371)	(–1.283)	(0.151)	(–1.683)	(–1.367)	(–1.088)
Bank size	0.043	0.067	0.018	0.015	0.017	0.067**	0.031	0.008	–0.050**	–0.058	–0.022
	(1.488)	(0.811)	(0.461)	(0.412)	(0.641)	(2.420)	(1.183)	(0.113)	(–2.106)	(–1.069)	(–0.552)
Foreign-owned	–0.230	0.049	–0.251	–0.249	–0.208	0.099	0.074	–0.107	–0.131	0.755*	0.267
	(–1.005)	(0.193)	(–1.031)	(–0.977)	(–1.019)	(0.640)	(0.498)	(–0.288)	(–0.474)	(1.771)	(1.244)
Foreign presence	0.009**		0.010**	0.010**	0.007**	0.005**	0.010***	0.016***	0.004*	0.001	0.001
	(2.506)		(2.431)	(2.482)	(2.138)	(2.267)	(3.088)	(3.629)	(1.954)	(0.210)	(0.526)
Foreign presence in terms of assets		0.003***									
		(2.617)									
Entry restrictions	0.014***	0.045	0.015***	0.015***	0.012***	0.007**	0.009***	0.026**	–0.001	–0.003	–0.002
	(5.956)	(1.513)	(6.182)	(5.856)	(4.018)	(2.286)	(3.031)	(2.569)	(–0.193)	(–0.718)	(–0.948)
GDP per capita	–0.297**	–0.255	–0.322*	–0.282	–0.146	–0.045	–0.097	–0.044	0.256	–0.011	0.138
	(–2.149)	(–0.546)	(–1.747)	(–1.575)	(–0.997)	(–0.272)	(–0.680)	(–0.164)	(1.196)	(–0.037)	(0.613)
Observations	49,776	25,837	49,830	49,769	47,125	55,855	51,216	61,653	55,613	51,173	51,217
Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen (overall)	0.329	0.143	0.297	0.289	0.284	0.516	0.423	0.447	0.637	0.809	0.749
Hansen (IV style)	0.229	0.440	0.120	0.264	0.616	0.452	0.426	0.136	0.595	0.762	0.306
AR1	0.003	0.035	0.001	0.001	0.000	0.000	0.006	0.357	0.000	0.000	0.000
AR2	0.988	0.599	0.912	0.994	0.538	0.324	0.107	0.924	0.247	0.202	0.815

NOTE: The table reports coefficients and *t* statistics (in parentheses). The total sample consists of 131 countries and spans the time period 1997–2009. Column I shows our baseline results, where we use the simple Lerner index. The following columns confirm the results of our baseline regression when using alternative measures of foreign ownership (column II) or competition proxies (III–XI). The dependent variable in column III is the Lerner index with financial capital, in IV the Lerner index with financial capital when we include country fixed effects in the estimation of marginal cost, in V the adjusted-Lerner index, in VI the Lerner index obtained from the dual-output cost function, in VII the average Lerner index by country and year, in VIII the Lerner index of the World Bank by country and year, in IX the Boone indicator from the World Bank by country and year, in X the H-statistic and in XI is the average H-statistic by country and year. The variables are defined in Table 1. All regressions are estimated with the two-step "difference" GMM estimator for dynamic panels and robust standard errors are clustered by country. Also, all regressions include year-fixed effects. Wald is the *p* value of the Wald test, which shows the joint statistical significance of the coefficient estimates. Hansen is the *p* value of the Hansen test of overidentifying restrictions, which requires a value higher than 0.05 to accept the null (valid instruments) at the 5% level. AR1 and AR2 are the *p* values of the tests for the first- and-second-order autocorrelation, respectively. All equations include GMM-style instruments (lags) and the entry restriction for foreign banks ($ERFB_{t-1}$) as an IV-style instrument. The *, **, *** marks denote statistical significance at the 10%, 5%, and 1% level, respectively.

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overidentified and the AR2 test that there is no second-order autocorrelation. As expected, the values of the coefficient on the lagged dependent variable indicate that market power is quite persistent.

The specifications in Table 3 include different measures of market power. In column I we use the most basic Lerner index and we find that the coefficient of *foreign owned* is statistically insignificant. This result shows that the average foreign bank in our sample does not have a significantly higher Lerner index compared to the average domestically owned bank. In contrast, *foreign presence* has a positive and statistically significant (at the 5% level) effect on the Lerner index. This effect is also economically significant. For example, an increase in foreign bank presence by 8%p (percentage points) from 17% in 1997 to 25% in 2009 (which is the increase observed for the average country in our baseline specification) resulted in an increase in the Lerner index of 0.07 points (for the average Lerner index in our sample of 0.22 this is equivalent to a 32% increase). Considering that the standard deviation of *foreign presence* is 17%p, and the trend on this variable is indeed increasing, it seems that the share of foreign banks is a very important explanatory factor of the bank-level markups.

In column II we assess the inclusion of *foreign presence in terms of assets* to examine the spillover effect (instead of *foreign presence*). The coefficient on this variable is positive and statistically significant at the 1% level. The economic significance however is lower compared to *foreign presence*. This is expected because the assets-based variable incorporates the element that foreign banks can also be partially owned by domestic owners, whereas *foreign presence* characterizes foreign banks entirely as foreign owned or not. Still a 10%p increase in foreign bank ownership in terms of assets will increase the Lerner index by 0.03. For the bank in our sample with an average Lerner index this implies an 13.6% increase in the Lerner index.

In columns III and IV we carry out the same analysis by using Lerner indices obtained when *capitalization* is included in the cost function and when, in addition to the inclusion of *capitalization*, the cost function also includes country fixed effects. Compared to column I, the results from both specifications remain practically unaffected. In columns V and VI we further experiment with the adjusted-Lerner and the dual-output Lerner indices, and we still find that the only statistically significant ownership variable is *foreign presence*. These results also hold when we use the country-year average of the Lerner index (column VII), the translog-based country-year average Lerner index from the World Bank (column VIII), and the country-year Boone indicator from the World Bank (column IX). In contrast, the results are inferior when we use the H-statistic, either at the bank-level as in column X or at the country-year level as in column XI.[10]

The implications of these results are then straightforward. The ownership status, foreign or domestic, of individual banks seems to play no role in explaining banks'

10. The inferior findings on the regressions including the H-statistic compared to the rest of the specifications on the Lerner and Boone indices may reflect the fact that from the three measures of market power, the H-statistic is the only one that does not robustly map the various degrees of market power (e.g., Bikker, Shaffer, and Spierdijk 2012).

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market power. Thus, we can rule out a significant direct effect of *foreign owned* on bank market power, but we do find a positive and significant spillover effect of *foreign presence* on bank markups.

The effect of the control variables is in line with expectations and with previous studies. For example, Barth, Caprio, and Levine (2004) find that higher entry restrictions in banking markets are associated with a greater ability for the banks to charge a price above its marginal cost. In our sample we identify the same effect through the entry restrictions variable. We also find that well-capitalized banks are those possessing higher market power, which can be attributed to their ability to raise capital more easily and perhaps more inexpensively. In contrast, banks with higher *deposits* have lower market power in some of our baseline specifications. This is consistent with the fact that the higher cost of deposits relative to other sources of bank funds, implies lower market power, probably because the marginal cost is higher.

We also consider in our baseline specifications the effect of the economic development (as measured by the *GDP per capita*) and we find that it is associated with lower Lerner indices in our preferred models (columns I–III). Thus, it seems that banks in countries with lower economic development benefit from higher price-cost margins, a result in line with Delis (2012). In online Appendix C1 (https://sites.google.com/site/sotirioskokas/publications) we report the results from the addition of many other structural, institutional, and macro-economic variables. Our main results on the effect of the foreign ownership variables remain unaffected.

The findings reported in Table 3 and online Appendix C1 (https://sites.google.com/site/sotirioskokas/publications) are in contrast with the two existing studies on this issue (Claessens and Laeven 2004, Jeon, Olivero, and Wu 2011) that document a negative effect of foreign bank presence on market power measured at the country level. In online Appendix C2 (https://sites.google.com/site/sotirioskokas/publications) we identify the main reason behind this different finding. In column I we report the results from a cross-sectional sample (year averages for each country over the period 1997–2004 including the same countries with Claessens and Laeven 2004).[11] We use the same explanatory variables with this study and the same estimation method (ordinary least squares (OLS) with robust standard errors). We are indeed able to (almost) exactly replicate their results on the foreign bank presence variable in terms of sign and magnitude. Subsequently, we aggregate our Lerner index across the same set of countries and years and find that the results also predict a negative relation between foreign bank presence and market power. Thus, the findings of Claessens and Laeven (2004) are not due to the measure of market power.

Subsequently, in column III we allow the Lerner index to vary at the bank level and we use again the countries included by Claessens and Laeven over the period 1997–2004. Thus, in this regression the Lerner index is identified at the bank-country-year level as in our baseline specification in Table 3. We use the GMM estimator, but the results are robust to the use of OLS with bank fixed effects. The results change completely and are in line with those of Table 3. Thus, we confirm that the difference

11. Claessens and Laeven (2004) use data for the period 1994–2001. Given that we do not have data on market power prior to 1997, we replicate their findings using the period 1997–2004.

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in our findings compared to the study of Claessens and Laven (2004) is mainly due to the higher dimension of our data.[12]

Intuitively, the increased foreign bank presence can increase the market power of banks for at least three reasons. First, Herrero and Martinez Peria (2007) found that foreign banks penetrate those banking sectors with profit opportunities. Usually the old regime of these sectors consists of banks with low-quality technology that are relatively cost-inefficient or misprice risk (Peek, Rosengren, and Kasirye 1999). In these situations, foreign banks are better able to price risk through their technological advantage, and this leads to higher intermediation margins *via* higher intermediation prices (Havrylchyk and Jurzyk 2011). Claessens (2006) suggest that this effect is then carried over to the domestic banks, which will follow the new pricing schemes because they will, in time, gain access to the new technology (i.e., resulting in a technology spillover effect of know-how). Second, foreign banks tend to lend to more creditworthy clients. From the demand side, these borrowers might be willing to pay higher margins, if they perceive foreign banks as less risky. Third, foreign banks have the ability to offer new banking products compared to domestic banks. Thus, they become the monopolists in these products, at least for some time.

3.3 Heterogeneity in the Results

In this section we examine the driving forces of the positive effect on foreign presence on banks' market power, by following the changes in the effects over time, and by differentiating between the components of the Lerner index (price vs. marginal cost), the mode of foreign bank entry (greenfield vs. M&A), and the period in question (pre- vs. postcrisis). In most of the analysis, we focus on the effect of *foreign presence*, which is the only foreign-ownership variable that carries a significant coefficient in Table 3.

First, we follow the changes in the market power of foreign banks over time in a more systematic way. We begin by considering the potential heterogeneity in the coefficient on *foreign presence* based on the time (years) because the foreign bank presence reached a specific threshold. The rationale for including this variable is that the longer it takes foreign banks to dominate in a new market, the more acquainted they become with domestic practices and clientele, thereby facing lower informational and agency costs. To this end, we introduce interaction terms between the years in which *foreign presence* reached values equal to 40% and 50%, respectively, and we present the estimation results in columns I and II of Table 4. A 50% threshold naturally captures the presence of a clear majority of foreign-owned banks at the country-year

12. We also try to replicate the results by Jeon, Olivero, and Wu (2011). Their H-statistics are unavailable to us, and thus we use our bank-level estimates of the H-statistic (used in column X of Table 3) to produce country-year aggregates for the countries and years in their study. However, the *Foreign Bank Presence* variable is not a statistically significant determinant of the thusly constructed H-statistic. We also tried to reestimate the country-year H-statistic parametrically using the methodology described in their study. We find that their nonlinear estimator does not converge in our country-specific samples. Finally, we use the random coefficient estimation approach of Swamy (1970) to produce the country-year H-statistics, but again the resulting measure is not significantly explained by foreign bank presence. These results are available on request.

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TABLE 4

FOREIGN BANK PRESENCE AND MARKET POWER: EVOLUTION OF THE EFFECT OVER TIME

	I	II	III	IV	V	VI
Heterogeneous effect due to:	Years of foreign ownership >40%	Years of foreign ownership >50%	Evolution of the effect of foreign presence	Evolution of the effect of foreign owned	Treatment effect (1 year)	Treatment effect (2 year)
Lagged dependent	0.470***	0.456***	0.452***	0.468***		
	(3.760)	(3.070)	(4.153)	(3.686)		
Deposits	–0.231	–0.256*	–0.109	–0.119	0.034***	0.065***
	(–1.450)	(–1.766)	(–0.647)	(–0.586)	(6.377)	(8.800)
Capitalization	0.803***	0.800***	1.019***	1.098***	–0.078***	–0.112***
	(3.368)	(3.523)	(4.355)	(4.626)	(–6.250)	(–6.485)
Loans	0.078	0.041	0.220*	0.188	0.028***	0.034***
	(0.588)	(0.290)	(1.660)	(1.310)	(6.665)	(6.129)
Bank size	0.057***	0.046**	0.049	0.044	0.008***	0.006***
	(2.598)	(2.116)	(1.244)	(0.922)	(4.778)	(2.672)
Foreign owned	–0.270	–0.234	–0.435*	–0.389	0.070	0.180
	(–1.372)	(–1.143)	(–1.877)	(–1.452)	(0.50)	(1.20)
Foreign owned ($t-3$)				–0.060		
				(–0.247)		
Foreign presence	0.005**	0.007***	0.010***	0.011**	0.001***	0.000
	(2.255)	(2.726)	(2.599)	(2.316)	(4.434)	(0.854)
Foreign presence (t–3)			–0.003			
			(–1.105)			
Entry restrictions	0.013***	0.014***	0.015***	0.016***	0.003***	0.010***
	(6.957)	(7.513)	(5.042)	(5.222)	(7.805)	(18.918)
GDP per capita	–0.290*	–0.261	–0.418***	–0.440***	–0.083***	–0.238***
	(–1.754)	(–1.549)	(–3.020)	(–2.865)	(–6.145)	(–12.464)
Years of foreign ownership	–0.036*	–0.040				
	(–1.669)	(–1.521)				
Foreign presence * Years of foreign ownership	0.001*	0.001*				
	(1.855)	(1.736)				
Observations	49,733	49,733	41,037	41,037	60,728	51,107
Wald	0.000	0.000	0.000	0.000	0.000	0.000
Hansen (overall)	0.859	0.977	0.260	0.158		
Hansen (IV style)	0.834	0.946	0.282	0.151		
AR1	0.001	0.003	0.000	0.001		
AR2	0.948	0.913	0.272	0.659		

NOTE: This table reports coefficients and t statistics (in parentheses). The dependent variable is the Lerner index. The variables are defined in Table 1. Columns I–IV are estimated with the two-step "difference" GMM for dynamic panels and robust standard errors clustered by country. Columns V–VI are estimated with treatment effects model. Also, all regressions include year-fixed effects. Wald is the p value of the Wald test, which shows the joint statistical significance of the coefficient estimates. Hansen is the p value of the Hansen test of overidentifying restrictions, which requires a value higher than 0.05 to accept the null (valid instruments) at the 5% level. AR1 and AR2 are the p values of the tests for the first- and- second-order autocorrelation, respectively. All equations include the entry restriction for foreign banks ($ERFB_{t-1}$) as an IV-style instrument. Columns I–IV include GMM-style instruments (lags). The *, **, *** marks denote statistical significance at the 10%, 5%, and 1% level, respectively.

level. The 40% threshold exercise then shows what happens as we move from a lower (40%) to a higher (50%) decile.

We find a positive and marginally statistically significant (at the 10% level) interaction term in both regressions. Therefore, our findings suggest that the longer a country has high levels of foreign bank presence, the higher the positive impact of foreign bank presence on banks' market power.

In column III of Table 4 we additionally include the third lag of *foreign presence* to examine how the estimation results evolve over time. This is a test of whether the

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positive effect of foreign presence will fade over time. The results show that this is not the case. The first lag used all along in our empirical analysis is the only one that retains a positive and statistically significant coefficient. We do not include the second lag of *foreign presence* because the results are clearly driven by collinearity (the pairwise correlation coefficient between the first and the second lags of foreign presence is equal to 0.99). We also experiment with the inclusion of the fourth and the fifth lags, but these estimates are again statistically insignificant. In column IV we report the results from the equivalent exercise with the *foreign-owned* variable. The coefficient estimates on all the lags of this variable are statistically insignificant.

We also take one additional step and carry out an event-type analysis to examine the timeliness of the effect of the foreign ownership variables. Specifically, in a similar fashion to Peristiani (1997), we regress the change in foreign bank ownership in the year following the event of foreign bank entry on a dummy variable that takes the value one in the year the foreign bank enters the market. We use a treatment effect model, where the dummy variable is endogenous and again the *entry restrictions for foreign banks* is our instrument. The results, reported in column V, are equivalent to those of the previous analysis, showing that foreign presence is the only significant foreign ownership variable one year after the entry. When we use a two-year time window after the event, the foreign ownership variables become insignificant (column VI). The same holds for longer time windows for market power. This finding implies that the "spillover effect" is undeniably a short-term effect. Whether this effect truly weakens after the first year of course requires a deeper investigation, given that other corporate events might bias the estimates.

In Table 5 we look at the effect of foreign bank ownership on the separate components of the Lerner index. In column I we replicate column I of Table 3, this time using the price of bank output as our dependent variable, whereas in column II we use the marginal cost as our dependent variable. We find that the only significant effect (at the 10% level) is than of *foreign presence* on marginal cost. Equivalently, in column III the results show that the effect of *foreign presence* on the Lerner index is due to the increase in the gap between the price and marginal cost (i.e., the numerator of the Lerner index). Thus, the main mechanism driving the increase in the market power of banks relates to the cost-efficiency advantage of the foreign banks, which forces domestic banks to also become more efficient. However, this increase in efficiency is not accompanied by a significant reduction in the lending rates for the average bank.

In Table 6 we look into the role of the mode of entry of foreign banks, greenfield or through M&As, on the positive nexus between foreign presence and market power. The table includes the same set of control variables with column I of Table 3 (and Table 5), but we do not include these estimates due to space considerations. Column I reports the results from a specification that includes an interaction term between *foreign presence* and the variable named *country M&As*. This variable equals the number of foreign-owned banks that enter in the host country through an M&A over the total number of foreign-owned banks, scaled from zero to one for expositional brevity. In our sample, two out of three foreign banks enter our sample through an M&A. To provide inference at the mean of the main effects, we mean-center the

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TABLE 5

FOREIGN BANK PRESENCE AND SUBCOMPONENTS OF THE LERNER INDEX

	I	II	III
Dependent variable	Price	Marginal cost	Price-cost margin
Lagged dependent	0.495***	0.743***	0.464***
	(4.37)	(5.170)	(7.791)
Deposits	0.175	–0.013	–0.082**
	(1.330)	(–0.24)	(–2.137)
Capitalization	0.341*	–0.060	0.241***
	(0.206)	(–0.540)	(5.603)
Loans	–0.141	–0.151	–0.038
	(–1.680)	(–1.620)	(–1.268)
Bank size	–0.054	–0.022	0.002
	(–1.510)	(–1.050)	(0.434)
Foreign-owned	0.200	0.153	0.024
	(0.990)	(1.140)	(0.794)
Foreign presence	0.001	–0.002*	0.002**
	(0.780)	(–1.730)	(2.476)
Entry restrictions	–0.007*	0.007	–0.014***
	(–1.777)	(–1.440)	(–3.273)
GDP per capita	0.372	0.426*	–0.011
	(1.260)	(1.65)	(–0.444)
Observations	51,173	61,740	51,173
Wald	0.000	0.000	0.000
Hansen (overall)	0.306	0.456	0.665
Hansen (IV style)	0.302	0.422	0.105
AR1	0.002	0.000	0.000
AR2	0.765	0.385	0.157

NOTE: The table reports coefficients and *t* statistics (in parentheses). The dependent variable in column I is the average price of bank activities (*P*), in II the marginal cost (MC), and in III the price-cost margin (the difference between price and marginal cost). The variables are defined in Table 1. All regressions are estimated with the two-step "difference" GMM for dynamic panels and robust standard errors clustered by country. Also, all regressions include year-fixed effects. Wald is the *p* value of the Wald test, which shows the joint statistical significance of the coefficient estimates. Hansen is the *p* value of the Hansen test of overidentifying restrictions, which requires a value higher than 0.05 to accept the null (valid instruments) at the 5% level. AR1 and AR2 are the *p* values of the tests for the first- and- second-order autocorrelation, respectively. All equations include GMM-style instruments (lags) and the entry restriction for foreign banks (ERFBt-1) as an IV-style instrument. The *, **, *** marks denote statistical significance at the 10%, 5%, and 1% level, respectively.

variables used to construct interaction terms. The main effect of the *foreign presence* comes out positive and statistically significant as before. The interaction effect is also positive and statistically significant at the 5% level, indicating that entry through M&As is one of the main causal factors of the positive relation between *foreign presence* and *Lerner*. Thus, greenfield entry of foreign banks, along with an equally capitalized domestic banking sector, seems to be the *sine qua non* to avoid the buildup of market power.

In column II of Table 6 we examine how the incumbent domestic banks react to foreign bank entry via greenfield or M&As. We find that the results are almost identical with those of column I, with the exception that the main effect of *foreign presence* is statistically insignificant at conventional levels. Thus, this regression equation shows that the positive effect of foreign presence on incumbent domestic banks only comes from the entry of foreign banks through M&As. In this sense, our results are in line with DeYoung, Hasan, and Kirchhoff (1998) who find that the cost efficiency of local banks improves in response to increased entry in states, which had

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TABLE 6

FOREIGN BANK PRESENCE AND MARKET POWER: THE MODE OF FOREIGN BANK ENTRY

	I	II	III	IV	V	VI
Dependent variable	Lerner	Lerner	Average Lerner	Price	Marginal cost	Price-cost margin
Lagged dependent	0.450***	0.447***	0.399***	0.636***	0.663***	0.474***
	(3.489)	(3.283)	(3.271)	(5.930)	(4.430)	(8.469)
Foreign-owned	–0.326	–0.046	0.016	0.218	0.080	0.010
	(–1.166)	(–1.201)	(0.087)	(0.960)	(0.790)	(0.313)
Foreign presence	0.008**	0.005	0.008**	0.001	–0.002	0.001
	(2.196)	(1.267)	(2.305)	(–0.350)	(–1.010)	(1.217)
Country M&As	0.057	0.061	0.049	0.073	–0.004	0.008
	(0.891)	(0.912)	(0.865)	(0.930)	(–0.200)	(1.111)
Foreign presence * Country M&As	0.010**	0.011**	0.010*	0.003	–0.001*	0.001**
	(2.101)	(2.145)	(1.909)	(0.870)	(–1.750)	(2.555)
Observations	49,776	46,842	51,216	51,173	61,740	51,173
Wald	0.000	0.000	0.000	0.000	0.000	0.000
Hansen (overall)	0.134	0.276	0.497	0.447	0.364	0.471
Hansen (IV style)	0.468	0.296	0.300	0.416	0.428	0.265
AR1	0.001	0.002	0.000	0.000	0.000	0.000
AR2	0.607	0.528	0.726	0.971	0.630	0.212
Bank characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Country characteristics	Yes	Yes	Yes	Yes	Yes	Yes

NOTE: The table reports coefficients and *t* statistics (in parentheses). The dependent variable in columns I–II is the Lerner index, in III the average Lerner index, in III the average price of bank activities (*P*), in IV the marginal cost (MC), and in V the price-cost margin (the difference between price and marginal cost). The variables are defined in Table 1. All regressions are estimated with the two-step "difference" GMM for dynamic panels and robust standard errors clustered by country. Also, all regressions include year-fixed effects and the control variables included in Table 3. Wald is the *p* value of the Wald test, which shows the joint statistical significance of the coefficient estimates. Hansen is the *p* value of the Hansen test of overidentifying restrictions, which requires a value higher than 0.05 to accept the null (valid instruments) at the 5% level. AR1 and AR2 are the *p* values of the tests for the first- and second-order autocorrelation, respectively. All equations include GMM-style instruments (lags) and the entry restriction for foreign banks (ERFBt-1) as an IV-style instrument. The *, **, *** marks denote statistical significance at the 10%, 5%, and 1% level, respectively.

been allowing out-of-state entry for some considerable period of time, as well as with Evanoff and Ors (2008) who receive similar results for a larger time frame. In column III we further experiment with the country-year average Lerner index by carrying out the same analysis. The result on *foreign presence* is identical to column I whereas the interaction effect is positive but statistically significant at the 10% level, indicating that the foreign bank entry through M&As is the main transition mechanism for the positive effect even in country-level regression.

The main question arising from the exercises of Tables 5 and 6 is whether the higher market power of the foreign banks entering through an M&A is price- or efficiency based. In columns IV–VI of Table 6 we replicate the results of Table 5, using as dependent variable the price of bank output, marginal cost and the price-cost margin in columns IV, V, and VI, respectively when including the interaction term of column I. Again, the results show that changes are mainly driven by reductions in the marginal cost due to the increased foreign presence of banks entering through M&As (column VI). Also, for a value of *country M&As* equal to this variable's average (0.72), the derivative d(*Marginal cost*) / d(*Foreign presence*) equals 0.0027, which is very close to the value of 0.0023 found in column II of Table 5.

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These findings are quite important and have specific implications in relation with the existing literature. As in Bonin, Hasan, and Wachtel (2005) and Degryse et al. (2012), foreign banks mainly acquire domestic banks with high cost inefficiency and the new bank, after the M&A, tends to reduce marginal costs, which increases the gap between the output price and the marginal cost. Note, however, that there is no loss in allocative efficiency in this scenario: bank customers keep paying the same prices, total output does not decline, and wealth is transferred from bank suppliers to bank owners.

Further, we have to keep in mind that there is a reason for the acquisition. Even in developed countries, the acquired bank usually is a low-performance institution or a government-owned one with no clear profit-maximizing objective (Berger et al. 2005). In the same vein, a recent strand of the literature (Martinez Peria and Mody, 2004) suggests that cross-border M&As in banking are value destructing because of the high inefficiency of the acquired domestic banks. The new bank entering through an M&A will lower costs, giving rise to higher Lerner indices. In turn, the local-incumbent banks react with similar strategies, and hence the comparative advantage of the foreign banks quickly erodes over time. This scenario is indicative of the insignificant direct effect. In contrast, the increased foreign presence tends to increase the overall market power and, hence, generates a significant spillover effect.

An interesting extension of the empirical analysis is to consider the potential structural break in the relation between foreign bank presence and market power caused by the financial crisis of 2007. A recent strand of the literature suggests that foreign banks do not necessarily enjoy the financial support of their parent institutions during the financial crisis (De Haas and Van Lelyveld 2014) or that foreign banks become even more selective in directing their lending to financially sounder local firms (Pennathur and Vishwasrao 2014). In columns I and III of Table 7 we report our baseline results for the pre- and postcrises periods, respectively (before and after 2007). We find that the coefficients on *foreign presence* are positive and statistically significant in both periods and that the economic significance is somewhat higher in the postcrisis period. Thus, the nexus between foreign bank presence and market power becomes somewhat stronger after 2007. Again, the main source of this finding is foreign bank entry through M&As. This is reflected in the larger coefficient of the relevant interaction term in column V (postcrisis period) relative to the respective one in column II (precrisis period).

We consider various other analyses to examine the heterogeneity in our baseline results based on the theoretical considerations discussed in Section 1. First, we examine whether our results on the foreign ownership variables change with the level of economic development, by either introducing relevant interaction terms of the foreign ownership variables or examining each income group separately. The differences in findings are negligible Second, we introduce an interaction term between foreign-owned and foreign presence. This would allow to see whether the spillover effect is similar across the domestic and foreign banks. We find that this interaction term is statistically insignificant, showing that domestic and foreign banks are perfect substitutes in this process. Third, we hypothesize that the impact of foreign bank

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TABLE 7

FOREIGN BANK PRESENCE AND MARKET POWER: THE EFFECT OF THE CRISIS

	I	II	III	IV
Threshold	Precrisis	Precrisis type of entry	Postcrisis	Postcrisis type of entry
Lagged dependent	0.451***	0.391**	0.413	0.388***
	(4.927)	(2.523)	–1.322	(5.265)
Foreign owned	0.283	0.087	–0.260	–0.115
	(0.881)	(0.290)	(–0.880)	(–0.407)
Foreign presence	0.010**	0.011**	0.011**	0.009**
	(2.190)	(1.967)	–1.998	(2.103)
Country M&As		0.024		0.140*
		(0.568)		(1.924)
Foreign presence * Country M&As		0.009**		0.014**
		(2.074)		(2.250)
Observations	27,916	27,916	21,860	24,641
Wald	0.000	0.000	0.000	0.000
Hansen (overall)	0.779	0.706	0.544	0.878
Hansen (IV style)	0.695	0.560	0.669	0.558
AR1	0.000	0.012	0.143	0.000
AR2	0.331	0.222	0.919	0.061
Bank characteristics	Yes	Yes	Yes	Yes
Country characteristics	Yes	Yes	Yes	Yes

NOTE: The table reports coefficients and *t* statistics (in parentheses). The dependent variable is the Lerner index. In columns I–II we limit our sample to the pre-2007 period and in columns III–IV to the post-2007 period. The variables are defined in Table 1. All regressions are estimated with the two-step "difference" GMM for dynamic panels and robust standard errors clustered by country. Also, all regressions include year-fixed effects and the control variables included in Table 3. Wald is the *p* value of the Wald test, which shows the joint statistical significance of the coefficient estimates. Hansen is the *p* value of the Hansen test of overidentifying restrictions, which requires a value higher than 0.05 to accept the null (valid instruments) at the 5% level. AR1 and AR2 are the *p* values of the tests for the first- and second-order autocorrelation, respectively. All equations include GMM-style instruments (lags) and the entry restriction for foreign banks ($ERFB_{t-1}$) as an IV-style instrument. The *, **, *** marks denote statistical significance at the 10%, 5%, and 1% level, respectively.

ownership on the market power of banks depends on differences in banking-system institutions between the host and the origin country (Mian 2006). We consider difference in (i) restrictions on banks to own nonfinancial firms, (ii) entry barriers on banks, (iii) regulations in terms of the summation of the three previous regulatory characteristics, (iv) geographical distance between the capitals of the two countries, (v) institutions (information sharing, credit rights, and property rights), (vi) culture, (vii) banking-industry concentration, and (viii) financial-statement transparency. However, we do not find robust evidence in favor of these hypotheses.

4. CONCLUSIONS

This paper analyzes the impact of foreign bank ownership on the market power of individual banks. We collect bank-year data for all countries in the world to estimate the market power of banks through the use of the Lerner index. We use a cost function with a semiparametric technique that allows for a very flexible specification and does not impose a specific functional form on the data. Our method yields observation-specific estimates of the Lerner index.

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Subsequently, we match our data set with that of Claessens and van Horen (2014) who have information on foreign bank ownership. Thus, our final sample includes information for banks from 131 countries over the period 1997–2009. Using this data set we examine the impact of the ownership status (foreign or domestic) of individual banks on their market power (direct effect), as well as the impact of the share of the number of foreign-owned banks to the total number banks in the industry (spillover effect).

We find that the only significant impact comes from the spillover effect and that this effect is positive in the sense of a higher bank market power due to an increased foreign bank presence. This effect is mainly transmitted through the considerably higher incidence of foreign bank entry through M&As, instead of greenfield entry. We also find that the positive impact of the country-level trends in foreign bank presence on banks' market power is mainly driven by a decrease in the marginal cost (a cost-efficiency effect).

These results have important policy implications for regulators and policymakers alike. If increased competition is the requirement, then it seems imperative that foreign bank entry is made through greenfield entry. Further, a concomitant abolition of entry barriers is warranted. If, in contrast, competition is already rather strong and there are concerns about the stability of the banking system, the foreign bank entry through M&As and the protectionist policies are preferable to increase the market power of banks and their rents. Thus, a natural extension to our work would be to examine the real effects behind the positive nexus of foreign bank presence with banks' market power. In particular, bank market power is usually linked to increased lending rates and, thus, to reduced welfare. Yet a higher market power of banks increases bank profitability and can lead to increased financial stability. Given our findings, the special role of foreign bank presence in the bank market power-stability relation needs further examination. We leave this and other issues for future research.

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