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What are the driving forces of bank competition across different income groups of countries?☆

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ABSTRACT

This paper rigorously investigates the determinants of bank competition for 146 countries over the sample period 1999–2011. The results employing both the Lerner index and the Boone indicator, reveal the distinctive characteristics of the competition drivers across different income groups of countries. Amongst other things, a concentrated banking system jeopardises competitiveness in developing economies, however, such a causal nexus is absent for advanced and emerging economies. Contestability and institutional development seem to boost competition in less-developed banking systems, whereas inter-industry competition and financial freedom are beneficial to advanced banking systems. These findings survive robustness tests.

1. Introduction

The essential role of bank credit as an input in the production of goods and services places banks in a unique and influential position, such that any inefficiency in credit allocation, or other market

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distortions in banking, are almost certain to be felt throughout the economy (Shaffer, 2004). Hence, the issue of bank competition is of vital importance, and the study of market competition can help understand the social welfare implications of changes in the banking sector. As in other industries, the degree of competition in the financial sector matters for the efficiency of production of financial services, the quality of financial products and the degree of innovation in the sector (Claessens, 2009). Therefore, the banking sector can impose severe costs on an economy, if there is anticompetitive behaviour, leading to inefficiency or market failure among banks. This vindicates the importance of more research into this issue, where the degree of banking competition and its association with banking structure, regulations, institutions and other key characteristics of a country is essential for welfare-related public policy in the banking industry. Fernández de Guevara and Maudos (2007) point out that, from the regulator's point of view, knowledge and understanding of the degree of competition may be limited, but finding the main sources of market power complements this limitation in order to carry out the reforms necessary to achieve a reduction of the social costs associated with the existence of monopoly power. Numerous studies have focused on analysing the evolution of competition in banking markets, however, studies that have attempted to investigate factors explaining intensity of competition are rather limited. See e.g. Demirguc-Kunt et al. (2004), Claessens and Laeven (2004) and Fernández de Guevara and Maudos (2007) who conducted research for advanced economies. In terms of emerging and developing economies, there is very little empirical work found, except for those of Jeon et al. (2011) and Delis (2012).[2]

It is argued that banking sectors in emerging and developing markets are characterised by higher market-power, relatively weak legal systems, and high levels of networking and corruption in their respective financial systems, which might constrain the strength of competitive forces compared with those in developed banking systems. Following financial market deregulation in the late 1980s in many emerging countries, their banking markets have been subjected to several structural changes: The prominent features include innovation in financial products and services, removing barriers to entry, hosting foreign banks, developments in information technology, liberalisation of the financial sector and the internationalisation of banking activities. However, the market-power of financial intermediation in emerging and developing economies remained higher than that in most advanced economies. Abiad et al. (2010) show countries in all income groups and regions, which have significantly reformed their financial sectors over the period 1973–2005. Out of 136 large-reform events, 39 were for emerging, 25 for advanced, and the rest for developing economies. The main objective of financial reform policies was to promote a diversified, efficient and competitive financial system which is essential for an efficient allocation of capital. Delis (2012) has attempted to investigate whether such reforms have been effective in promoting competition among banks, by analysing the impact of financial reform and the quality of institutions on the degree of bank market-power for 84 banking systems around the world. Estimating the bank-level Bonne indicator for the market-power of banks, Delis (2012) finds that bureaucratic quality, the rule of law and transparency, negatively affect market-power but financial liberalisation policies improve competition among banks, only if the country meets certain criteria of institutional endowment. Hence, financial reform may not have translated into the improvement of banking competition in countries with weaker institutions and a lower level of institutional development. Such concerns may be smaller in advanced countries, which have developed financial, legal and regulatory systems, as well as strong protections for private property and economic freedom. These issues seem to necessitate the study by distinguishing emerging and developing from advanced economies in order to trace the differences in findings in the theoretical arguments available in the literature.

In this paper, we rigorously investigate the driving forces of competition-behaviour in the banking sector by distinguishing between developed, emerging and developing economies. Due to data availability, it is impossible to cover all countries, however, we have a very large coverage of 146 countries over the recent sample period of 1999–2011, which encompasses the period of the financial

[2] Jeon et al. (2011) investigated emerging Asian and Latin American markets, however, their focus was on the effect of foreign banks, omitting such variables as those relating to institutions, inter-industry and contestability. Delis (2012) studied bank competition for 84 countries with a view to analysing the impact of financial reform.

crisis triggered by the US subprime-market. We relate the evolution of competition to bank structures, contestability, inter-industry, institutional and other potential explanatory variables (Claessens and Laeven, 2004; Jeon et al., 2011 and Delis, 2012), and systematically compare across these three types of economies to avoid proposing a general pattern for all countries.

As one of the driving forces in the evolution of competition, firstly, we consider concentration. Theory provides predictions about the link between market-structure and bank-competition. According to the traditional structure–conduct–performance hypothesis, a more concentrated market implies a lower degree of competition due to the undesirable exercise of market power by banks. It can be also argued that regulatory impediments to competition also create a desirable environment for a few powerful banks to hinder competition. According to this view, a concentrated market is a useful signal of an uncompetitive market. Indeed, antitrust authorities use measures of market-concentration to make an initial assessment of competition, and analyse whether concentration will create or enhance the exercise of market-power. The issues of competition and concentration in the banking industry are heavily debated by policy makers, however, the empirical literature on the relationship is comparatively scarce. Also, existing studies have shown a mixed picture. Whilst earlier studies find an inverse relationship between concentration and the degree of competition, new empirical studies show a lesser association of concentration and competition,[3] and hence they cannot be used interchangeably. For example, if the market is contestable, i.e. no barriers to entry and exit, even very concentrated markets can remain competitive. The lack of importance of market structure implies that competition policy in the financial sector is more complicated than it is expected. Thus, more work needs to be done to shed further light on this debate.

Secondly, the role of market regulations is considered as a determinant in shaping competition. According to the theory of industrial organisation, the competitiveness of an industry cannot be measured by market-structure alone, whereas the theory of entry can be a more relevant issue for analysing factors that explain the behaviour of market participants. Also, the New Industrial Organization theory proposes a structural, contestability approach that can effectively test the degree of competition (see Baumol, 1982). Institutional quality, as well as the degree of inter-industry competition (such as stock market and insurance companies), may also play an important role in determining banking-system competitiveness (Claessens and Laeven, 2004). For instance, it is found that the institutional environments in some countries hampers competition. Hence, we also consider these factors in our empirical analyses.

Estimation of competition, i.e. the inverse of market-power, is heavily influenced by the New Empirical Industrial Organization (NEIO) literature. This literature has been developed primarily from the models of, for instance, Bresnahan (1982) and Panzar and Rosse (1987). The most popular tool, widely used for the estimation of bank market-power, is the Lerner (1934) index, owing to its simplicity, its straightforward interpretation and the fact that it does not pose stringent data requirements. The *H*-statistic of Panzar and Rosse (1987) is also used routinely in the literature on banking to assess degrees of competition. The disadvantage of this method is that it maps the various degrees of market-power only weakly and, thus, cannot be viewed as a continuous variable. It is argued that the only hypothesis that can be tested using the *H*-statistic is whether a bank operates in long run equilibrium.

In our empirical application, we employ the Lerner index and also the Boone indicator. The Lerner index is the price-cost margin and is the method often used in several studies of banking competition (e.g. Fernández de Guevara et al., 2005 and Anginer et al., 2014). The Boone indicator is the elasticity of profits to marginal cost (Boone et al., 2005 and Boone, 2008). It captures the reallocation of market-share to efficient from inefficient banks. See Van Leuvensteijn et al. (2007) and Delis (2012) for the empirical application. The published data at country-level by the World Bank (Global Financial Development Database 2012) are utilised for the Lerner index and the Boone indicator. We also use two other databases of bank competition as robustness tests. The first one is the adjusted Lerner index and the Boone indicator at country-level, reported in Clerides et al. (2013), and the second one is based on our own estimation of the Lerner index at bank-level using the BankScope database.

[3] The studies by Claessens and Laeven (2004), Fernández de Guevara et al. (2005) Fernández de Guevara and Maudos (2007) and Carbo et al. (2009) all show the inadequacy of using concentration measures as a proxy for the competition environment in the banking sector.

The empirical results reveal distinctive characteristics of competition-drivers for different income levels of an economy. A concentrated banking system jeopardises the competitiveness in developing economies, in line with the traditional view of competition policy, whereas such a causal nexus is absent for advanced and emerging economies. Contestability and institutional development are found to be the key driving forces of competition in non-advanced banking systems. Rivalry from other segments of financial-services industries and financial freedom are contributory to boosting the competitiveness amongst advanced banks. The ownership structure seems to matter for bank competition in emerging and developing countries. Foreign bank-ownership favours competition for the former, whereas state bank-ownership is a hindrance to competition in the latter. These findings are robust to model specification and alternative measures of competition and remain unchanged by controlling bank-specific traits.

The remainder of the paper is organised as follows. Section 2 reviews literature. Section 3 provides the empirical models. Section 4 presents an analysis of data. Section 5 contains the estimation results together with robustness tests. Conclusions are offered in Section 6.

2. Literature review

With respect to competition measures, several indicators are found in literature, which can be classified into two major categories: those that use the traditional structural measures of competition and those that fall within the so-called 'new empirical industrial organization' models (i.e. the non-structural approach). The traditional measures use concentration indices under the structure–conduct–performance or the efficient-structure hypothesis. The non-structural indicators include the estimation of the mark-up test of Bresnahan (1982), the Panzar and Rosse test (Nathan and Neave, 1989; Molyneux et al., 1994 and Bikker and Haaf, 2002) or instruments derived from Monti–Klein-type banking competition models, such as the estimation of Lerner index (Fernández de Guevara et al., 2005 and Maudos and Fernández de Guevara, 2007).

One of the non-structural indicators used to assess competitive behaviour in financial services are based on the model advocated by Panzar and Rosse (1987). This methodology, extensively applied in banking studies, is based on reduced-form revenue functions using bank-level data. It investigates market-power, the so-called, *H*-statistic, measured by the extent to which changes in factor prices are reflected in revenues. Panzar and Rosse show that this statistic can reflect the structure and conduct of the market to which the firm belongs.[4] The critical feature of the *H*-statistic is that it measures a degree of bank-competition over a specific period of time, giving one score over that time so that it does not capture the evolution of bank-competition. Although Bikker and Haaf (2002) and Jeon et al. (2011) estimate the time-varying version of Panzar and Rosse *H*-statistics in order to account for the market dynamic of a banking system, it does not come without limitations. For instance, using the time-varying *H*-statistics implies that either bank competition is increasing or decreasing over-time, and this is not in accordance with the real world, since, if competition increases in one year, it may decease or be constant in the next year.[5]

An alternative approach to the Panzer and Rosse methodology is the Lerner model developed by Lerner (1934), which has recently attracted many European scholars. This is developed from the (static) theory of firm models under equilibrium conditions and typically use some form of price mark-up against a competitive benchmark: the Lerner index is the mark-up of price (average revenue) over marginal cost. The higher the mark-up, the greater is the realised market power. In empirical work, a

[4] For a body of recent literature using *H*-statistic to gauge the degree of bank competition, see, e.g. Mamatzakis et al. (2005), Levy Yeyati and Micco (2007) and Delis (2010) for emerging economies, and Matthews et al. (2007) an Goddard and Wilson (2009) for advanced economies (for a comprehensive study see also Bikker et al., 2012).

[5] Bikker et al. (2012) also show that a Panzar–Rosse price function or scaled-revenue equations which have been widely applied in literature cannot be used to infer the degree of competition. They argue that only an unscaled revenue equation version of *H*-statistics may yield a valid measure of competition. Even if the competitive climate is assessed on the basis of an unscaled revenue equation, the Panzar–Rosse *H*-statistic generally requires additional information about costs, market equilibrium and market-demand elasticity to allow meaningful interpretation.

number of recent studies have used the Lerner index to determine the trend in competitive behaviour over time, specifically, in European countries.

Boone (2000, 2004) and Boone et al. (2005) introduced, the so-called Boone indicator, which measures the impact of efficiency on performance in terms of profits or market-share. The underlying concept behind the Boone indicator is that competition enhances the performance of efficient banks and impairs the performance of inefficient banks, which is reflected in their respective profits or market-share. This approach is closely associated with the well-known efficiency hypothesis, which also explains banks' performances by differences in efficiency (Goldberg and Rai, 1996 and Smirlock, 1985). The hypothesis of Boone's model takes two steps. Firstly, efficient banks, i.e. banks with lower marginal costs, gain higher market-share or profits. Secondly, this is translated into the fact that, if this effect is stronger, the higher the degree of competition in that particular market is. See, for instance, Van Leuvensteijn et al. (2007), who is the first to apply the Boone indicator to the banking market for the Euro area.

Studies attempting to assess the impact of banking market-structure, regulations and institutional factors on competition are limited. Bikker and Haaf (2002), for instance, regress the *H*-statistic on a variety of concentration indices for a sample of 23 industrialised countries, and the results show the presence of a negative relationship between the degree of concentration and the level of competition. Contrary to these results, Angelini and Cetorelli (2003), in their analysis of the Italian banking sector, uncover a positive association using the Lerner index and the Herfindahl–Hirschman index. For a sample of 50 countries, Claessens and Laeven (2004) also find the same result by employing the *H*-statistic. Fernández de Guevara et al. (2005) in a study on European banking sectors emphasise that concentration is inadequate as an indicator of competition. Likewise, Staikouras and Koutsomanoli-Fillipaki (2006) report that European banking systems have experienced a substantial increase in competition (measured by the *H*-statistic) during the period 1998–2002 with higher levels of concentration. Furthermore, Park (2009) examined whether consolidation amongst Korean commercial banks lessened competition for the period 1992–2004, and found that contrary to a growing concern over market-power of Korean banks, an increased concentration has not impaired competition.

According to the traditional viewpoint, an increase in concentration fosters collusion and impairs competition. However, it is difficult to judge whether concentration decreases competition among banks, based on these empirical findings, where the case for using concentration as a proxy for competition is seriously disputed. This is critical for the inference of policy implications since concentration does not necessarily imply a lack of competition.

Claessens and Laeven (2004) analyse the effect of banking regulations and institutional settings' indicators on competitiveness employing the constant *H*-statistics of Panzar and Rosse (1987). Using bank-level data for 50 countries, they find that the contestability market-theory showed a stronger effect on competition than did concentration, in particular, fewer entry and activity restrictions as well as greater foreign-bank entry to the market positively affected the level of competition. The finding of Bikker and Spierdijk (2009) based on the Panzar–Rosse approach is supportive to that of Claessens and Laeven (2004) for 101 countries: traditional market-structure variables, such as concentration and the number of banks are found to have no impact at all. In Bikker and Spierdijk (2009), explaining the measured competition by a large set of potential determinants reveal that competition in many countries would be higher with more anti-trust regulation, fewer obstacles to foreign investment and fewer cross-sector restrictions. Angelini and Cetorelli (2003) also find that the deregulation process significantly contributed to improving bank-competition during the 1990s in Italy, whereas Turk-Ariss (2009) argues that contestability determines effective competition by allowing foreign-bank entry and reducing activity restrictions on banks in the Middle Eastern and North African banking sectors. The study by Thorsten Beck and Jonghe (2013) indicates that the positive association between competition and banks' fragility increases with the presence of strict activity restrictions. Delis (2012) examines the degree of market-power as measured by the Boone indicator for 84 banking systems worldwide, and finds that competition improves in developed countries with advanced institutions, however, it is unlikely to improve at the same rate in countries with weaker institutions. The empirical evidence by Anginer et al. (2014) also reveals that a lack of competition can be mitigated by a strong institutional environment.

The structure of the banking sector provides information on potential threats to competition. However, a growing body of empirical research over the past decade or two seems to suggest that structure, itself, does not seem to impair competition. It is the conduct of financial institutions that may determine competitive behaviour among banks. To assess the real situation of banking systems in terms of competition, we investigate the evolution of competition by relating it to market structure, contestability, inter-industry competition and institutional and macro-economic conditions. We include all developed, emerging and developing countries, as long as data availability permits, and systematically compare these three types of economies to derive the specific sources of competition. The more sophisticated measures of the Lerner index and the Boone indicator are utilised for competition rather than the Panzer–Rosse method. Determining the drivers of competition and observing different features across different income groups are crucial in further developing competitive policies and regulations.

3. Model specification

3.1. Measuring competition

The Lerner index is a measure of market-power in the banking market. It is defined as the difference between output prices and marginal costs (relative to prices). Prices are calculated as total bank revenue over assets, whereas marginal costs are obtained from an estimated translog cost function with respect to output. The index ranges from the highest, 1, to the lowest, 0, with a higher number implying greater market-power or less competition. The dataset of the Lerner index of the World Bank follows the methodology described in Demirguc-Kunt and Martinez Peria (2010) using data collected from BankScope. The Boone indicator is a measure of the degree of competition, computed as the elasticity of profits to marginal costs. To obtain the elasticity, the log of profits (measured by return on assets) is regressed on the log of marginal costs. The estimated coefficient (derived from the first derivative of a translog cost function) is the elasticity. The rationale behind the indicator is that higher profits are achieved by more efficient banks. Hence, the more negative the Boone indicator, the higher the degree of competition is, since the effect of reallocation is stronger. The dataset of the Boone indicator in the World Bank follow the methodology used by Schaeck and Cihak (2010) with some modification by using marginal costs instead of average costs. Regional estimates of the Boone indicator pool the bank data by regions (for more information, see Hay and Liu, 1997, Boone, 2001 and Boone et al., 2005), based on underlying data in BankScope. For our main empirical application, the dataset of the World Bank is used.

For the robustness test, we employ the dataset of the adjusted Lerner index and the Boone indicator published in Clerides et al. (2013). The bank selection criteria for estimating the Lerner and Boone indicators are different from the dataset of the World Bank. There are also a number of differences in estimation. Firstly, Clerides et al. use the modification of the conventional Lerner index, i.e. adjusted Lerner index that accounts for the possibility of foregone rents (Koetter et al., 2012). Koetter et al. (2012) pointed out that the conventional Lerner index assumes both profit- and cost-efficiency, hence the estimated price-cost margins do not accurately measure the true picture of market-power. See Koetter et al. (2012) who developed the efficiency-adjusted Lerner index. Secondly, marginal costs are estimated based on a smooth coefficient model, or a semi-parametric method, of Delis (2012), which allows increasing the flexibility of the functional form imposed on the cost function. Clerides et al. use the local polynomial fitting regression and the Gaussian kernel function to obtain regression coefficients of the translog costs function for each bank at each time period. See Delis et al. (2012) for the detailed discussion. Delis et al. (2012) and Wheelock and Wilson (2012) show that estimation of marginal costs using semi-parametric and non-parametric methods performs significantly better than do parametric techniques.

The two datasets of the World Bank and Clerides et al. (2013) are at country-level. Hence, we elaborate by estimating the bank-level data of the Lerner index for a further robustness check covering

134 countries (see Panel C, Table A.1). This allows us to assess the impact of bank regulations and institutions at bank-level.[6] The Lerner index is computed as:

$$\text{Lerner}_{it} = \frac{P_{it} - \text{MC}_{it}}{P_{it}} \tag{1}$$

where P_{it} is the price charged by bank i at time t on their assets and MC_{it} is the marginal cost. The marginal cost is estimated on the basis of the following translog cost function for each country:

$$\ln\ (C_{it}) = \alpha_0 + \alpha_1 \times \ln\ Q_{it} + \frac{1}{2} \times \alpha_2 \times (\ln Q_{it})^2 + \sum_{j=1}^{3} \beta_j \times \ln\ w_{j,it} + \frac{1}{2} \sum_{j=1}^{3} \sum_{k=1}^{3} \beta_{jk} \times \ln\ w_{j,it}$$

$$\times \ln\ w_{k,it} + \sum_{j=1}^{3} \gamma_j \times \ln\ Q \times \ln w_{j,it} + \Phi \times \text{Year dummies}$$

$$+ \Omega \times \text{Bank specialization dummies} + \varepsilon_{it} \tag{2}$$

where C_{it} is the total cost (interest expenses and other operating costs) of bank i at time t. Following prior studies (e.g. Anginer et al., 2014, among others), we choose one output: total assets (Q), and three input prices: cost of deposits (w_1) computed by dividing financial costs (interest paid) by their corresponding liabilities, cost of labour (w_2) calculated by dividing personnel costs by total assets, and cost of physical capital (w_3) calculated as the ratio between expenditures on plant and equipment (other non-interest expenses) and the book value of physical capital (fixed assets). Since we have three bank specializations of commercial, co-operative and savings banks, we use bank dummies to capture the effect of each type of bank (Anginer et al., 2014). Furthermore, to account for changes in technology over time, we include *Year dummies*.

With the symmetry restriction imposed, necessary and sufficient conditions for our translog specification are linearly homogeneous in input prices, hence:

$$\sum_{j=1}^{3} \beta_j = 1 \sum_{k=1}^{3} \beta_{jk} = 0\ (j = 1, 2, 3) \sum_{j=1}^{3} \gamma_j = 1$$

We then use the coefficient estimates from Eq. (2) to estimate the marginal cost for bank i in time t:

$$\text{MC}_{it} = \frac{\partial C_{it}}{\partial Q_{it}} = \frac{C_{it}}{Q_{it}} \left[\alpha_1 + \alpha_2 \times \ln Q_{it} + \sum_{j=1}^{3} \gamma_j \times \ln w_{j,it} \right] \tag{3}$$

3.2. Determinants of competition

We consider the banking market-structure, contestability, inter-industry, institutions and macroeconomic environment for the determinants of competition.

For the structure of the banking system, we specify the following variables: (i) bank concentration, which is measured by the market share of the five largest banks in the country, (ii) a number of banks per hundred thousand inhabitants in a particular country as a proxy for the density of banks, and (iii) foreign and state bank ownership, i.e. the share of assets of banks which are foreign-controlled and government-controlled,[7] respectively. Note that those banks that are 50% or more government- and foreign-owned are taken account of as state- and foreign-owned, respectively.

For contestability of the respective markets, we consider (i) the activity restriction variable, which indicates the limits imposed on commercial banks to engage in securities markets, insurance and

[6] Note that the Boone indicator cannot be estimated at bank-level.
[7] Government ownership of banks is likely to influence the pricing of loans and deposits.

real estate activities with higher scores indicating more restrictions (Barth et al., 2001), (ii) the limit on foreign banks, which measures the extent to which foreign banks may own domestic banks and enter a country's banking industry, (iii) the entry requirement and the fraction of entry applications denied to both domestic and foreign banks, and (iv) the restriction on the formulation of financial conglomerates.[8] With institutional variables, we employ (i) an overall indicator of financial freedom that captures the degree to which banks are free to conduct their business, (ii) property rights that are an indicator of the protection of private property rights, and (iii) the KKZ institution index that is an aggregate indicator of the quality of institutional development in the country, computed using information on six issues of voice accountability, political stability, a government's effectiveness, regulatory quality, rule of law and control of corruption. For inter-industry development, we specify (i) the degree of insurance penetration that is measured by the amount of annual life and non-life insurance premiums collected, divided by GDP, as a competition indicator from non-bank financial institutions, and (ii) market capitalization and stock-market efficiency measured by the stock-market turnover ratio as a proxy of the degree of capital-market competition. For these institutional variables, a positive association with competition is expected. Likewise a positive relationship is expected for inter-industry indicators, where the developed non-bank financial institutions or capital markets generate competitive pressure on the banking system.

For control variables, we specify macroeconomic variables of GDP per capita as a proxy for the general level of development in a country, bank-credit growth, GDP growth as a proxy for the economic size and activity, and the inflation rate as an indicator for macroeconomic stability.

By specifying the above potential determinants of competition, we have the following model for estimation (Demirguc-Kunt et al., 2004 and Claessens and Laeven, 2004):

$$\begin{aligned}\text{Competition}_{ct} = {} & \beta_0 + \Omega \times \text{Market structure}_{ct} + \theta \times \text{Market contestability}_{ct} + \eta \\ & \times \text{Inter industry}_{ct} + \gamma \times \text{Institution}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \\ & \times \text{Dummy crisis}_{t} + \varepsilon_{ct} \end{aligned} \tag{4}$$

where subscripts c and t refer to country and year, respectively. *Competition* is a competitiveness indicator: the Lerner index or the Boone indicator. Market structure is a vector of market structure indicators (concentration ratio, number of banks relative to population and bank ownership status), Contestability is a vector of regulatory variables (activity restriction, financial conglomerates, limit on foreign banks, entry requirements and fraction of entry denied), *Inter-industry* is a vector of inter-industry development indicators (insurance penetration, market capitalisation and stock-market efficiency) and *Institution* is a vector of institutional variables (financial freedom, property rights, and the KKZ index). Control is a vector of macroeconomic variables (GDP per capita, GDP growth, credit and inflation). *Dummy crisis* takes 1 for year 2008–2011, and 0 otherwise, in order to control the recent financial crisis. ε is the error term.

4. Data

Three different datasets of competition are used for the main and the robustness estimations. The first dataset of the Lerner index and the Boone indicator used for the main estimation is, collected from the Global Financial Development Database of the World Bank. The database covers 167 countries, however, due to limited observations for some countries, we have selected 146 countries for estimation over the period 1999–2011. The second dataset used for the robustness test is retrieved from Clerides et al. (2013), who provide the data of the Lerner index, the adjusted Lerner index and the Boone indicator. Clerides et al. estimated the degree of competition in the banking sectors of 148 countries worldwide over the period 1997–2010. We exclude those countries that are not included in our main estimation for consistency, and hence we have a panel dataset of 128 countries. We extract the data for the adjusted Lerner index and the Boone indicator from Tables 6 and 7 in Clerides et al. (2013),

[8] See Table A.3 for the definition.

respectively.[9] The third dataset is based on bank-level data, which we have estimated by specifying the Lerner model as in Eqs. (1)–(3) in Section 3 above. We initially selected 152 countries that have more than 5 banks in BankScope, however, by eliminating those countries that are not included in the main dataset, we have 134 countries covering 7517 banks over the period of 1999–2011.[10]

Table A.1 shows the sample selection and the number of countries for these datasets, and Table A.2 reproduces the Lerner index and the Boone indicator, published by the World Bank and Clerides et al. (2013). In Table A.2, the income group for each country is indicated by the World Bank classification.

Fig. 1a and b plot the Lerner index and the Boone indicators of the World Bank and Clerides et al. (2013), respectively.[11] Fig. 1a shows a relatively moderate and smooth movement, whereas significant volatility is apparent in Fig. 1b. Some common trends are shown: The Boone indicator seems to play a leading role in terms of evolution, as the Lerner index, in general, follows with approximately a one year time lag. An upward trend is observed up until around 2002–2004, indicating a gradual deterioration in competition, followed by a downward trend. There is a clear indication of the adverse effect of the financial crisis around 2008, where banks started regaining their market-power.

Fig. 2 presents the evolution of the averaged Lerner index of 146 countries in different income-group countries. It clearly shows a higher level of competition for advanced economies in comparison to less-developed countries. It is also observed that market-power in emerging banking systems is steadily increasing over the period, whereas the evolution of competition in developing countries is more or less constant over the sample period. It seems that the impact of the financial crisis is strongly felt in the advanced countries. This heterogeneous evolution of competition surely justifies our approach in classifying the countries into three different income groups.

The model is specified with the contemporaneous regressors except for regulatory variables. With respect to contestability variables, data are based on surveys by Barth et al. (2013). Surveys were conducted in 1999, 2003, 2007, and 2011. Since the effect of the country-level regulations is felt slowly over time and also following Anginer et al. (2014), we specify the previously available survey data until a new survey becomes available. Specifically, the survey data of 1999 are used for 1999–2002, the survey data of 2003 for 2003–2006, the survey data of 2007 for 2007–2010, the survey data of 2011 for 2011.

The detail of the definition and sources of all variables are provided in Table A.3 and the average of market-structure, regulation and institutions across countries are shown in Table A.4. The summary statistics are found in Table 1.

5. Empirical results

We estimate Eq. (4) by regressing the measures of competition on the potential determinants, applying the Generalised Method of Moments (GMM) of Arellano and Bond (1991) to all estimations. There are likely to be correlations amongst some of the regressors specified in the model. For instance, as argued in González (2009), bank concentration may be associated with stricter bank-entry restrictions, more generous insurance, and a stronger legal environment. The model may also suffer from a potential endogeneity problem, among others, the effect on bank concentration may derive from bank competition. The GMM technique mitigates these problems. We use the lagged once- and twice-dependent and independent variables as instrument variables, which are not rejected by the Sargan test.

[9] Note that in preliminary estimation, we find similar results between the conventional Lerner index and the adjusted Lerner index in Clerides et al. (2013) with the correlation coefficient of 86%.

[10] Several criteria are used to filter bank-data. Banks must be active; hence banks that went into bankruptcy are removed. These data are only from commercial, savings and cooperative banks: banks that carry out traditional banking activity. Certain outlier rules are also applied: the 1st and 99th percentiles of the distributions of main variables are eliminated. This helps alleviate the problems arising from extreme outliers that affect estimation. In order to ensure that each bank is included only once in the dataset, we use unconsolidated statements when available and consolidated statements when the unconsolidated ones were not available. Merged banks are considered as separate entities before the merger and as one entity afterwards. Note also that we exclude subsidiaries of parent banks to avoid double counting.

[11] Note that the correlation coefficient between the Lerner index in World Bank and the adjusted Lerner index in Clerides et al. (2013) is 54% that is statistically significant at the 1% level.

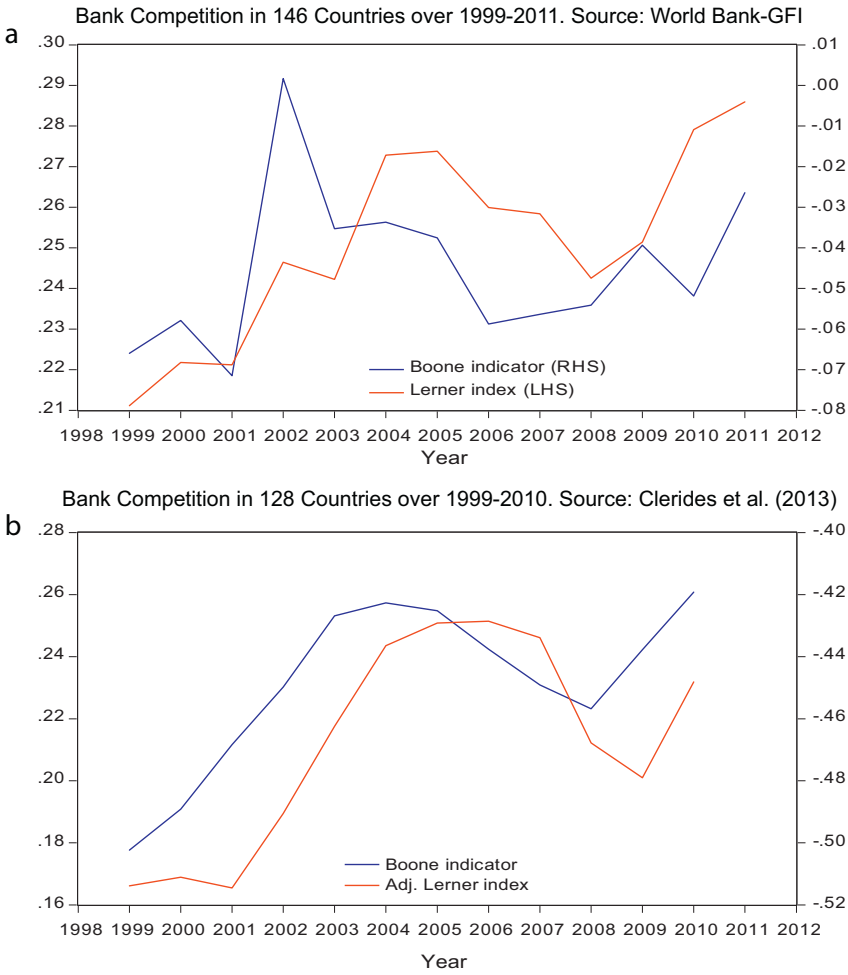

Fig. 1. (a) Evolution of bank competition (World Bank data). This figure shows the evolution of the averaged Lerner index and Boone indicator across 146 countries. (b) Evolution of bank competition (Clerides et al. data). This figure shows the evolution of the averaged Lerner index and Boone indicator across 128 countries.

5.1. *Preliminary results based on World Bank dataset*

Table 2 reports the preliminary regression results including all countries.[12] We run various regressions by isolating one category of explanatory variables from others.[13] This is important, since there is some concern of the potential multicollinearity amongst some independent variables, and also there are some missing variables in this unbalanced panel data set.[14] Panel A specifies the banking

[12] In all estimated regressions, we included the constant term and dummy variables, though not reported.

[13] However, note that we retain macroeconomic control variables in all regressions in order to control for differences in economic development and stability across countries.

[14] Note that there is a different number of observations from one model to another model. This is due to the fact that the sources of contestability, institutions and market-structure variables are from different databases and each database does not necessarily hold information for all countries.

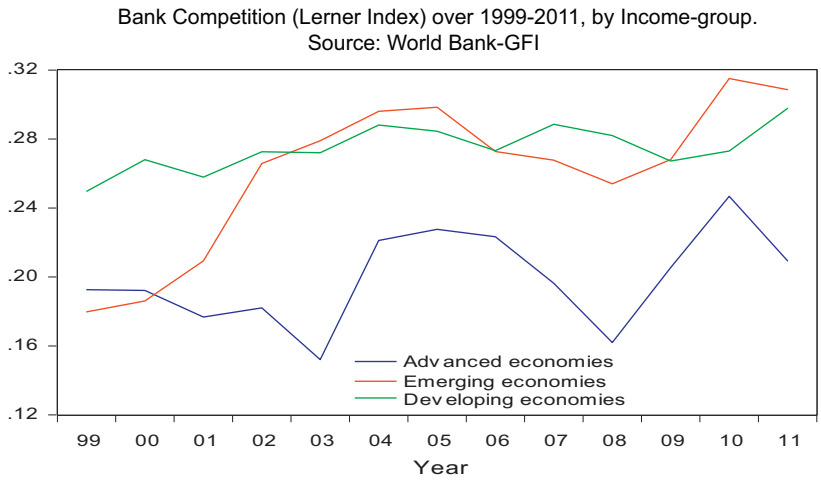

Fig. 2. Evolution of bank competition in different income-group countries (World Bank data). This figure shows the evolution of the averaged Lerner index across 146 countries in different income groups.

structure, and Panel B deals with contestability and structure-contestability. Panel C and Panel D cover inter-industry and institutional indicators, respectively.

The result in Panel A of Table 2 evidently indicates that variables describing the banking-system structure can help explain its measured competitiveness, in particular, bank-concentration

Table 1
Summary statistics. Definitions of variables are in Table A.3.

	Obs.	Mean	Std. Dev.	Min.	Med.	Max.
Bank competition						
Lerner index	1581	0.251	0.135	−1.609	0.244	0.650
Boone indicator	1825	−0.045	0.297	−2.162	−0.055	5.968
Market structure						
Concentration %	1471	80.667	15.967	28.050	83.463	100.000
Log (No. of banks to population)	1742	−13.072	1.443	−16.705	−13.193	−7.557
Foreign bank ownership %	1282	36.930	31.254	0.000	25.800	100.000
State bank ownership %	1303	16.846	21.668	0.000	6.800	95.780
Market contestability						
Activity restriction	1492	7.492	2.042	3.000	8.000	12.000
Financial conglomeratem	1425	6.796	1.758	3.000	7.000	12.000
Limit on foreign banks	1237	3.755	0.629	0.000	4.000	4.000
Entry requirement	1702	7.584	0.985	0.000	8.000	8.000
Fraction denied %	724	0.182	0.267	0.000	0.004	1.000
Inter-industry						
Insurance penetration %	1662	2.880	2.869	0.005	1.747	18.188
Stock market capitalization %	1251	54.807	63.733	0.101	34.594	606.001
Stock market efficiency	1231	50.730	78.563	0.000	25.785	1612.942
Institution						
Financial freedom	1767	54.041	18.342	10.000	50.000	90.000
Property right	1767	50.733	22.692	0.000	50.000	95.000
KKZ index	1606	0.077	0.870	−1.747	−0.127	1.986
Control variables						
Log (GDP per capita)	1705	10.668	2.245	5.599	10.376	16.894
Bank credit growth	1550	0.039	1.056	−17.388	0.023	31.662
GDP growth %	1703	4.333	4.296	−17.955	4.260	34.500
Inflation %	1652	7.052	15.926	−8.525	4.100	324.997

Table 2
Competition model based on World Bank data: baseline results. Definitions of all variables are listed in Table A.3. We estimate all regressions using the two-step GMM estimator of Arellano and Bond (1991). Robust *T*-values are in parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%, respectively. Sargan test: the test for over-identifying restrictions in the GMM dynamic model estimation. AR(1) and AR(2): the autocorrelation tests in residuals of order 1 and 2, respectively. Sample size varies across regression specifications since not all variables are available for all countries and/or for the full sample period (1999–2011).

Panel A: Market structure and competition: regression results of the model.

$\text{Competition}_{ct} = \beta_0 + \Omega \times \text{Market structure}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \times \text{Dummy crisis}_t + \varepsilon_{ct}$

	Model 1: Lerner index		Model 2: Boone indicator	
	(1)	(2)	(3)	(4)
Lag dependent variable	0.315***	0.354***	0.130***	0.049***
	(8.95)	(10.10)	(70.02)	(41.67)
Market structure				
Concentration	0.013***	0.014***	0.002**	0.001**
	(2.61)	(2.89)	(1.96)	(2.42)
No. of banks to	−0.015	−0.007	−0.067*	−0.013
population	(−1.15)	(−1.08)	(−1.70)	(−0.47)
Foreign bank	−0.005***	−0.005***	−0.007***	−0.006***
ownership	(−3.66)	(−3.30)	(−12.31)	(−10.13)
State bank ownership	0.003	0.001	0.012***	0.002**
	(1.11)	(0.69)	(6.15)	(2.00)
Control variables				
Log (GDP per capita)		0.023*		0.037***
		(1.75)		(4.31)
Bank credit growth		−0.003***		−0.000***
		(−3.40)		(−2.69)
GDP growth		−0.001		−0.001
		(−0.13)		(−0.94)
Inflation		−0.002***		0.002***
		(−2.98)		(8.22)
Sargan test (*p*-value)	0.12	0.14	0.31	0.31
AR(1)-(*p*-value)	0.03	0.02	0.00	0.00
AR(2)-(*p*-value)	0.41	0.33	0.66	0.90
Number of country	146	146	146	146
Number of obs.	839	779	904	836

Panel B: Market contestability and competition: regression results of the model.

$\text{Competition}_{ct} = \beta_0 + \theta \times \text{Market contestability}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \times \text{Dummy crisis}_t + \varepsilon_{ct}$

	Model 1: Lerner index		Model 2: Boone indicator	
	(1)	(2)	(3)	(4)
Lag dependent variable	0.089***	0.073***	0.081***	0.091***
	(12.23)	(13.69)	(10.40)	(9.98)
Market contestability				
Activity restriction	0.077***	0.061***	0.032***	0.031***
	(4.79)	(3.95)	(12.71)	(13.45)
Financial	0.059***	0.052***	0.064*	0.055*
conglomeratem	(3.55)	(3.06)	(1.83)	(1.71)
Limit on foreign banks	0.031	0.029	0.006	0.070***
	(1.63)	(1.03)	(0.31)	(3.17)
Entry requirement	0.067***	0.058**	0.031***	0.012***
	(3.49)	(1.98)	(3.33)	(3.81)
Fraction denied	0.773*	0.609*	0.305	0.345
	(1.76)	(1.71)	(1.21)	(1.06)

Table 2 (*Continued*)

Panel B: Market contestability and competition: regression results of the model.

$\text{Competition}_{ct} = \beta_0 + \theta \times \text{Market contestability}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \times \text{Dummy crisis}_t + \varepsilon_{ct}$

	Model 1: Lerner index		Model 2: Boone indicator	
	(1)	(2)	(3)	(4)
Control variables				
Log (GDP per capita)		−0.019***		0.177***
		(−2.62)		(10.47)
Bank credit growth		−0.004***		−0.001
		(−6.18)		(−0.71)
GDP growth		0.003***		−0.002***
		(4.35)		(−10.98)
Inflation		−0.003***		−0.002***
		(−4.49)		(−5.25)
Sargan test (*p*-value)	0.61	0.82	0.43	0.92
AR(1)-(*p*-value)	0.05	0.01	0.00	0.00
AR(2)-(*p*-value)	0.13	0.09	0.32	0.32
Number of country	146	146	146	146
Number of obs.	371	356	413	373

Panel C: Inter-industry and competition: regression results of the model.

$\text{Competition}_{ct} = \beta_0 + \eta \times \text{Inter industry}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \times \text{Dummy crisis}_t + \varepsilon_{ct}$

	Model 1: (1)	Lerner index (2)	Model 2: (3)	Boone indicator (4)
Lag dependent variable	0.201***	0.226***	0.194***	0.190***
	(6.89)	(8.02)	(7.80)	(7.76)
Inter-industry				
Insurance penetration	−0.009***	−0.008***	−0.019***	−0.018***
	(−4.72)	(−3.03)	(−3.68)	(−4.52)
Stock market	−0.001	−0.001	−0.001*	−0.001*
capitalization	(−1.50)	(−1.23)	(−1.76)	(−1.74)
Stock market efficiency	−0.001	−0.001	−0.001	−0.001
	(−0.76)	(−1.38)	(−0.05)	(−0.31)
Control variables				
Log (GDP per capita)		0.008		−0.023***
		(0.66)		(−4.47)
Bank credit growth		−0.004**		0.002
		(−2.38)		(0.37)
GDP growth		0.001		0.001
		(1.37)		(0.86)
Inflation		−0.002***		−0.002***
		(−4.63)		(−5.26)
Sargan test (*p*-value)	0.21	0.25	0.15	0.12
AR(1)-(*p*-value)	0.02	0.02	0.00	0.02
AR(2)-(*p*-value)	0.94	0.98	0.33	0.35
Number of country	146	146	146	146
Number of obs.	1006	942	1041	976

Table 2 (*Continued*)

Panel D: Institution and competition: regression results of the model.

$\text{Competition}_{ct} = \beta_0 + \gamma \times \text{Institution}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \times \text{Dummy crisis}_t + \varepsilon_{ct}$

	Model 1: Lerner index		Model 2: Boone indicator	
	(1)	(2)	(3)	(4)
Lag dependent variable	0.324***	0.311***	0.283***	0.282***
	(9.19)	(9.21)	(8.84)	(8.19)
Institution				
Financial freedom	0.001	0.001	−0.003	−0.004
	(0.36)	(0.33)	(−0.83)	(−0.63)
Property right	−0.001	−0.001	−0.006***	−0.004***
	(−0.51)	(−0.78)	(−9.31)	(−7.12)
KKZ index	−0.011***	−0.018***	−0.416***	−0.489***
	(3.78)	(−4.19)	(−20.45)	(−24.58)
Control variables				
Log (GDP per capita)		−0.009		−0.110***
		(−0.77)		(−6.12)
Bank credit growth		−0.002**		−0.002***
		(−2.09)		(−4.51)
GDP growth		0.001***		0.001
		(2.79)		(1.62)
Inflation		−0.002***		−0.001***
		(−3.36)		(−3.59)
Sargan test (*p*-value)	0.26	0.07	0.09	0.12
AR(1)-(*p*-value)	0.02	0.03	0.00	0.00
AR(2)-(*p*-value)	0.74	0.83	0.24	0.27
Number of country	146	146	146	146
Number of obs.	1295	1180	1444	1269

is positively correlated with market-power. This is in line with the traditional structure conduct–performance hypothesis, where intensified market-power may be brought about among the large dominant banks. In terms of foreign bank-ownership, the coefficient is statistically significant with a negative sign in all regressions, indicating that foreign bank-ownership contributes to improving the level of competition. Countries may benefit more from hosting foreign banks. On the other hand, state bank-ownership tends to erode competition as evidenced in the Boone indicator, highlighting the difficulty in generating competition for the banks under state-ownership. Of the contestability variables in Panel B, we find that banking competition can be undermined by restrictions on bank activities and on the establishment of conglomerates. Contestable systems due to high entry-requirements also face a lesser competition. The result with respect to the inter-industry competition in Panel C shows that deeper insurance penetration enhances competition among banks, however, the competitiveness does not seem to be much affected by the stock-market capitalisation, nor by stock-market efficiency.

It is argued that institutional quality is usually seen as the means by which competition in markets is maintained, rather than to improve competition, hence institutional variables have little direct effect on bank competition (Delis, 2012). Notwithstanding this, turning to Panel C, the KKZ index and Property rights (only in the Boone indicator) are found to be exerting a positive effect on competition. In terms of the control variables, the results are somewhat mixed across regressions. The consistent results include that with the growth in bank credit, competition among banks intensifies. The coefficients of the inflation rate are mostly significantly negative, indicating a positive association between economic instability and intensified bank competition.

5.2. Main results based on World Bank dataset

We estimate Eq. (4) by splitting the countries into different groups of income, i.e. advanced, emerging and developing countries (see Table A.2 for the classification of income groups for each country.) Panel A and Panel B are the results for the Lerner index and the Boone indicator, respectively. The model specification in the table is based on the general-to-specific model, where we retain the statistically significant variables, if they are found in regressions in either the Lerner or Boone model at least at the 10% level. In general, the findings are consistent between the two measures of competition in terms of the statistical significance and the sign on the coefficients.

Concentration in the advanced economies has a negative coefficient, implying that in a concentrated banking-system, a competitive operation is enhanced. This finding supports the argument in the New Industrial Organization that concentration is not necessarily an inverse proxy of competition. Claessens and Laeven (2004) also point out that concentration and competition may capture different aspects of banking market-structure, and concentration is unlikely to be a driver of competition. Evidence for developing countries contradicts this, as the results indicate that concentration impairs competition, which supports the traditional hypothesis, demonstrating the positive effect of concentrated market on competition. Jeon et al. (2011) also find a similar result using time-varying *H*-statistics for 17 less-developed countries over the period of 1997–2008. The competition in the lower-income countries is also negatively affected by state bank-ownership, and this, coupled with concentration, seems to be the factor to preserve a sustainable market-power in developing banking-systems. Jeon et al. (2011) and Claessens and Laeven (2004) find the significant impact of foreign bank penetration on generating competition, and our result is in harmony with them for emerging countries. Note also that Yeyati and Micco (2007) find, that while increased concentration did not weaken banking competition for Latin American banking sectors, foreign penetration has led to a less competitive industry.

We find no statistical evidence that variations in bank competition can be explained by regulatory variables for advanced economies. This suggests that regulations set in the context of macro-prudential policy may only hamper banks to take on risky projects, not affecting competition. On the other hand, contestability theory is well-supported for emerging and developing banking-systems, in which banks with severe entry- and activity-restrictions face decreasing competition. Being open to new entry should exert an important competitive pressure on these banking sectors.

A distinctive feature across heterogeneous income groups is also apparent in the inter-industry variable. The significant coefficient of insurance penetration with the negative sign that is found for the advanced countries in Panel A, draws attention to the fact that the super growth of other segments of the financial-services industry of insurance weakens market-power or strengthens competition in the advanced banking-sector.[15] This seems to be an advanced-market specific feature, since such a phenomenon is absent in less-developed financial markets. We observe that financial freedom boosts competition in advanced banks, whereas the quality of institutional development, captured by property rights and the KKZ index, tends to yield a competitive environment among emerging and developing banks. The latter accords with the result in Delis (2012), who finds that the impact of financial reform on banking competition is positive if the country has a certain level of institutional quality.

The coefficients on inflation remain significant and negative, suggesting that an unstable economic condition moves in tandem with intensive bank competition.

5.3. Robustness test based on Clerides et al. (2013) dataset

We run the identical regressions as in Table 3 based on the dataset of Clerides et al. (2013). See Table 4, where Panel A is the result for the adjusted Lerner index, and Panel B is for the Boone indicator. Overall, we find consistent results with those in Table 3, and underline the robust findings as follows: In terms of market-structure, bank concentration is positively correlated with the Lerner index and

[15] This is not consistent with the Boone indicator in Panel B, since the coefficient on Insurance penetration is positive. Yet, a further robustness test using the dataset of Clerides et al. (2013) supports the negative effect.

Table 3
Competition model based on World Bank data: main results. Regression results of the model. $Competition_{ct} = \beta_0 + \Omega \times$ Market structure$_{ct} + \theta \times$ Market contestability$_{ct} + \eta \times$ Inter industry$_{ct} + \gamma \times$ Institution$_{ct} + \lambda \times$ Control variables$_{ct} + \varphi \times$ Dummy crisis$_t + \varepsilon_{ct}$. Definitions of all variables are listed in Table A.3. We estimate all regressions using the two-step GMM estimator of Arellano and Bond. Robust *T*-values are in parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%, respectively. Sargan test: the test for over-identifying restrictions in the GMM dynamic model estimation. AR(1) and AR(2): autocorrelation tests in residuals of order 1 and 2, respectively. Note that we eliminate Number of bank to population as it is fixed over time and similarly Limit on foreign bank and also Fraction denied, Stock market capitalization, and Stock market efficiency as we have limited observations and also they perform poorly in baselines results. Sample size varies across regression specifications, since not all variables are available for all countries or for the full sample period (1999–2011).

Panel A: The Lerner index				
		Advanced vs. emerging vs. developing countries		
	All (1)	Advanced (2)	Emerging (3)	Developing (4)
Lag dependent variable	0.419***	0.455**	0.353*	0.564***
	(5.90)	(2.05)	(1.78)	(5.23)
Market structure				
Concentration	0.010*	−0.002***	0.005	0.013**
	(1.76)	(−3.32)	(0.30)	(2.07)
Foreign bank	−0.001**	−0.001	−0.003***	−0.002*
ownership	(−2.11)	(−0.60)	(−3.45)	(−1.74)
State bank ownership	0.001**	−0.001	0.001*	0.002***
	(2.38)	(−1.46)	(1.73)	(4.43)
Market contestability				
Activity restriction	0.006**	0.008	0.007**	0.012***
	2.20)	(0.70)	(2.16)	(4.30)
Financial	0.002*	−0.007	0.021*	0.016***
conglomeratem	(1.78)	(−1.39)	(1.76)	(4.46)
Entry requirement	0.004**	0.006	0.021**	0.008***
	(1.97)	(1.09)	(2.24)	(3.43)
Inter-industry				
Insurance penetration	−0.003*	−0.015***	−0.006	0.012
	(−1.86)	(−4.81)	(−0.42)	(1.15)
Institution				
Financial freedom	0.002	−0.003**	0.002*	0.000
	(1.06)	(−2.15)	(1.72)	(0.43)
Property right	−0.002***	0.002	−0.003*	−0.000**
	(−3.79)	(1.12)	(−1.68)	(−2.07)
KKZ index	−0.001**	0.008	−0.144*	−0.187***
	(−2.07)	(0.33)	(−1.69)	(−5.32)
Control variables				
Log (GDP per capita)	0.059***	0.047	0.143	−0.000
	(3.27)	(1.21)	(1.53)	(−0.02)
Bank credit growth	−0.002**	−0.084*	0.050	−0.004***
	(−2.12)	(−1.79)	(1.48)	(−3.63)
GDP growth	0.001	0.001	0.001	0.001
	(1.62)	(0.88)	(0.70)	(0.82)
Inflation	−0.003***	−0.013***	−0.003**	−0.002***
	(−3.88)	(−9.12)	(−2.04)	(−2.96)
Sargan test (p-value)	0.20	0.98	0.99	0.99
AR(1)-(p-value)	0.01	0.00	0.04	0.02
AR(2)-(p-value)	0.12	0.75	0.32	0.45
Number of country	146	33	40	73
Number of obs.	521	173	194	154

Table 3 (*Continued*)

Panel B: Boone indicator

		Advanced vs. emerging vs. developing countries		
	All	Advanced	Emerging	Developing
	(1)	(2)	(3)	(4)
Lag dependent variable	0.123***	0.077***	0.334***	0.511***
	(24.76)	(14.96)	(7.11)	(31.96)
Market structure				
Concentration	0.002***	−0.001*	−0.000	0.002***
	(3.90)	(−1.70)	(−0.13)	(3.91)
Foreign bank	−0.002***	−0.000	−0.004***	−0.000
ownership	(−17.75)	(−0.94)	(−10.50)	(−0.57)
State bank ownership	0.001*	−0.004**	−0.001	0.001**
	(1.80)	(−2.04)	(−0.94)	(2.04)
Market contestability				
Activity restriction	0.002*	0.003	0.001	0.005***
	(1.75)	(0.69)	(0.88)	(3.18)
Financial	0.009***	0.00	0.003**	−0.002
conglomeratem	(3.37)	(0.60)	(2.29)	(−0.60)
Entry requirement	0.004	0.001	0.008*	0.023**
	(1.53)	(0.41)	(1.78)	(2.07)
Inter-industry				
Insurance penetration	0.017***	0.010**	−0.004***	0.004
	(3.77)	(2.51)	(−3.31)	(0.59)
Institution				
Financial freedom	−0.000	−0.001***	0.000	0.001***
	(−0.46)	(−4.47)	(1.32)	(3.82)
Property right	−0.001***	−0.001	−0.001***	−0.001***
	(−2.92)	(−0.72)	(−3.31)	(−4.24)
KKZ index	−0.043***	0.042	−0.024*	−0.036**
	(−4.49)	(1.19)	(−1.79)	(−1.98)
Control variables				
Log (GDP per capita)	0.010*	−0.143***	0.005	0.042***
	(1.86)	(−2.62)	(0.79)	(7.17)
Bank credit growth	0.001	0.047	−0.002	−0.001
	(0.84)	(1.29)	(−0.14)	(−0.99)
GDP growth	−0.000	−0.000	−0.003***	−0.000
	(−1.00)	(−0.50)	(−9.53)	(−1.50)
Inflation	−0.001**	−0.001	−0.001***	−0.000
	(−2.28)	(−0.22)	(−2.99)	(−0.13)
Sargan test (*p*-value)	0.07	0.96	0.99	0.97
AR(1)-(*p*-value)	0.09	0.05	0.01	0.19
AR(2)-(*p*-value)	0.60	0.21	0.40	0.29
Number of country	146	33	40	73
Number of obs.	551	177	204	170

the Boone indicator for developing economies, confirming that concentration enhances competition, whereas, in reverse, concentration in the advanced banking-sector is negatively related to the Boone indicator. Foreign bank-ownership threatens market-power in banks located in emerging countries, whilst state bank-ownership seems to impair bank competition in developing economies. We again find no evidence that contestability theory holds for the banking system in advanced economies. Most of the contestability variables remain to be significant for emerging and developing economies. The preferable effect of insurance penetration is still observed for advanced economies. We find that financial freedom continues to weaken the market power of the advanced banking sector, and the effect of property rights and the KKZ index remains robust for less developed countries.

Table 4
Competition model based on Clerides et al. (2013) data: robustness test. Regression results of the model $\text{Competition}_{ct} = \beta_0 + \Omega \times \text{Market structure}_{ct} + \theta \times \text{Market contestability}_{ct} + \eta \times \text{Inter industry}_{ct} + \gamma \times \text{Institution}_{ct} + \lambda \times \text{Control variables}_{ct} + \varphi \times \text{Dummy crisis}_{t} + \varepsilon_{ct}$. Definitions of all variables are listed in Table A.3. We estimate all regressions using the two-step GMM estimator of Arellano and Bond (1991). Robust *T*-values are in parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%, respectively. Sargan test: the test for over-identifying restrictions in the GMM dynamic model estimation. AR(1) and AR(2): autocorrelation tests in residuals of order 1 and 2, respectively. Sample size varies across regression specifications as not all variables are available for all countries or for the full sample period (1999–2010).

Panel A: Adjusted Lerner index

		Advanced vs. emerging vs. developing countries		
	All	Advanced	Emerging	Developing
	(1)	(2)	(3)	(4)
Lag dependent variable	0.537***	0.319***	0.378***	0.463**
	(9.09)	(2.97)	(3.16)	(2.46)
Market structure				
Concentration	0.001*	−0.001	0.002	0.003***
	(1.67)	(−1.07)	(0.98)	(2.68)
Foreign bank	−0.001	0.001	−0.001**	−0.001
ownership	(−0.33)	(1.31)	(−2.16)	(−1.14)
State bank ownership	0.001***	0.001	0.002***	0.002*
	(3.79)	(1.01)	(2.80)	(1.72)
Market contestability				
Activity restriction	0.003*	−0.000	0.003*	0.010**
	(1.89)	(−0.11)	(1.71)	(2.45)
Financial	0.005**	−0.003	0.001	0.011**
conglomeratem	(2.14)	(−0.89)	(0.42)	(2.30)
Entry requirement	0.005***	−0.027	0.018***	0.008**
	(3.03)	(−1.31)	(4.48)	(1.98)
Inter-industry				
Insurance penetration	−0.010**	−0.001**	−0.001	0.030
	(−2.38)	(−1.94)	(−0.13)	(1.62)
Institution				
Financial freedom	−0.001	−0.002*	0.001*	−0.000
	(0.90)	(−1.87)	(1.72)	(−0.40)
Property right	−0.002**	−0.000	−0.002***	−0.002**
	(−2.06)	(−0.34)	(−2.77)	(−2.32)
KKZ index	−0.047*	−0.008	−0.072**	−0.130*
	(−1.77)	(−0.16)	(−2.04)	(−1.86)
Control variables				
Log (GDP per capita)	−0.006	0.017	−0.012	−0.032**
	(−0.83)	(0.92)	(−0.77)	(−2.00)
Bank credit growth	−0.001	−0.040	0.022	−0.000
	(−1.56)	(−1.33)	(0.64)	(−0.27)
GDP growth	0.005***	0.007***	0.006***	0.005***
	(6.52)	(4.40)	(5.60)	(3.31)
Inflation	−0.004***	−0.014***	−0.003**	−0.002*
	(−5.56)	(−6.80)	(−2.32)	(−1.73)
Sargan test (*p*-value)	0.08	0.75	0.98	0.82
AR(1)-(*p*-value)	0.00	0.03	0.03	0.07
AR(2)-(*p*-value)	0.64	0.22	0.89	0.79
Number of country	128	32	40	56
Number of obs.	492	163	179	150

Table 4 (*Continued*)

Panel B: Boone indicator

		Advanced vs. emerging vs. developing countries		
	All	Advanced	Emerging	Developing
	(1)	(2)	(3)	(4)
Lag dependent variable	0.920***	0.720***	0.209**	0.652***
	(17.76)	(5.81)	(2.20)	(13.17)
Market structure				
Concentration	0.001**	−0.001*	0.001	0.002**
	(2.28)	(−1.79)	(0.30)	(2.16)
Foreign bank	−0.001*	0.001	−0.001*	−0.001
ownership	(−1.77)	(0.64)	(−1.80)	(−0.40)
State bank ownership	0.001**	−0.001***	0.000	0.003***
	(2.13)	(−3.04)	(0.31)	(2.62)
Market contestability				
Activity restriction	0.008***	0.005	0.004**	0.002**
	(3.01)	(0.92)	(2.05)	(2.10)
Financial	0.003*	−0.000	0.008*	0.004**
conglomeratem	(1.78)	(−0.03)	(1.84)	(2.21)
Entry requirement	0.003***	0.008	0.019	0.001**
	(2.94)	(0.77)	(−1.05)	(2.18)
Inter-industry				
Insurance penetration	−0.002*	−0.012*	0.001	0.009
	(−1.83)	(−1.78)	(0.28)	(1.53)
Institution				
Financial freedom	−0.000	−0.001***	0.001	−0.000
	(−0.62)	(−3.23)	(1.28)	(−0.24)
Property right	−0.001	0.001	−0.002**	−0.001*
	(−1.34)	(1.03)	(−2.12)	(−1.92)
KKZ index	−0.044***	−0.018	−0.069*	−0.045***
	(−3.33)	(−0.24)	(−1.96)	(−2.61)
Control variables				
Log (GDP per capita)	−0.004	−0.023	0.037	0.006
	(−0.64)	(−1.09)	(1.53)	(0.83)
Bank credit growth	0.000**	−0.111**	0.002	0.001*
	(2.54)	(−2.17)	(0.11)	(1.65)
GDP growth	0.000	−0.001	0.001**	0.001***
	(0.05)	(−0.80)	(2.48)	(3.13)
Inflation	−0.003***	−0.017***	−0.004***	−0.001**
	(−4.22)	(−7.21)	(−4.40)	(−2.00)
Sargan test (*p*-value)	0.17	0.88	0.90	0.99
AR(1)-(*p*-value)	0.00	0.00	0.16	0.04
AR(2)-(*p*-value)	0.70	0.55	0.16	0.88
Number of country	128	32	40	56
Number of obs.	492	163	179	150

5.4. Further robustness test based on bank-level data

Following Claessens and Laeven (2004) and Jeon et al. (2011), our empirical testing proceeds in two steps. Firstly, we estimate the measures of competition, as specified in Eqs. (1)–(3) in Section 3 for the Lerner index at a bank-level. Secondly, we estimate a linear model by augmenting Eq. (4) with bank-specific traits as additional control variables to verify that our results are not affected by differences in banking management across countries. We specify five bank-level variables, i.e. bank size, bank equity, share of wholesale funding, lending and bank fee income. Large banks may operate in international markets that are competitive, hence bank size may matter. It is measured by taking the natural logarithm of bank assets in US million dollars. It is argued that well-capitalized banks face

Table 5
Competition model based on bank-level data for the Lerner index: Robustness test Regression results of the model $Competition_{ict} = \beta_0 + \delta \times Bank\ control_{ict} + \Omega \times Market\ structure_{ct} + \theta \times Market\ contestability_{ct} + \eta \times Inter\ industry_{ct} + \gamma \times Institution_{ct} + \lambda \times Control\ variables_{ct} + \varphi \times Dummy\ crisis_t + \varepsilon_{ict}$. Definitions of all variables are listed in Table A.2. We estimate all regressions using the two-step GMM estimator of Arellano and Bond (1991). Robust *T*-values are in parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%, respectively. Sargan test: the test for over-identifying restrictions in the GMM dynamic model estimation. AR(1) and AR(2): autocorrelation tests in residuals of order 1 and 2, respectively, are 0 (H0: no autocorrelation). Sample period (1999–2011).

		Advanced vs. emerging vs. developing countries		
	All	Advanced	Emerging	Developing
	(1)	(2)	(3)	(4)
Lag dependent variable	0.721***	0.339***	0.567***	0.466***
	(26.89)	(10.68)	(18.19)	(7.26)
Bank control				
Log (size)	−0.025***	−0.035***	−0.021***	−0.011*
	(−6.10)	(−3.18)	(−5.39)	(−1.77)
Capital adequacy	0.010	−0.237	−0.018	0.307***
	(0.32)	(−1.61)	(−0.66)	(5.04)
Share of wholesale	0.015*	0.052***	−0.012*	−0.029
funding	(1.75)	(3.90)	(−1.75)	(−1.26)
Lending	−0.052***	0.004	−0.003	−0.031
	(−2.80)	(0.11)	(−0.17)	(−0.74)
Diversification	−0.170***	−0.135***	1.211***	1.147***
	(−11.78)	(−10.44)	(5.43)	(4.18)
Market structure				
Concentration	0.005***	−0.001	0.002***	0.008***
	(12.55)	(−0.78)	(4.22)	(13.61)
Foreign bank	0.001	−0.001	−0.004***	−0.006***
ownership	(0.02)	(−0.47)	(−5.48)	(−6.07)
State bank ownership	0.002***	0.001	−0.001	0.002***
	(2.80)	(1.05)	(−1.41)	(3.39)
Market contestability				
Activity restriction	0.002*	−0.008	0.002	0.016***
	(1.85)	(−0.84)	(1.34)	(4.94)
Financial	0.006*	0.012	0.043***	0.014***
conglomeratem	(1.67)	(0.84)	(9.79)	(3.65)
Entry requirement	0.033***	0.068***	0.050***	0.010**
	(4.66)	(7.28)	(3.26)	(2.32)
Inter-industry				
Insurance penetration	−0.003	−0.007*	0.002	0.006
	(−1.63)	(−1.69)	(1.03)	(1.40)
Institution				
Financial freedom	−0.001***	−0.001***	−0.001	0.001***
	(−4.91)	(−4.38)	(−1.42)	(2.84)
Property right	−0.004***	0.001	−0.005***	−0.001*
	(−9.74)	(1.54)	(−8.78)	(−1.70)
KKZ index	−0.121***	0.139***	−0.113***	−0.096*
	(−8.37)	(5.04)	(−3.82)	(−1.76)
Control variables				
Log (GDP per capita)	0.039**	0.065	−0.035**	−0.016
	(2.33)	(1.40)	(−2.22)	(−1.06)
Bank credit growth	0.022**	0.334***	0.004	0.006**
	(2.56)	(10.82)	(0.26)	(2.31)
GDP growth	0.001***	−0.004***	−0.002***	−0.001*
	(3.50)	(−10.52)	(−3.29)	(−1.75)
Inflation	0.004***	0.032***	−0.004***	0.005***
	(7.49)	(20.38)	(−5.87)	(5.70)
Sargan test (*p*-value)	0.15	0.25	0.09	0.07
AR(1)-(*p*-value)	0.00	0.00	0.02	0.00

Table 5 (*Continued*)

		Advanced vs. emerging vs. developing countries		
	All (1)	Advanced (2)	Emerging (3)	Developing (4)
AR(2)-(*p*-value)	0.36	0.67	0.22	0.38
Number of country	134	33	40	61
Number of obs.	15273	9111	5113	1049

lower funding costs and have larger net interest margins, hence we specify the ratio of equity to total assets. By including the share of wholesale funding, we are able to control the degree of dependence on money-markets for the source of bank funds. The higher dependence on short-term borrowing may have repercussions on bank competition. By introducing fee income measured by the ratio of non-interest-operating income to total assets as a proxy of diversification, we control for different product mixes in assessing the impact of bank-regulations, concentration and institutions on bank competition. Lending as the ratio of loans to assets is also specified. We expect that the operation of those banks which have the higher ratio follows traditional bank activities, implying that competition among such banks may be less. The contemporaneous terms enter into the model for the bank-specific characteristics. However, to address potential endogeneity issues with the dependent variable, and also correlation with the determinants, GMM is also employed here using the lagged variables as instrument variables.

The regression results based on these bank-level controlling variables are reported in Table 5. It appears that the relationship between banking competition and these bank-specific factors are independently informative. Given the negative significant coefficients on bank size for all income groups, the robust finding is that large banks are facing greater competition across countries. Evidence also suggests that an increase in diversification enhances competition for advanced banks, whereas it impairs competition for emerging and developing economies. The latter reflects the less-developed financial sector, where fee income activities are still underdeveloped and mainly practised in less-competitive environments. It is also found that in developing countries, a high capital adequacy is a source of market-power.

While controlling the bank-specific factors, the main results in Table 3 are sustained in terms of statistical significance and the direction of the effect. The noteworthy points are as follows: There is a clear picture that concentrated banking-systems enhance market-power for developing banking sectors. It is verified that foreign asset penetration enhances competition in emerging economies, and state bank-ownership is negatively associated with competition in developing economies. Contestability remains to be a strong source to boost market-power for less-developed countries, preserving the contestability hypothesis for emerging and developing income countries. Insurance and financial freedom are consistently the main drivers of greater competition in developed countries. The effect of the institutional factors of Property rights and the KKZ index on emerging and developing economies is also hardly altered by the bank-level data approach.

6. Conclusions

In this paper, we attempt to investigate the driving forces of competition in banking sectors by distinguishing banks located in developed, emerging and developing countries. The competition model is estimated by employing the Lerner index and the Boone indicator for 146 countries. Some empirical results are diverse across different income-groups of countries.

The evidence reveals that a more concentrated banking system seems to face greater competition for advanced economies, whereas it would hamper competition for developing economies. The nature of ownership matters for competition, specifically, the penetration of foreign banks seems to be beneficial to emerging economies. Developing countries with less state-owned bank assets have a more competitive banking sector, hence less intervention of government is contributory to the creation of a competitive banking-industry for low-income countries. Fewer entry and activity restrictions in

the less-developed banking sectors are associated with competitive banking systems, whereas we find no evidence that contestability theory holds in advanced economies. Banks located in countries with good-quality institutional development face greater competition for emerging and developing economies. Inter-industry competition from insurance industries, together with financial freedom, seem to be the main drivers in increasing competition amongst developed economies. The enhancement of the rivalry from non-bank financial industries should be encouraged to prevent the dominance of the banking sector in developed financial markets, in this respect. Many of these results survive robustness tests, even after controlling for bank-specific factors.

Our findings advance the literature on an important topic, with direct implications for public policy towards banking-structure and regulations for the respective income-group of countries. In particular, for the developing economies, there is scope for raising competitiveness by preventing excessive concentration in their banking sector. It is argued that market structure indicators may have become less valuable as a driving force of competition, and it necessitates a reassessment of competition policy (Claessens and Laeven, 2004). Our evidence suggests that this applies to developed and emerging countries, however, traditional competition policy in the financial sector may yet allow more rein to the forces of competition for low income countries.

Appendix A.

Table A.1
Sample selection and number of countries in the sample.

	All	Drop	Remaining
Panel A: Sample selection of the main dataset of the study			
All countries in Bank Regulation and Supervision Database	180		180
Less			
Countries not included in Global Financial Development Database[a]		13	167
Countries included but limited observation of Lerner and Boone indicators in Global Financial Development Database[b]		21	146
Final sample			146
Panel B: Sample selection for Clerides et al. (2013) – for robustness			
All countries	148		148
Countries not included in our main dataset (Panel A)		20	128
Final sample			128
Panel C: Sample selection of bank-level data – for robustness			
All countries in BankScope	192		192
Less			
Countries with less than 5 banks		40	152
U.S.		1	151
Countries not listed in final sample of our main dataset (Panel A)		17	134
Final sample			134
Criteria for selecting banks			
All commercial, cooperative and savings banks	8236		8236
Less			
Inactive banks		719	7517
All banks			7517

[a] Anguilla, Cook Islands, Gibraltar, Guernsey, Jersey, Montserrat, Palestinian, Puerto Rico, Serbia and Montenegro, Taiwan, Turks and Caicos Island, Virgin Islands, and Yugoslavia.

[b] Aruba, Central Africa Rep., Chad, Congo Rep., Dominica, Equatorial Guinea, Fiji, Guinea-Bissau, Iraq, Isle of Man, Kosovo, Liechtenstein, Maldives, Papua New Guinea, Saint Lucia, Saint Vincent, Seychelles, Solomon Islands, Tonga, Turkmenistan, and Zimbabwe.

Table A.2
Average of country-level bank competition (WB: World Bank 1999–2011; Clerides et al. 1999–2010).

Row	Country	Code	Economy	Lerner index			Boone indicator			Clerides et al. (2013)	
				Obs.	Mean	Sd. Dv.	Obs.	Mean	Sd. Dv.	Adj. Lerner	Boone
1	Albania	ALB	Dev.	13	0.26	0.04	13	−0.02	0.02	0.25	−0.43
2	Algeria	DZA	Dev.	13	0.43	0.21	13	0.01	0.02	0.26	−0.47
3	Angola	AGO	Dev.	13	0.44	0.09	13	−0.07	0.03	0.26	−0.41
4	Antigua and Barbuda	ATG	Dev.				9	−0.48	0.30	0.18	−0.43
5	Argentina	ARG	Eme.	13	0.24	0.09	13	−0.03	0.10	0.14	−0.47
6	Armenia	ARM	Dev.	13	0.30	0.08	13	−0.22	0.03	0.26	−0.46
7	Australia	AUS	Adv.	12	0.11	0.04	13	0.09	0.18	0.16	−0.47
8	Austria	AUT	Adv.	13	0.20	0.04	13	−0.06	0.01	0.11	−0.49
9	Azerbaijan	AZE	Dev.	13	0.33	0.08	13	−0.10	0.03	0.27	−0.47
10	Bahrain	BHR	Eme.	13	0.32	0.07	13	−0.05	0.02	0.18	−0.58
11	Bangladesh	BGD	Eme.	13	0.28	0.11	13	−0.07	0.02	0.14	−0.44
12	Belarus	BLR	Dev.	12	0.21	0.05	13	0.47	0.27	0.11	−0.50
13	Belgium	BEL	Adv.	13	0.23	0.03	13	−0.09	0.03	0.10	−0.49
14	Belize	BLZ	Dev.	9	0.38	0.07	11	−0.03	0.02		
15	Benin	BEN	Dev.	13	0.25	0.06	13	0.02	0.03		
16	Bhutan	BTN	Dev.				13	−0.07	0.04		
17	Bolivia	BOL	Dev.	13	0.18	0.07	13	−0.08	0.03	0.13	−0.40
18	Bosnia and Herzeg.	BIH	Dev.	8	0.22	0.04	13	−0.04	0.01	0.11	−0.44
19	Botswana	BWA	Dev.	12	0.24	0.05	13	−0.13	0.02	0.30	−0.40
20	Brazil	BRA	Eme.	13	0.18	0.06	13	−0.17	0.02	0.15	−0.49
21	Bulgaria	BGR	Eme.	11	0.35	0.04	13	−0.09	0.02	0.29	−0.41
22	Burkina Faso	BFA	Dev.	13	0.30	0.04	13	−0.09	0.02	0.23	−0.40
23	Burundi	BDI	Dev.	13	0.39	0.10	13	−0.15	0.05		
24	Cambodia	KHM	Dev.	11	0.38	0.09	11	0.03	0.07	0.32	−0.44
25	Cameroon	CMR	Dev.	13	0.42	0.07	13	−0.04	0.01	0.31	−0.41
26	Canada	CAN	Adv.	12	0.18	0.03	13	−0.11	0.03	0.17	−0.40
27	Cayman Islands	CYM	Dev.	12	0.32	0.07	13	−0.04	0.02		
28	Chile	CHL	Eme.	12	0.27	0.07	13	−0.05	0.03	0.20	−0.45
29	China	CHN	Eme.	12	0.36	0.10	13	−0.02	0.01	0.30	−0.41
30	Colombia	COL	Eme.	13	0.23	0.10	13	−0.07	0.02	0.16	−0.42
31	Costa Rica	CRI	Dev.	13	0.20	0.07	13	−0.08	0.02	0.16	−0.48
32	Cote d'Ivoire	CIV	Dev.	13	0.24	0.03	13	−0.06	0.02	0.19	−0.40
33	Croatia	HRV	Dev.	13	0.22	0.05	13	−0.10	0.02	0.21	−0.42
34	Cyprus	CYP	Adv.	13	0.22	0.07	13	0.01	0.03	0.13	−0.45
35	Czech Republic	CZE	Adv.	13	0.16	0.07	13	−0.21	0.12	0.25	−0.42
36	Denmark	DNK	Adv.	12	0.26	0.10	13	−0.07	0.02	0.16	−0.50
37	Dominican Republic	DOM	Dev.	13	0.19	0.06	13	−0.23	0.06	0.17	−0.46
38	Ecuador	ECU	Dev.	12	0.14	0.07	12	−0.02	0.02	0.16	−0.42
39	Egypt, Arab Rep.	EGY	Eme.	5	0.14	0.19	13	−0.08	0.01	0.20	−0.43
40	El Salvador	SLV	Dev.	13	0.37	0.10	13	−0.09	0.08	0.20	−0.42
41	Estonia	EST	Adv.	12	0.20	0.08	13	0.08	0.06	0.19	−0.44
42	Ethiopia	ETH	Dev.	13	0.48	0.09	13	−0.03	0.01	0.46	−0.42
43	Finland	FIN	Adv.	10	−0.07	0.55	13	0.42	1.79	0.23	−0.39
44	France	FRA	Adv.	13	0.17	0.05	13	−0.05	0.01	0.15	−0.46
45	Gabon	GAB	Dev.				13	−0.04	0.01		
46	Gambia, The	GMB	Dev.	13	0.35	0.15	12	0.06	0.07	0.41	−0.39
47	Georgia	GEO	Dev.	13	0.33	0.08	13	−0.10	0.03	0.21	−0.48
48	Germany	DEU	Adv.	12	0.16	0.03	13	−0.04	0.01	0.09	−0.42
49	Ghana	GHA	Dev.	12	0.33	0.13	13	−0.19	0.02	0.31	−0.41

Table A.2 (*Continued*)

Row	Country	Code	Economy	Lerner index			Boone indicator			Clerides et al. (2013)	
				Obs.	Mean	Sd. Dv.	Obs.	Mean	Sd. Dv.	Adj. Lerner	Boone
50	Greece	GRC	Adv.	11	0.23	0.14	8	−0.07	0.08	0.10	−0.41
51	Grenada	GRD	Dev.				13	−0.08	0.04		
52	Guatemala	GTM	Dev.				13	−0.13	0.05	0.19	−0.50
53	Guinea	GIN	Dev.				10	0.03	0.06		
54	Guyana	GUY	Dev.				13	−0.05	0.01		
55	Honduras	HND	Dev.	13	0.18	0.05	13	−0.04	0.02	0.16	−0.42
56	Hong Kong SAR, China	HKG	Adv.	12	0.30	0.08	13	−0.07	0.19	0.25	−0.46
57	Hungary	HUN	Eme.	13	0.09	0.06	13	−0.09	0.03	0.13	−0.45
58	Iceland	ISL	Adv.	12	0.18	0.13	8	−0.10	0.10	0.20	−0.56
59	India	IND	Eme.	13	0.24	0.04	13	−0.06	0.01	0.14	−0.46
60	Indonesia	IDN	Eme.	13	0.17	0.06	13	−0.03	0.01	0.19	−0.48
61	Ireland	IRL	Adv.	12	0.22	0.05	13	−0.01	0.01		
62	Israel	ISR	Adv.	12	0.19	0.03	13	−0.04	0.01	0.09	−0.43
63	Italy	ITA	Adv.	12	0.19	0.03	13	−0.04	0.03	0.17	−0.42
64	Jamaica	JAM	Dev.	11	0.32	0.05	9	−0.09	0.01	0.26	−0.43
65	Japan	JPN	Adv.	13	0.21	0.14	13	−0.02	0.01	0.14	−0.35
66	Jordan	JOR	Eme.	13	0.32	0.09	13	−0.06	0.01	0.27	−0.42
67	Kazakhstan	KAZ	Dev.	13	0.29	0.05	13	−0.07	0.04	0.20	−0.54
68	Kenya	KEN	Dev.	13	0.28	0.08	13	−0.07	0.01	0.29	−0.39
69	Korea, Rep.	KOR	Adv.	12	0.31	0.03	120	0.07	0.06	0.14	−0.52
70	Kuwait	KWT	Eme.	13	0.47	0.08	13	−0.08	0.03	0.41	−0.52
71	Kyrgyz Republic	KGZ	Dev.	11	0.38	0.13	11	−0.01	0.05	0.30	−0.41
72	Latvia	LVA	Eme.	13	0.21	0.06	13	−0.04	0.03	0.23	−0.43
73	Lebanon	LBN	Dev.	13	0.17	0.04	13	−0.07	0.01	0.13	−0.56
74	Lesotho	LSO	Dev.				13	0.00	0.02		
75	Lithuania	LTU	Eme.	12	0.14	0.05	13	−0.03	0.05	0.18	−0.42
76	Luxembourg	LUX	Adv.	13	0.10	0.06	13	−0.05	0.01	0.16	−0.50
77	Macao SAR, China	MAC	Dev.	13	0.14	0.08	13	0.01	0.01	0.26	−0.45
78	Macedonia, FYR	MKD	Dev.	13	0.27	0.05	13	−0.08	0.01	0.19	−0.41
79	Madagascar	MDG	Dev.	13	0.34	0.08	13	−0.02	0.02	0.35	−0.41
80	Malawi	MWI	Dev.	12	0.26	0.09	13	−0.09	0.02	0.36	−0.45
81	Malaysia	MYS	Eme.	13	0.30	0.18	13	−0.03	0.01	0.28	−0.41
82	Mali	MLI	Dev.	13	0.27	0.05	13	−0.09	0.01	0.19	−0.40
83	Malta	MLT	Adv.	12	0.24	0.07	13	−0.05	0.01	0.28	−0.44
84	Mauritius	MUS	Eme.	13	0.42	0.12	13	−0.05	0.01	0.25	−0.54
85	Mexico	MEX	Eme.				13	−0.04	0.03	0.09	−0.62
86	Moldova	MDA	Dev.	13	0.27	0.09	13	−0.13	0.04	0.29	−0.47
87	Montenegro	MNE	Dev.	10	0.04	0.07	9	−0.05	0.04	0.11	−0.40
88	Morocco	MAR	Eme.	13	0.27	0.05	13	−0.03	0.01	0.23	−0.42
89	Mozambique	MOZ	Dev.	12	0.24	0.07	13	2.25	1.24	0.26	−0.40
90	Myanmar	MMR	Dev.				7	−0.07	0.12		
91	Namibia	NAM	Dev.				8	0.03	0.03	0.19	−0.45
92	Nepal	NPL	Dev.	13	0.20	0.22	13	−0.07	0.01	0.30	−0.44
93	Netherlands	NLD	Adv.	12	0.17	0.03	13	0.03	0.04	0.15	−0.50
94	New Zealand	NZL	Adv.	13	0.15	0.05	13	−0.24	0.31	0.19	−0.50
95	Nicaragua	NIC	Dev.				13	−0.01	0.02	0.24	−0.42
96	Niger	NER	Dev.	13	0.20	0.14	13	−0.11	0.04	0.17	−0.40
97	Nigeria	NGA	Eme.	13	0.21	0.25	13	−0.07	0.03	0.23	−0.42
98	Norway	NOR	Adv.	12	0.22	0.06	13	−0.01	0.05	0.18	−0.45
99	Oman	OMN	Eme.	13	0.40	0.05	13	−0.01	0.02	0.29	−0.41
100	Pakistan	PAK	Eme.	13	0.15	0.11	13	−0.03	0.03	0.20	−0.45
101	Panama	PAN	Dev.	13	0.38	0.05	13	−0.11	0.02	0.25	−0.44
102	Paraguay	PRY	Dev.	13	0.09	0.13	13	−0.15	0.16	0.07	−0.57
103	Peru	PER	Eme.	13	0.31	0.08	13	−0.04	0.02	0.22	−0.41
104	Philippines	PHL	Eme.	13	0.11	0.12	13	−0.17	0.16	0.17	−0.43

Table A.2 (*Continued*)

Row	Country	Code	Economy	Lerner index			Boone indicator			Clerides et al. (2013)	
				Obs.	Mean	Sd. Dv.	Obs.	Mean	Sd. Dv.	Adj. Lerner	Boone
105	Poland	POL	Eme.	13	0.19	0.07	13	−0.12	0.03	0.15	−0.45
106	Portugal	PRT	Adv.	13	0.28	0.11	13	−0.11	0.07	0.12	−0.53
107	Qatar	QAT	Eme.	13	0.47	0.09	13	0.02	0.04	0.39	−0.45
108	Romania	ROM	Eme.	13	0.22	0.05	13	−0.06	0.04	0.17	−0.51
109	Russian Federation	RUS	Eme.	13	0.17	0.09	13	−0.04	0.01	0.27	−0.48
110	Rwanda	RWA	Dev.	13	0.31	0.09	11	−0.17	0.02	0.21	−0.39
111	Saint Kitts and Nevis	KNA	Dev.				13	−0.03	0.03		
112	Samoa	WSM	Dev.				13	−0.02	0.03		
113	Saudi Arabia	SAU	Eme.	13	0.47	0.10	13	−0.05	0.02	0.30	−0.42
114	Senegal	SEN	Dev.	13	0.33	0.03	13	−0.07	0.01	0.27	−0.40
115	Serbia	SRB	Dev.	11	0.24	0.12	13	−0.36	0.44	0.17	−0.41
116	Sierra Leone	SLE	Dev.	12	0.35	0.20	12	−0.10	0.05	0.37	−0.40
117	Singapore	SGP	Adv.	13	0.21	0.13	13	−0.01	0.05	0.32	−0.47
118	Slovak Republic	SVK	Adv.	13	0.14	0.07	13	−0.10	0.03	0.21	−0.45
119	Slovenia	SVN	Adv.	13	0.25	0.04	13	−0.11	0.03	0.16	−0.44
120	South Africa	ZAF	Eme.	13	0.25	0.04	11	−0.10	0.04	0.15	−0.44
121	Spain	ESP	Adv.	13	0.16	0.08	13	0.18	0.14	0.19	−0.49
122	Sri Lanka	LKA	Eme.	12	0.20	0.04	13	−0.18	0.03	0.13	−0.51
123	Sudan	SDN	Eme.	13	0.31	0.12	13	0.01	0.03	0.18	−0.49
124	Suriname	SUR	Dev.				13	−0.02	0.02		
125	Swaziland	SWZ	Dev.	12	0.19	0.05	13	−0.56	0.23		
126	Sweden	SWE	Adv.	13	0.23	0.05	13	−0.05	0.02	0.19	−0.47
127	Switzerland	CHE	Adv.	13	0.21	0.03	13	−0.06	0.01	0.12	−0.45
128	Syrian Arab Republic	SYR	Dev.	7	0.28	0.19	7	0.07	0.09	0.42	−0.43
129	Tajikistan	TJK	Dev.				7	−0.22	0.95		
130	Tanzania	TZA	Dev.	9	0.33	0.07	9	−0.09	0.03	0.36	−0.37
131	Thailand	THA	Eme.	13	0.11	0.23	13	−0.05	0.01	0.21	−0.42
132	Togo	TGO	Dev.	13	0.25	0.09	12	−0.10	0.04	0.27	−0.40
133	Trinidad and Tobago	TTO	Dev.	12	0.34	0.04	13	0.02	0.05	0.30	−0.45
134	Tunisia	TUN	Eme.	13	0.24	0.05	13	−0.03	0.01	0.19	−0.47
135	Turkey	TUR	Eme.	12	0.21	0.06	13	−0.15	0.26	0.17	−0.57
136	Uganda	UGA	Dev.	5	0.33	0.05	13	−0.11	0.01	0.33	−0.39
137	Ukraine	UKR	Eme.	12	0.21	0.10	13	−0.14	0.26	0.13	−0.52
138	United Arab Emirates	ARE	Eme.	13	0.42	0.09	13	−0.04	0.01	0.36	−0.45
139	United Kingdom	GBR	Adv.	13	0.23	0.09	13	−0.04	0.01	0.19	−0.44
140	United States	USA	Adv.	13	0.27	0.05	13	−0.07	0.01	0.22	−0.40
141	Uruguay	URY	Dev.	13	0.11	0.09	13	−0.07	0.06	0.13	−0.50
142	Vanuatu	VUT	Dev.				9	−0.01	0.01		
143	Venezuela, RB	VEN	Eme.	13	0.24	0.06	13	−0.13	0.03	0.22	−0.41
144	Vietnam	VNM	Eme.	13	0.25	0.04	13	−0.07	0.01	0.23	−0.49
145	Yemen, Rep.	YEM	Dev.				13	0.01	0.02	0.14	−0.46
146	Zambia	ZMB	Dev.	13	0.18	0.15	13	−0.12	0.04	0.20	−0.38
Mean				12.4	0.25	0.08	12.5	−0.05	0.07	0.21	−0.45

Table A.3
Definition of variables.

Variable	Description	Source
i. Dependent variables		
Lerner index	A measure of market power in the banking market. It compares output pricing and marginal costs (that is, markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries.	World Bank: The Global Financial Development Database. Martin Čihák et al. (2012).
Boone indicator	A measure of degree of com petition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries.	World Bank: The Global Financial Development Database. Martin Čihák et al. (2012).
ii. Explanatory variables		
Market structure		
Concentration	Assets of five largest banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles. Current tax assets, deferred tax, discontinued operations and other assets.	World Bank: The Global Financial Development Database. Martin Čihák et al. (2012).
Number of banks to population	The ratio of the number of banks in the country per 100,000 people.	Barth et al. (2001) and authors' calculation based on BankScope for missing countries
Foreign bank ownership	The extent to which the banking system's assets a re foreign owned which is the fraction of the banking system's assets that is 50% or more foreign owned.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)
State bank ownership	The extent to which the banking system's assets are government owned which is the fraction of the banking system's assets that is 50% or more government owned.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)
Market contestability		
Activity restriction	A variable that ranges from zero to twelve, with twelve indicating the highest restrictions on bank activities. The activity restrictions include restrictions on securities activities, insurance activities, and real estate activities. A value of 1 is added to the index if an activity is unrestricted, 2 if it is permitted, 3 if it is restricted, and 4 if it is prohibited.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)
Financial conglomerate	A variable that ranges from zero to twelve, with twelve indicating the highest restrictions on bank conglomerate. The financial conglomerate includes the extent to which banks may own and control nonfinancial firms, the extent to which nonfinancial firms may own and control banks, and the extent to which nonbank financial firms may own and control banks.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)

Table A.3 (*Continued*)

Variable	Description	Source
Limit on foreign bank	A variable that measures whether foreign banks may own domestic banks and whether foreign banks may enter a country's banking industry. It examines are foreign entities prohibited from entering through: Acquisition, Subsidiary, and Branch? The indicator ranges from zero to four, with Lower values indicate greater stringency.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)
Entry requirement	Entry requirement measures whether various types of legal submissions are required to obtain a ban king license. It examines whether the eight documents (such as draft by-laws, intended organization chart) are legally required to be submitted before issuance of the ban king license. The indicator ranges from zero to eight, with higher values indicate greater stringency.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)
Fraction denied	The percentage of applications (both domestic and foreign) to enter banking denied in the past five years.	World Bank surveys on bank regulation. Surveys on bank regulation were conducted in 1999, 2003, 2007, and 2011, covering 180 countries. Barth et al. (2013)
Inter-industry		
Insurance penetration	Ratio of life and non-life insurance premium volume to GDP. Premium volume is the insurer's direct premiums earned (if Property/Casualty) or received (if Life/Health) during the previous calendar year.	World Bank: The Global Financial Development Database. Martin Čihák et al. (2012)
Market capitalization	Stock market capitalization of listed companies to GDP. Market capitalization is calculated by multiplying a company's shares outstanding by the current market price of one share.	World Bank: World Development Indicators.
Stock market efficiency	Stock market turnover ratio as an indicator of market efficiency. Turnover ratio is the total value of shares traded during the period divided by the average market capitalization for the period.	World Bank: World Development Indicators.
Institution		
Financial freedom	Financial freedom is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. The Index scores an economy's financial freedom by looking into five broad a re as: (i) The extent of government regulation of financial services, (ii) The degree of state intervention in banks and other financial firms through direct and indirect ownership, (iii) The extent of financial and capital market development, (iv) Government influence on the allocation of credit, and (v) Openness to foreign competition. An overall score on a scale of 0 to 100 is given to an economy's financial freedom through deductions from the ideal score of 100.	Heritage Foundation Data base.

Table A.3 (*Continued*)

Variable	Description	Source
Property rights	Property right measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. It also assesses the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. It ranges from 0 to 100. A higher score indicates better protection of property rights and signify greater protection of private property rights.	Heritage Foundation Data base.
KKZ index	KKZ institution index is an aggregate indicator of the quality of institutional development in the country. The index is calculated using the average indicators of information on six issues: voice accountability, political stability, government's effectiveness, regulatory quality, rule of law, and control of corruption. Higher value indicates higher institutional quality.	Worldwide Governance Indicator. Kaufman et al. (2010).
Macroeconomics		
Log (GDP per capita)	Natural logarithm of real GDP per capita.	World Bank: World Development Indicators.
Bank credit growth	Bank credit growth is the growth of domestic credit provided by ban king sector to GDP. Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other ban king institution.	World Bank: World Development Indicators.
GDP growth	The real annual growth of GDP.	World Bank: World Development Indicators.
Inflation	The annual change in the consumer price index.	World Bank: World Development Indicators.
Bank-level variables		
Log (size)	Natural logarithm of a bank total assets.	BankScope.
Capital adequacy	The ratio of equity to total assets of a bank.	BankScope.
Share of wholesale funding	The ratio of money market funding to total deposits of a bank.	BankScope.
Efficiency	Inverse of a bank's overhead costs to total assets.	BankScope.
Diversification	The ratio of non-interest income to total income of a bank.	BankScope.
Stability	A measure of a bank soundness calculated as return on assets plus capital ratio divided by volatility of return on assets.	BankScope.

Table A.4
Average of country-level bank market structure, regulation and institutions over 1999–2011.

Row	Code	Market structure			Market contestability					Inter-industry			Institution		
		Concent.	Foreign bank own.	State bank own.	Activity rest.	Financial conglom.	Limit on foreign banks	Entry req.	Fraction denied	Insurance penetra-tion	Stock market capital.	Stock market efficiency	Financial freedom	Property right	KKZ index
1	ALB	86.34	42.30	57.70	7.00	7.00		8.00	0.00	0.53			54.62	30.77	−0.37
2	DZA	94.30	6.97	92.89	5.50	9.00	4.00	7.50	0.00	0.59			35.38	33.08	−0.84
3	AGO	90.04	46.28	28.91	6.00		4.00	8.00	0.00	1.03			38.75	23.75	−1.20
4	ATG	100.00	58.40	0.00	7.00	6.67	4.00	8.00		6.65					0.75
5	ARG	55.48	34.73	35.29	7.31	5.62	3.80	6.77	0.15	2.41	37.27	9.67	44.62	36.92	−0.28
6	ARM	83.27	51.34	0.77	8.62	5.85	3.20	7.69	0.23		1.00	4.81	71.54	43.08	−0.31
7	AUS	88.48	16.19	0.00	7.54	7.08	4.00	7.69	0.00	6.69	113.69	80.31	90.00	90.00	1.60
8	AUT	75.17	12.85	2.20	4.62	5.00	4.00	7.92	0.07	4.94	26.18	43.32	70.00	90.00	1.62
9	AZE	66.97	10.45	31.35	9.00	6.00		7.00	0.25	0.45			32.31	28.08	−0.86
10	BHR	95.00	61.68	1.57	7.85	5.77	4.00	8.00	0.22	1.99	105.24	4.70	80.77	62.31	0.20
11	BGD	58.90	7.72	55.65	9.11	11.00	4.00	6.08	0.83	0.73	7.09	81.65	24.62	27.69	−0.93
12	BLR	94.87	15.95	72.13	9.08	6.15	3.00	7.31	0.40	0.66			22.31	26.15	−0.94
13	BEL	92.71	28.70	0.00	6.23	5.31	4.00	7.92	0.00	8.16	65.70	41.43	72.31	86.15	1.33
14	BLZ	100.00	73.89	0.00	10.44	6.50	4.00	8.00	0.53	3.62			50.00	50.00	−0.02
15	BEN	98.83	91.00	0.00	7.44	7.22	3.44	8.00		0.73			52.31	33.08	−0.23
16	BTN		17.11	64.39	9.46	9.08	4.00	7.62	0.85				30.00	60.00	0.11
17	BOL	90.59	37.20	2.23	8.67	8.00	4.00	8.00	0.00	1.20	17.81	0.93	64.62	30.38	−0.52
18	BIH	69.97	67.47	13.96	6.69	6.69	4.00	7.92	0.00	1.70			50.77	10.77	−0.40
19	BWA	97.65	95.78	4.22	8.38	6.15	3.00	7.92	0.37	2.42	27.48	3.38	70.00	70.38	0.70
20	BRA	61.10	21.82	42.95	6.77	4.85	4.00	8.00	0.24	1.89	51.78	49.26	48.46	50.00	0.03
21	BGR	76.65	74.17	11.17	7.15	5.92	4.00	8.00	0.16	1.98	15.44	15.97	58.46	37.69	0.20
22	BFA	89.39	56.00	0.00	7.44	7.22	3.44	8.00		0.59			46.92	33.08	−0.32
23	BDI	100.00	4.34	36.46	8.85	8.69	4.00	7.38	0.24	0.88			30.00	28.13	−1.25
24	KHM	84.04	35.50	8.00	9.00	4.50		8.00	0.67	0.10			56.15	30.00	−0.83
25	CMR	88.78	0.00	0.00	7.50	5.50	4.00	8.00		0.83			46.15	30.00	−0.88
26	CAN	83.82	6.00	0.00	5.08	8.38	4.00	8.00	0.06	5.52	114.75	73.74	73.08	90.00	1.62
27	CYM	85.00	98.21	0.00	6.11	4.33	4.00	7.11	0.00			0.18	45.38	26.15	1.16
28	CHL	68.14	46.91	14.42	9.08	7.85	3.20	4.00	0.06	3.47	103.79	14.85	65.38	89.23	1.17
29	CHN	70.69	1.89	68.76	10.89	8.00	4.00	7.00		2.44	62.77	131.23	33.08	26.15	−0.54
30	COL	77.67	19.80	15.60	9.78	9.56	2.80	8.00	0.00	1.90	32.60	10.04	66.15	39.23	−0.48
31	CRI	73.81	23.99	57.87	10.22	6.00	2.56	6.67	0.00	1.86	9.97	5.29	48.46	50.38	0.57
32	CIV	89.09	84.20	10.60	7.44	7.22	3.44	8.00		1.22	20.45	2.38	60.77	30.00	−1.24
33	HRV	74.13	64.46	14.28	6.00	5.46	4.00	6.85	0.63	2.48	34.82	5.62	58.46	31.54	0.34
34	CYP	96.81	21.36	3.32	7.00	8.11	4.00	5.85	0.04	4.43	49.97	38.88	70.00	85.38	1.03
35	CZE	79.90	66.80	8.43	7.67	6.67	4.00	8.00	0.00	3.57	23.74	56.93	86.15	69.23	0.84
36	DNK	89.65	11.62	0.05	6.38	6.69	4.00	8.00	0.04	8.21	62.67	79.52	85.38	90.38	1.86

37	DOM	82.03	8.45	26.29	10.80	4.00	4.00	8.00	0.00	1.37			43.08	30.00	−0.35
38	ECU	71.97	6.03	14.51	9.60	8.00	4.00	8.00	0.50	1.59	7.56	4.39	45.38	31.15	−0.77
39	EGY	69.83	13.07	66.00	8.00	7.00	4.00	7.38	0.78	0.71	49.45	35.68	38.46	46.15	−0.52
40	SLV	89.06	28.17	5.12	9.54	10.11	4.00	7.69	0.16	1.72	19.58	3.15	70.00	52.31	−0.16
41	EST	99.88	94.75	0.00	5.08	5.85	4.00	8.00	0.00	1.90	26.18	20.85	82.31	76.15	0.99
42	ETH	96.73	0.00	70.98	10.00	9.20	0.00	5.60	0.00	0.61			26.15	30.00	−0.97
43	FIN	99.07	27.60	6.74	5.92	4.62	4.00	5.23	0.05	3.82	119.20	110.42	69.23	90.38	1.89
44	FRA	73.09	14.86	0.56	5.23	5.00	4.00	6.46	0.00	8.84	82.59	94.96	56.92	71.54	1.23
45	GAB		0.00	0.00	7.50	5.50	4.00	8.00		1.06			46.15	46.15	−0.48
46	GMB	99.44	85.38	0.00	10.78	8.31	4.00	7.56	0.00				47.69	40.38	−0.42
47	GEO	94.20	29.10	0.00	6.00	9.00		7.00	0.27	0.39	5.63	6.03	50.00	33.85	−0.39
48	DEU	85.96	5.53	40.64	4.33	5.33	4.00	5.33	0.00	5.36	48.04	130.43	53.08	90.00	1.47
49	GHA	74.00	52.03	22.59	8.92	5.31	2.80	8.00	0.47	0.95	13.36	3.01	50.77	50.00	0.00
50	GRC	87.19	9.34	17.11	6.92	5.22	4.00	7.31	0.06	1.66	59.48	56.18	47.69	55.38	0.64
51	GRD		88.70	0.00	7.00	6.67	4.00	8.00		8.20					0.45
52	GTM	66.05	8.16	4.48	9.00	7.08	4.00	7.38	0.27	0.98			61.54	35.38	−0.60
53	GIN		90.00	0.00	3.00	9.00		8.00	0.33	0.06			53.08	27.69	−1.22
54	GUY		32.92	10.46	10.15	6.92	4.00	7.69	0.20	4.55			52.31	45.00	−0.36
55	HND	68.90	20.18	0.60	7.33	8.50	4.00	8.00	0.00	1.63			57.69	36.15	−0.57
56	HKG	82.77		0.00	3.44	7.00	4.00	6.11	0.00	8.49	407.70	80.77	90.00	90.00	1.38
57	HUN	85.47	82.33	3.84	7.46	6.54	4.00	7.69	0.15	3.04	24.50	79.77	69.23	69.23	0.87
58	ISL		0.00	22.81	7.46	5.38	4.00	7.69	0.00	2.62	85.07	57.69	62.31	90.00	1.70
59	IND	42.53	4.89	76.21	8.69	8.46	4.00	6.15	0.57	2.87	61.89	131.80	32.31	50.00	−0.26
60	IDN	64.20	24.55	40.93	10.56	8.40	4.00	7.56	0.08	1.29	31.42	49.73	33.85	33.08	−0.65
61	IRL	90.36	62.90	20.69	5.23	5.69	4.00	5.23	0.00	8.93	53.83	45.95	84.62	90.00	1.52
62	ISR	91.34	1.48	36.88	9.69	8.77	4.00	4.31	0.13	4.52	78.14	56.92	55.38	70.00	0.56
63	ITA	71.21	8.09	11.17	7.92	7.31	4.00	8.00	0.18	6.44	40.38	132.73	64.62	61.15	0.63
64	JAM	97.42	72.43	24.89	9.56	7.33	4.00	8.00	0.67	3.81	72.23	2.81	56.15	51.92	−0.04
65	JPN	52.87	6.23	0.58	8.67	7.33	4.00	6.67	0.00	7.44	77.64	103.70	46.92	76.15	1.14
66	JOR	98.43	47.20	0.00	7.54	6.33	3.80	7.69	0.70	1.76	137.54	36.11	66.15	56.15	−0.01
67	KAZ	75.72	12.35	2.33	7.33	8.00	3.00	7.69	0.00	0.63	22.91	10.92	43.08	30.00	−0.60
68	KEN	68.43	38.78	1.02	8.54	8.08	4.00	7.69	0.68	2.25	28.63	7.49	53.08	43.46	−0.71
69	KOR	73.82	32.11	28.94	7.46	7.78	4.00	7.67	0.00	10.51	72.94	243.38	54.62	76.15	0.69
70	KWT	92.26	0.00	0.00	6.46	6.62	3.60	6.46	0.41	0.58	97.98	61.76	50.00	62.69	0.23
71	KGZ	100.00	32.55	12.39	5.67	8.00	3.56	8.00	0.04	0.14	1.56	188.61	50.00	28.85	−0.86
72	LVA	68.61	60.07	5.06	5.62	4.69	4.00	8.00	0.08	1.61	8.60	11.51	66.15	51.15	0.60
73	LBN	63.08	34.49	1.00	8.54	5.54	3.20	8.00	0.00	1.86	21.84	11.17	67.69	34.23	−0.56

Table A.4 (*Continued*)

Row	Code	Market structure			Market contestability					Inter-industry			Institution		
		Concent.	Foreign bank own.	State bank own.	Activity rest.	Financial conglom.	Limit on foreign banks	Entry req.	Fraction denied	Insurance penetration	Stock market capital.	Stock market efficiency	Financial freedom	Property right	KKZ index
74	LSO		84.07	23.39	9.33	10.50	4.00	8.00	0.50	4.81			44.62	46.15	−0.19
75	LTU	90.11	84.45	17.28	7.23	6.77	4.00	8.00	0.22	1.36	17.56	11.96	72.31	51.15	0.66
76	LUX	43.57	94.66	5.07	4.85	7.67	4.00	8.00	0.00	5.42	163.53	1.05	83.08	90.00	1.71
77	MAC	95.36	54.09	0.69	7.00	6.77	4.00	7.38	0.53	1.94			70.00	60.00	0.75
78	MKD	86.54	65.03	1.14	7.33	6.67	3.00	8.00	0.50	1.75	8.71	174.76	65.00	31.00	−0.29
79	MDG	100.00	74.24	0.00	8.20	6.80	3.00	7.56	0.14	0.60			46.92	48.85	−0.34
80	MWI	99.86	19.77	24.06	10.22	6.56	3.00	7.89	0.26	1.57	19.45	3.21	45.38	47.69	−0.37
81	MYS	77.97	19.63	0.00	7.67	9.00	3.00	7.38	0.00	4.55	139.69	33.08	38.46	53.46	0.36
82	MLI	95.43	67.00	21.80	7.44	7.22	3.44	8.00		0.47			41.54	39.62	−0.29
83	MLT	99.62	59.95	0.00	7.69	6.69	4.00	8.00	0.00	4.55	46.32	4.97	64.62	84.62	1.19
84	MUS	83.37	41.10	0.82	9.69	8.00	4.00	7.69	0.00	4.51	45.73	6.32	66.92	66.15	0.74
85	MEX	74.40	62.72	12.56	7.08	6.00	3.00	8.00		1.57	28.64	28.16	58.46	50.00	−0.08
86	MDA	74.81	30.78	7.32	8.38	6.08	4.00	8.00	0.27	1.02	3.25	80.20	50.00	47.69	−0.47
87	MNE	93.16	88.40		5.00	6.00	4.00	8.00	0.00		69.74	9.22	42.00	36.00	−0.09
88	MAR	85.34	20.36	29.30	8.62	5.85	4.00	8.00	0.15	2.35	52.33	19.52	46.92	36.92	−0.30
89	MOZ	97.17	93.95	0.00	7.60	8.60	4.00	8.00	0.00	0.85			53.08	30.00	−0.32
90	MMR	100.00	69.00		8.00	10.00		8.00		0.06					−1.68
91	NAM	98.56	73.27	0.00	6.89	7.60	4.00	8.00	0.75	7.57	8.27	2.77	53.85	48.46	0.28
92	NPL	62.34	31.50	20.86	7.40		3.00	8.00		0.92	21.17	5.14	30.00	33.46	−0.86
93	NLD	90.18	5.55	5.48	4.69	4.69	4.00	8.00	0.00	6.41	101.52	133.62	87.69	90.00	1.70
94	NZL	97.10	98.38	0.69	3.46	3.31	4.00	6.69	0.05	2.92	39.93	43.50	86.15	91.15	1.75
95	NIC	94.14	12.52	0.11	10.50	10.89	3.60	8.00	0.05	1.39			58.46	28.08	−0.53
96	NER	100.00	73.40	0.00	7.44	7.22	3.44	8.00		0.51			40.77	31.54	−0.62
97	NGA	60.39	1.47	6.67	7.44	6.38	3.00	8.00	0.00	0.61	18.70	13.20	34.62	31.54	−1.14
98	NOR	97.73	22.03	0.00	6.33	8.22	4.00	7.89	0.00	4.83	52.35	109.85	52.31	90.00	1.68
99	OMN	98.09	7.67	0.00	8.92	9.08	3.40	8.00	0.64	1.05	30.70	23.57	50.00	51.54	0.32
100	PAK	65.53	36.71	35.04	9.33	7.89	4.00	7.38	0.00	0.63	22.25	253.74	42.31	30.00	−1.01
101	PAN	63.92	50.75	11.82	8.00	5.31	4.00	8.00	0.03	2.63	29.32	2.09	76.92	36.15	0.09
102	PRY	68.51	74.85	8.53	8.80	9.00	4.00	7.56	0.00	1.00	3.52	1.84	56.92	30.38	−0.81
103	PER	87.19	42.58	4.59	6.92	5.69	4.00	7.69	0.16	1.09	43.24	8.17	66.15	40.00	−0.33
104	PHI	69.77	13.53	1.185	5.00	8.00	3.40	7.69	0.34	1.28	49.16	21.59	48.46	40.77	−0.47
105	POL	71.32	55.54	28.62	7.31	4.54	4.00	7.31	0.00	2.95	26.80	40.50	60.77	58.85	0.63
106	PRT	93.06	15.67	22.85	7.15	6.38	4.00	7.31	0.00	6.71	40.32	64.11	52.31	70.00	1.09
107	QAT	98.11	11.92	44.70	5.78	8.00		6.67	0.00	1.14	100.43	24.06	43.85	52.69	0.49
108	ROM	82.26	33.92	50.57	8.62	6.23	4.00	8.00	0.31	1.30	13.75	15.34	47.69	31.92	0.05
109	RUS	42.27	9.42	46.83	5.92	5.38	3.00	8.00		1.53	54.67	58.41	36.92	33.46	−0.73
110	RWA	93.02	25.00	28.30	8.00	6.00		8.00	0.33	0.60			33.85	25.77	−0.66

111	KNA		55.55	35.65	7.00	6.67	4.00	8.00							0.74
112	WSM		83.76	0.00	10.00	6.60	4.00	8.00	1.00				40.00	54.17	0.45
113	SAU	77.54	10.35	13.73	8.33	6.00	4.00	8.00		0.36	80.94	120.05	40.77	49.62	−0.35
114	SEN	85.33	78.70	0.00	7.44	7.22	3.44	8.00		1.10			46.15	48.85	−0.22
115	SRB	65.80	73.50	17.90	7.00	8.00	3.00	8.00	0.00	1.89	24.41	14.73	42.00	36.00	−0.41
116	SLE	94.08	62.29	37.71	6.00	8.00	4.00	8.00	0.29	0.38			29.09	13.64	−0.88
117	SGP	97.77	52.33	0.00	6.38	7.00	4.00	8.00		6.78	183.23	68.38	61.54	90.00	1.47
118	SVK	89.20	80.18	9.67	7.46	6.77	4.00	8.00	0.60	3.10	5.85	23.47	71.54	50.38	0.72
119	SVN	77.38	15.91	25.47	7.23	6.62	4.00	7.69	0.00	3.65	23.85	14.53	51.54	56.92	0.95
120	ZAF	98.60	19.63	0.01	6.92	5.62	3.20	7.31	0.16	14.06	194.46	47.87	56.92	50.00	0.34
121	ESP	84.78	9.75	0.00	5.31	5.08	4.00	8.00	0.03	5.06	84.12	166.26	73.85	70.00	1.02
122	LKA	88.46	6.91	36.55	7.23	8.00	4.00	8.00	0.57	1.31	18.79	18.64	44.62	49.23	−0.33
123	SDN	92.25	4.00	12.00	8.00	6.00		8.00	0.75	0.41			30.00	30.00	−1.52
124	SUR		24.33	23.60	7.22	9.33	3.56	8.00	0.00	1.97			30.00	47.69	−0.08
125	SWZ		85.51	14.50	10.20	9.60	4.00	7.56					46.92	53.46	−0.62
126	SWE	97.70	0.90	0.00	7.00	5.33	4.00	8.00	0.03	6.72	108.07	115.27	79.23	87.31	1.76
127	CHE	91.80	9.47	13.76	4.54	4.38	4.00	8.00	0.03	8.90	230.51	95.76	83.85	90.00	1.74
128	SYR	93.56	0.00	71.00	8.20	9.00	1.20	8.00	0.00	0.48			13.85	29.62	−0.90
129	TJK	100.00	19.23	7.75	7.67	7.40	4.00	7.69	0.18	0.52			29.23	29.23	−1.14
130	TZA	75.99	52.21	17.74	6.60	8.40	2.80	7.80	0.10	0.64	4.69	4.55	54.62	33.08	−0.41
131	THA	66.28	6.13	24.67	8.31	9.00	1.67	8.00	0.18	3.33	59.22	89.79	53.85	56.92	−0.10
132	TGO		17.50	51.00	7.44	7.22	3.44	8.00		1.14			26.92	30.00	−0.94
133	TTO	96.35	14.35	15.90	7.85	5.85	3.11	5.85	0.56	4.42	73.71	2.77	70.00	68.85	0.18
134	TUN	64.11	15.70	42.70	8.00	7.00	4.00	8.00	0.00	1.47	13.67	14.75	39.23	50.00	−0.07
135	TUR	81.10	6.32	33.21	7.67	5.56	4.00	7.11	0.48	1.00	29.75	153.72	51.54	54.62	−0.10
136	UGA	78.12	75.58	0.64	10.40	8.00	3.00	8.00	0.17	0.50	10.70	1.48	56.92	40.77	−0.63
137	UKR	95.05	17.96	12.98	5.00	8.00	4.00	8.00		2.32	20.51	7.43	40.00	30.00	−0.57
138	ARE	74.55	27.00	35.00	5.80	6.00	3.00	8.00	0.00	1.47	26.57	62.43	43.85	61.54	0.50
139	GBR	63.11	46.53	2.89	3.69	3.77	4.00	8.00		14.64	136.40	126.50	88.46	89.23	1.45
140	USA	38.01	10.73	0.00	8.38	7.78	4.00	7.69	0.01	7.34			81.54	89.23	1.29
141	URY	70.75	41.77	51.01	7.22	8.00	4.00	7.11	0.00	1.73	0.54	3.08	48.46	70.38	0.72
142	VUT		92.56	8.58	9.11	7.44	4.00	7.69	0.00				40.00	40.00	0.15
143	VEN	62.58	35.05	9.19	7.00	7.77	4.00	7.69	0.17	1.57	4.29	5.57	37.69	25.38	−1.08
144	VNM	74.90			12.00	8.00		8.00		1.25	12.29	58.03	30.00	10.77	−0.53
145	YEM	100.00			9.00	10.00	4.00	8.00	0.80	0.23			30.00	30.00	−1.10
146	ZMB	82.80	64.00	23.00	9.00	10.00		8.00		1.27	13.36	4.40	53.08	43.85	−0.43
Mean		82.64	38.38	17.24	7.58	7.03	3.71	7.58	0.20	2.81	53.51	48.96	53.50	50.33	0.08

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