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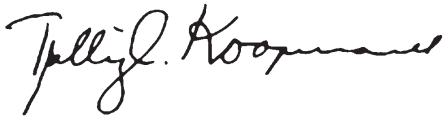

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The Impact of Market Structure, Contestability and Institutional Environment on Banking Competition

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Abstract
Using a measure of competition based on the Panzar-Rosse model, this paper explains bank competition across 76 countries on the basis of various determinants. Studies explaining banking competition are rare and typically insuffciently robust as they are based on a limited number of countries only. Traditionally, market structure indicators, such as the number of banks and banking concentration, have been considered the major determinants of competition in the banking sector. However, we find that these variables have no significant impact on market power. Instead, we show that a country's institutional framework is a key factor in explaining banking competition. Extensive regulation, particularly antitrust policies, improves the competitive environment. The foreign investment climate, a proxy of contestability, also plays an important role. The fewer restrictions on foreign investments exist, the more competitive the banking sector becomes. In addition, activity restrictions make large banks less competitive and collusion markups are procyclical. Finally, competition is substantially weaker in countries with a socialist past, such as Central- and Eastern Europe.

Keywords: banking competition, market structure, concentration, contestability, interindustry competition.

JEL classification: D4, G21, L11, L13

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1 Introduction

Sound competition in the banking market is of great economic importance because it lowers prices and improves quality, thereby contributing to the prosperity of consumers and companies alike. Furthermore, competition fosters innovative behavior, forces banks to improve their efficiency, thus promoting the access of households and firms to financial services and external finance, and thereby enhancing economic growth. Moreover, the link between competition and financial stability has been recognized in theoretical and empirical research, as well as in the conduct of prudential policy with respect to banks. Finally, competition improves the monetary transmission of policy rates to bank market rates.

Although banking competition cannot be observed directly due to the lack of detailed information on the prices and costs of banking products, indirect approaches abound. We distinguish proxies, such as banking concentration or interest rate margins, from model-based methods to assess competition such as empirical assessment of the Lerner index (see e.g. Angelini and Cetorelli (2003)), the Bresnahan (1982) model, and the Panzar and Rosse (1987) approach.

A vast amount of articles measure banking competition in a wide range of countries. Although there are theoretical models that explain competition, only few empirical studies investigate its origin: what factors determine competition? Such analyses are crucial for governments and banking supervisors when it comes to formulating effective policies and fostering domestic banking competition.

Traditionally, the market structure − generally measured by the number of banks, banking concentration or average bank size − takes a pivotal position in explaining competition. Various developments such as globalization and internationalization, increased scale of banks caused by ICT developments and increased competition, have over time caused consolidation in most countries, thereby affecting the banking market structure. This raises the question how those trends have influenced competition. Other theories focus on the impact of new entrants or on the contestability caused by the threat of po-

tential entrants, the efficiency of banks and the influence of the business cycle. A number of empirical studies assess the impact of other determinants on banking competition, such as measures of interindustry competition, indicators of contestability (e.g. actual foreign entrants and barriers to entry such as tighter entry and activity restrictions) and aspects of countries' overall institutional framework (e.g. regulatory and supervisory practices, entry restrictions, and barriers to foreign investment). Other empirical studies explain proxies of competition such as efficiency, net interest rate margins, operating costs and profitability, instead of on competition itself. Various studies explain a direct measure of competition. Most of them are based on the Lerner index of competition, while some focus on the H statistic coming from the Panzar-Rosse model. See e.g. Angelini and Cetorelli (2003), Maudos and Nagore (2005), Fernández de Guevara, Maudos and Pérez (2005), Carbó Valverde and Rodríguez Fernández (2006) and Fernández de Guevara and Maudos (2006).

In practice, an important weakness of the Lerner-index approach is that available bank balance-sheet data do not correspond to the prices and costs required to calculate the index, so that many debatable choices are needed to proxy prices and costs. Therefore, in this paper, we prefer the P-R measure. The vast amount of articles based on P-R models underline that this approach is generally acknowledged as valid. Also, the P-R approach has a strong theoretical foundation. The first P-R based paper explaining competition is Bikker and Haaf (2002), who consider 23 OECD countries using only a limited number of explanatory variables. They present their determinants-of-competition model as a spin-off from their measurement efforts. The second P-R paper is Claessens and Laeven (2004, henceforth C&L), who study between 22 and 39 countries during the period $1994 - 2001$. The latter article is the first extensive investigation into the factors that drive competition, and as such a major contribution to the economic literature.

The present paper extends C&L by assessing the determinants of banking competition for a much larger set of countries (76 in total) during the $1995 - 2004$ period. Our methodology differs from C&L on several points. In particular, we use a different P-R

model to estimate competition and do several robustness checks to assess the quality of our determinants-of-competition model. As demonstrated by Bikker et al. (2006a), the P-R model that is generally employed in the literature (including C&L) is misspecified. These authors show that taking interest income as share of total assets (the 'price'), instead of the absolute interest income (the 'revenue') as the dependent variable in the P-R model, leads to serious overestimation of the degree of competition in the banking industry. Generally, a correctly specified P-R model provides significantly lower estimates of competition. Throughout, we estimate the degree of competition in the banking industry from the correctly specified P-R model. Moreover, in contrast to C&L we employ a wide range of tests to assess the robustness of our approach, to make sure that the results do not depend on subjective choices regarding our model specification.

On the basis of a very robust determinants-of-competition model, we show that a country's institutional framework is a major determinant of banking competition. Extensive regulation, particularly antitrust policies, improves the competitive environment. Also contestability plays an important role; the more attractive is a country's investment climate, the more competitive the banking sector will be. In addition, activity restrictions make large banks less competitive. Furthermore, collusion markups of banks are procyclical in the sense that they follow the GDP growth rate that acts as a proxy for the business cycle. Finally, competition is substantially weaker in countries with a socialist history, e.g. in Eastern and Central Europe. Foreign ownership, a variable that turns out significant in the model of C&L, does not play a significant role in our model. The dominant determinant in the theoretical literature, market concentration, does not have a significant impact on competition either.

The structure of this paper is as follows. Section 2 provides a literature survey on theoretical and empirical studies assessing the determinants of bank competition. Section 3 introduces the Panzar-Rosse model that we use to estimate the level of competition in 76 countries, using data of individual banks. The second part of Section 3 presents the determinants-of-competition model, which explains the level of competition in a country

from several determinants. Furthermore, this section presents an overview of the potential explanatory variables in the determinants-of-competition model. Section 4 discusses the data used for the empirical analysis. We then move to Section 5, which provides estimation results and robustness checks on the model specification. Finally, Section 6 summarizes and concludes.

2 Literature review

Several papers analyze the determinants of bank competition, either theoretically or empirically. This section reviews some relevant contributions in both strands of literature.

2.1 Determinants of bank competition: theory

What factors affect the competitive environment in the banking industry? A variable that traditionally has been given much attention in the banking literature is market structure. The Structure-Conduct-Profitability (SCP) framework uses concentration as a proxy for market structure. The positive relation between concentration and profits within this model relies on micro-economic theory with collusion added. The competitive firm earns normal profits and the monopolist accumulates extra profits. In between these two extremes, it will be easier to collude and to use market power the lower the number of firms in the market is and the tighter the barriers to entry. See Bain (1956), Stigler (1964), and Hannan (1991). According to the SCP hypothesis, all banks respond similarly to an increase in market concentration, by strengthening their collusive behavior. As a result, they all benefit equally from such a change. Two alternative theories suggest that market concentration need not reduce competition between banks. The contestability theory states that a concentrated banking market can still behave competitively, as long as the entry barriers for potential newcomers are limited; see Baumol (1982) and Baumol et al. (1982). The efficiency hypothesis postulates that the most efficient banks gain market share at the cost of less efficient banks; see Demsetz (1974). According to this theory, bank efficiency is the driving force behind market concentration, resulting in lower prices.

Whereas the SCP model (implicitly) presumes that all banks benefit equally from a high level of concentration, this assumption is relaxed in the Cournot model for oligopolistic collusion; see e.g. Bos (2004) and Bikker and Bos (2005). The Cournot model focuses on individual banks' market shares and assumes that a bank will set a markup on prices reflecting its market power, which increases with the bank's market share.[1]

Furthermore, competition in the banking industry could be affected by the response of banks to business cycle dynamics. The expected direction of this response is ambiguous. In the model of Rotemberg and Saloner (1986) collusion markups are countercyclical. They model the response of colluding oligopolies to fluctuations in the demand for their products. Such oligopolies behave more competitively in periods of high demand. In such periods the benefit to a single firm from undercutting the price that maximizes joint profits is relatively large, since a firm can capture the entire industry profits by lowering its price only slightly. The threat that a member firm deviates is sufficiently large to induce cooperation by all firms. Hence, during periods of high demand price reductions are needed to maintain implicit collusion. By contrast, according to Green and Porter (1984) collusion markups are procyclical. They study the behavior of colluding oligopolies that maximize joint profits. For member firms in the cartel it turns out optimal to behave monopolistically when demand is high, but to switch temporarily to Cournot behavior when demand drops.

2.2 Determinants of bank competition: empirics

The empirical evidence in favor of the positive SCP relation between bank concentration and profits is impressive (see Weiss (1974)), but weakens when other market structure variables besides concentration are added. Some papers report a negative impact of concentration on profits when market shares are taken into account; see Martin (1983), Gilbert (1984) and Salinger (1990).[2] Several studies focus on the relation between concentration

[1] Bikker (2004, pp. 69-71) presents two theoretical models based on the Cournot framework which link performance (i.e. the price-cost margin) to the Herfindahl-Hirschman index and the five-bank concentration ratio, thereby providing theoretical underpinning of the SCP model.

[2] The SCP approach is criticized in e.g. Bresnahan (1989), Schmalensee (1989), and Bos (2002, 2004).

and competition. For various European countries, Fernandéz de Guevara et al. (2005, 2006) do not establish a significant relation between the Herfindahl-Hirschman index and competition. By contrast, Bikker and Haaf (2002a) find a significantly positive effect of various concentration ratios on market power. Finally, C&L establish a significantly negative impact of the five-bank concentration ratio on market power. The evidence is clearly inconclusive.

Several studies provide indirect evidence for the impact of contestability on banking competition. Claessens et al. (2001) analyze how foreign entry affects domestic banking markets in 80 countries and show that increased presence of foreign banks makes domestic banks more competitive by reducing their profitability and net interest margins. Barth, Caprio and Levine (2004) investigate the impact of regulatory and supervisory practices on banking sector development, efficiency, and fragility in 107 countries. In particular, they assess the impact of barriers to foreign bank entry on banking sector outcomes and show that tighter entry restrictions negatively impact bank efficiency and increase bank fragility. Demirgüç et al. (2004) examine the impact of bank regulations and market structure on bank net interest margins and overhead costs in 72 countries. Even after correcting for concentration, bank-specific properties and inflation, they find that tighter regulations on bank entry, activity restrictions, and regulations that reduce banking freedom lead to an increase in a bank's net interest margins. However, bank regulations do not significantly affect net interest margins after correction for the overall institutional framework in each particular country. Demirgüç et al. (2004) also analyze the impact of banking sector concentration on net interest margins. The influence exerted by the level of concentration depends heavily on the choice of other variables to be included. When controlling for bank-specific factors, concentration has a significantly positive effect on margin. However, if regulatory restrictions, macro-economic stability, and the overall institutional climate are corrected for, this relation breaks down. Levine (2003) finds that the interest margins are affected by regulatory restrictions on the entry of foreign banks, and hence contestability, rather than by the actual number of foreign banks. Some studies suggest that in developed

countries the advantages of foreign ownership outweigh the disadvantage of operating from a long distance and that the reverse is true in developing countries. See e.g. DeYoung and Nolle (1996), Berger et al. (2000) and Claessens et al. (2001). Various studies on interest rate margins and other performance indicators in Latin America and Eastern Europe report that foreign bank entry significantly reduces interest rate spreads and profit rates, indicating that foreign bank participation increases competition. By contrast, increasing bank concentration boosts the interest rate spread and the profit rate, suggesting that concentration impairs competition, e.g. Clarke et al. (2003), Martinez Peria and Mody (2004) and Wong (2004).

All in all, there is both theoretical and empirical evidence that various factors related to market structure affect the competitive climate in the banking sector, such as regulation, foreign entry, contestability, institutional framework, and macro-economic stability.

3 Empirical approach

The purpose of this study is to explain banking competition from various factors as discussed in Section 2. Therefore, we first measure competition in the banking industry.

3.1 The Panzar-Rosse model

We apply the widely used Panzar-Rosse model to measure competition in the banking industry. Seminal articles by Rosse and Panzar (1977) and Panzar and Rosse (1982, 1987) provide a convenient framework for assessing banking market structure. The P-R model uses bank-level data and measures how a change in factor input prices is reflected in equilibrium revenues earned by banks. In a situation of perfect competition, marginal costs and total revenues will increase proportionally to input prices. In a monopoly, however, an increase in factor input prices will raise marginal costs but reduce output and hence total revenues. Under certain assumptions, the P-R model offers a direct measure of banking competitiveness in a particular country, called the H statistic. This statistic is calculated from a reduced-form bank revenue equation and measures the elasticity of total revenues

with respect to factor input prices.

Following Bikker and Haaf (2002a), the empirical translation of the P-R approach assumes log-linear marginal cost and revenue functions. The corresponding reduced form revenue equation of the P-R model is obtained as the product of equilibrium output and the common price level. In this paper we use the same reduced-form revenue equation as Bikker et al. (2006a,b), which is written as

$$\begin{aligned} \ln \mathrm{II} \;=\; & \alpha + \beta \ln \mathrm{AFR} + \gamma \ln \mathrm{PPE} + \delta \ln \mathrm{PCE} + \eta_1 \ln \mathrm{LNS\_TA} \\ & + \eta_2 \ln \mathrm{ONEA\_TA} + \eta_3 \ln \mathrm{DPS\_F} + \eta_4 \ln \mathrm{EQ\_TA} \\ & + \eta_5 \mathrm{OI\_II} + \xi_1 \mathrm{COM\_dum} + \xi_2 \mathrm{COO\_dum} + \mathrm{error}. \end{aligned} \tag{1}$$

Here the dependent variable II denotes interest income. Regarding the factor input prices, AFR stands for annual funding rate, PPE denotes price of personnel expenses, and PCE is the price of physical capital expenditure. We cannot observe the three input prices directly and thus use proxies instead. Interest expenses to total funds is a proxy for the average funding rate, the ratio of annual personnel expenses to total assets is an approximation of the price of personnel expenses, and the ratio of other non-interest expenses to (modeled[3]) fixed assets serves as a proxy for the price of capital expenditure. The other covariates serve as correction variables. The ratio of customer loans to total assets (LNS_TA) represents credit risk. ONEA_TA equals the ratio of other non-earning assets to total assets, which mirrors characteristics of the asset composition. The ratio of customer deposits to the sum of customer deposits and short term funding (DPS_F) captures features of the funding mix. The ratio of equity to total assets (EQ_TA) is used to account for the leverage reflecting differences in the risk appetite across banks. OI_II denotes the ratio of other income to interest income. Finally, COM_dum and COO_dum are dummy variables for, respectively, commercial and cooperative banks.

[3]To deal with possible inaccuracies in the measurement of fixed assets, we make an adjustment to this variable. Following Resti (1997) and Bikker and Haaf (2002a), we regress the natural logarithm of fixed assets on the logarithm of total assets and loans, including quadratic and cross terms of these variables. Subsequently, we use the regression forecasts of fixed assets to calculate the price of capital expenditure.

Following Rosse and Panzar (1977) and Panzar and Rosse (1987), we use Equation (1) to construct the 'H statistic' that allows us to make a quantitative assessment of the competitive nature of banking markets and the market power of banks. The H statistic is calculated as the sum of the elasticities of a bank's total revenue with respect to that bank's input prices. Hence, based on Equation (1), this statistic equals $H = \beta+\gamma+\delta$. The banking industry is characterized by monopoly or perfect cartel for $H \leq 0$, monopolistic competition or oligopoly for $0 < H < 1$, and perfect competition for $H = 1$. Furthermore, under certain conditions, H increases with the competitiveness of the banking industry (see Vesala (1995)).

Finally, we may observe changes in the competitive structure of the banking industry over time, due to e.g. liberalization, harmonization, deregulation, technological progress, and internationalization. Therefore, we follow Bikker and Groeneveld (2000) and Bikker and Haaf (2002a) in using time-dependent factor input price elasticities in Equation (1), assuming that the long-term equilibrium market structure changes gradually over time. We do this by adjusting Equation (1) and arrive at a new specification in which time plays a role. The new reduced form revenue equation is written as

$$\begin{aligned} \ln \mathrm{II} \;=\; & \alpha + (\beta \ln \mathrm{AFR} + \gamma \ln \mathrm{PPE} + \delta \ln \mathrm{PCE}) \times \exp(\zeta \cdot \mathrm{TIME}) + \eta_1 \ln \mathrm{LNS\_TA} \\ & + \eta_2 \ln \mathrm{ONEA\_TA} + \eta_3 \ln \mathrm{DPS\_F} + \eta_4 \ln \mathrm{EQ\_TA} \\ & + \eta_5 \mathrm{OI\_II} + \xi_1 \mathrm{COM\_dum} + \xi_2 \mathrm{COO\_dum} + \mathrm{error}. \end{aligned} \tag{2}$$

Here the case $\zeta = 0$ refers to the situation where the competitive structure is constant over time, while $\zeta > 0$ (or, respectively, $\zeta < 0$) indicates a gradual increase (decrease) in competitiveness over time. When competition is allowed to change over time as in Equation (2), the H statistic transforms into $H(\mathrm{TIME}) = (\beta + \gamma + \delta) \exp(\zeta \cdot \mathrm{TIME})$.

3.2 Potential determinants of competition

To explain banking competition, we consider several covariates. All these variables have been predicted to affect competition in the theoretical literature or have been used in

other empirical cross-country studies to analyze the performance and competitiveness of the banking system (see Section 2).

We take the five-bank concentration ratio (CR5) as a measure of banking market concentration. This variable reflects the total market share of the five largest banks in a particular country, based on total assets. As an alternative to the five-bank concentration ratio, we also consider the Herfindahl-Hirschman index that weights banks' market shares with their own market shares. This index shows strong negative correlation with the number of banks, see Bikker and Haaf (2002a). This is due to a well-known weakness of concentration indices, namely their dependence on the size of a country or banking market. We deal with this by explicitly taking the number of banks into account as well, which we add to our set of explanatory variables. Another reason to include the number of banks in our regression specification, is that the concentration ratio is a one-dimensional measure taking account of two dimensions: the number of banks (reflecting the density of the banking market) and their size distribution (reflecting skewness). By including both the Herfindahl-Hirschman index and the number of banks as explanatory variables in our regression model, we restore this two-dimensionality (see Bikker and Haaf (2002b)). Furthermore, we also consider foreign bank ownership. This is a measure of the degree of foreign ownership of banks calculated as the fraction of the banking system's assets that is in banks that are 50% or more foreign owned.

Since the contestability theory predicts a direct relation between entrance barriers and the competitiveness of the banking industry, we include in our model a variable that measures the contestability of the banking sector. We use an activity restrictions variable that measures the banks' ability to engage in the businesses of underwriting, insurance and real estate, as well as the regulatory allowance of banks to own shares in non-financial firms. A higher value of the activity restrictions variable indicates that more restrictions are imposed on cross-sector activities in the financial industry.

To account for institutional differences among countries, we use several indices related to economic freedom in the style of the 'laissez-faire' model. We consider indicators for

property rights (the lower the score, the better the protection of property rights), regulation (the higher the score, the tighter the regulations affecting investments and the start-up of a business), banking freedom (the higher the score, the less banking freedom), and restrictions on foreign investments (the higher the score, the more restrictions on such investments).

Moreover, to assess the competitive pressure banks face from capital markets, we consider the country's stock market capitalization as a fraction of GDP. Also, we use the annual volume of life insurance premiums as a fraction of GDP as a proxy for the competition coming from the non-banking part of the financial sector, assuming that life insurance premiums not only reflect the demand for life insurance products but also for more sophisticated financial services in general.

Also, to control for differences in the countries' general economic development, we consider GDP per capita, real annual GDP growth, and the inflation rate (based on the GDP deflator). As mentioned in Section 2.1, the annual GDP growth can be regarded as a proxy for the business cycle. The pattern in the H-statistic may be affected by the response of banks to business cycle dynamics.

Furthermore, to account for EU-specific effects not captured by the covariates, we include a dummy variable for the EU-15 countries. Also, we include a dummy for countries with a socialist history (e.g. the previously centrally planned economies in Eastern and Central European countries that constituted the Warsaw Pact and the republics of the Sovjet Union), as banks in these countries are expected to be affected by the economic and institutional conditions during previous decades.

3.3 Determinants of competition model

To explain bank competition and explanatory variables, we regress the H statistic corresponding to the year 2004, say H_i for countries $i = 1, \ldots, N$, on the selected determinants. That is, we estimate the cross-country regression

$$H_i = X_i' b + \varepsilon_i, \tag{3}$$

where X_i represents a K-dimensional vector of country-specific covariates and b a K-dimensional vector of coefficients. These coefficients b reflect the marginal impact of the covariates on banking competition.

4 Bank data sample

This section discusses the Bankscope data used to estimate the H statistic and the data sources for the determinants-of-competition model. We also provide some sample statistics.

4.1 Bankscope data

We use a detailed data set obtained from Bankscope. The data set covers 25,000 private and public banks from around the world with more or less standardized reporting data that facilitate comparison across different accounting systems. The panel data set, prior to outlier reduction, is fairly extensive covering banks in 120 countries and spanning the years $1995 - 2004$. The data set is unbalanced in that (for various reasons) not all banks are included throughout the entire period.

We focus on consolidated data (if available) from the commercial, cooperative and savings banks and remove all observations pertaining to other types of financial institutions, such as securities houses, medium and long term credit banks, specialized governmental credit institutions and mortgage banks (25% of all banks in the Bankscope database). The latter types of institutions may be less dependent on the traditional intermediation function and may have a different financing structure compared to our focus group. In any case, we favor a more homogeneous sample. Furthermore, we apply a number of selection rules to the most important variables. We eliminate data on banks in special circumstances (e.g. holding companies, banks in their start-up or discontinuity phase), erroneous data and abnormally high or low ratios between key variables. To compensate for structural differences across countries, we adjust the bounds of the ratios as necessary. This allows for some flexibility regarding the inclusion of countries that have experienced (extremely) high inflation rates and hence (extremely) high interest rates or which are more labor

intensive. This operation reduces the number of observations by 6%. For the precise selection rules we refer to Bikker et al. (2006a,b). Finally, we exclude all countries for which the number of bank-year observations over the sample period after selection is less than 50, a minimum number needed to obtain a sufficiently accurate estimate of the country's H statistic. Also, we delete the countries for which the sample period contains less than 10 banks. These rules reduce our sample from 120 to 89 countries.

4.2 Remaining data sources

To estimate the determinants-of-competition model in Equation (3) we collect the explanatory variables mentioned in Section 3.2.

We calculate the five-bank concentration ratio directly from the Bankscope data. However, not all banks are included in this database, which may distort the concentration index value for some countries. Fortunately, this effect is generally limited since the ignored market segment consists mainly of the smallest banks.[4] Another shortcoming of the concentration index is that non-bank financial institutions are ignored. As competition of non-banks is mainly related to some segments of the banking market, such as mortgage lending, it is difficult to correct for that in the present measure based on total assets. Finally, the Bankscope data consists of consolidated figures and does not distinguish between domestic and foreign activities. Therefore, the concentration indices for small countries with large international banks are presumably overestimated.[5] The Herfindahl-Hirschman index and

[4] We notice that there is a correlation of 0.95 between the concentration ratios for the EU countries based on the 2004 Bankscope data and the concentration ratios provided by the European Central Bank (ECB, 2006) covering the same year. The ECB ratios are based on national banks' data of all banks. However, where the ECB data provide concentration ratios for only 25 EU countries, we have 76 countries in our final sample.

[5] Another problem with the concentration measure calculated from the Bankscope data is that they might be contaminated by the fact that the coverage of the database may vary from year to year. Consequently, the concentration measure may fluctuate over time, which is merely due to the incomplete coverage. Corvoisier and Gropp (2002) deal with this problem by identifying a fixed number of banks for which data are available throughout the entire sample period. They base their concentration ratios on this balanced sample. The disadvantage of their approach is that the number of banks in the balanced sample is relatively small. Since there is a high correlation between the (incomplete) Bankscope concentration ratios on the one hand and the ratios provided by the ECB on the other, we use the full (unbalanced) sample to calculate the concentration measure. This is also the approach followed by Bikker and Haaf (2002a) and Gelos and Roldos (2002).

the number of banks are also from Bankscope.

The source of the foreign ownership variable is Barth, Caprio, and Levine (2004). In contrast to all other variables, foreign ownership is measured for 2003 instead of 2004 for lack of more recent data. The source of the activity restrictions variable is the Worldbank. We use several indices related to economic freedom in the style of the 'laissez-faire' model, which we obtained from the Heritage Foundation.[6] We consider indicators for property rights, regulation, banking freedom and foreign investments. The country's stock market capitalization as a fraction of GDP comes from the World Development Indicators. The volume of annual life insurance premiums as a fraction of GDP, which acts as a proxy for the competition coming from the other parts of the financial sector, has been taken from the financial structure database (updated in January 2006), developed by Beck et al. (2000). GDP per capita, the real GDP growth and the inflation rate based on the GDP deflator are from the World Bank (WDI online).

We only consider those countries for which we have all explanatory variables. That is, we exclude countries for which one or more covariates are missing. Excluding the two variables for which we have limited data availability (foreign ownership and the annual volume of insurance premiums), this leaves us with a final sample of 76 countries; see Table 2.

4.3 Sample statistics

Level of competition

For all 76 countries in our final sample, we estimate the P-R model of Equations (1) and (2) by means of, respectively, ordinary and nonlinear least squares.[7] Table 2 reports the estimated values of H and $H(2004)$. The former is based on Equation (1) and reflects the average market power of the banks in 76 countries across the years $1995 - 2004$, whereas the latter is based on Equation (2) and corresponds to the level of market power in the year 2004. Table 2 also reports White (1980)'s heteroskedasticity robust standard errors

[6] See www.heritage.org.

[7] All estimations have been done in R version 2.4.1.

corresponding to the H statistics. For 26 out of 76 countries the value of H changed significantly over time, more often showing a significant decrease (15 countries) than an increase (11 countries). [8]

Explanatory variables

Table 1 provides a list of the explanatory variables in the data set, including their precise definitions and sources. Unless stated otherwise, we always use explanatory variables corresponding to the year 2004. The final sample consists of 100,972 bank-year observations on 17,385 different banks. The United States has by far the largest number of bank-year observations (53,025), followed by Germany (15,786), Italy (5,264), Japan (2,940), and France (2,543). Later we also consider models including foreign ownership and the annual volume of insurance premiums as explanatory variables, but due to limited data availability we apply these extended models to smaller data samples.

To get an idea of the main characteristics of the sample of countries, we present some sample statistics for the potential determinants of banking competition.[9] Covering 76 countries, our sample represents all main geographic areas across the world: 20% belongs to the EU-15, 21% has a socialist legal history, 18% is located in Middle- or South-America, 11% in the Far-East, 9% in Africa, and 7% in the Middle-East. More sample statistics are presented in Table 3.

5 Empirical results

This section describes and interprets the main determinants of banking competition. Furthermore, we also study the role of bank size.

[8] Bikker and Spierdijk (2007) analyze the changes in banking competition over time in more detail.
[9] The complete data set of explanatory variables is available upon request.

5.1 Estimating banking competition

Our final estimate of H, serving as the dependent variable in the determinants-of-competition model in Equation (3), is obtained as follows. When ζ in Equation (2) is not significantly different from zero at a 5% significance level, we estimate H from the constant-competition model in Equation (1) and ignore the time dimension. Otherwise, we use the time-dependent estimate of H that follows from Equation (2).

5.2 Explaining banking competition

Now that we have estimates of H, the next step is to estimate the determinants-of-competition model of Equation (3) in order to explain the level of competition. Our initial specification contains the variables listed in the upper pane of Table 1. In line with Bikker and Haaf (2002a), we explain the H statistic from the explanatory variables as observed in the same year, namely 2004.

To reduce any heteroskedasticity we take the natural logarithm of a number of explanatory variables, namely stock market capitalization as a fraction of GDP, GDP per capita, and the number of banks per country. Furthermore, to take into account the uncertainty in the estimates of H, we estimate Equation (3) by means of weighted least squares. We weight each observation with the inverse of the variance of the estimate of H, so that less weight is attached to less accurate estimates. Moreover, we calculate White (1980)'s robust covariance standard errors to deal with any remaining heteroskedasticity.

Our specification is based on a subset of the available explanatory variables from which those that cause multicollinearity have been excluded. The final model contains nine explanatory variables, being the five-bank concentration ratio, the number of activity restrictions, the Economic Freedom indices for restrictions on foreign investments and regulation, market capitalization as a fraction of GDP, GDP per capita, real GDP growth, an indicator variable for countries with a socialist legal history, and a dummy variable for

the EU-15 countries. Thus, we estimate the determinants-of-competition regression model

$$\begin{aligned} H_i &= b_1 + b_2\ \mathrm{CR5}_i + b_3\ \mathrm{activity\_restr}_i + b_4\ \mathrm{EF\_foreign\_inv}_i + b_5\ \mathrm{EF\_regulation}_i \\ &\quad + b_6\ \log(\mathrm{marketcap\_GDP}_i) + b_7\ \mathrm{real\_growth\_GDP}_i + b_8\ \log(\mathrm{GDP\_cap}_i) \\ &\quad + b_9\ \mathrm{legal\_soc\_dum}_i + b_{10}\mathrm{EU15\_dum}_i + \mathrm{error}. \end{aligned} \tag{4}$$

Note that in order to avoid multicollinearity, we do not combine the five-bank concentration ratio and the number of banks, dropping the latter. For the same reason we do not include inflation together with real GDP growth, and leave out the Economic Freedom indicators for property rights and banking, considering only those for foreign investments and regulation. We test for possible collinearity using the diagnostic procedures proposed by Belsley et al. (1980).[10] Belsley's procedure suggests that there are no collinearity problems in our final set consisting of nine covariates.

The estimation results are given in Table 4 ('model 1'). Somewhat remarkably, the five-bank concentration ratio turns out to be insignificant, confirming other studies which find that measures of concentration are not or only marginally related, if at all, to banking competition. This outcome is also surprising as it is in contrast to the dominant role of concentration in theoretical models. Also the number of activity restrictions and most macro-economic correction variables turn out to be insignificant in the final model, with real GDP growth as an exception. The latter variable has a negative impact on banking competition, which is in line with the model of Green and Porter (1984), where collusion markups are procyclical.

The influence of the investment climate is significantly negative, indicating that the banking sector is more competitive in countries with favorable investment conditions. A positive investment climate attracts foreign banks, which will increase competition among banks. Additionally, the banking industry is more competitive in countries with extensive

[10] This method examines the 'conditioning' of the matrix of independent variables. If the largest condition index (the condition number) is large (Belsley et al. (1980) suggest 30 or higher), then there may be collinearity problems. If a large condition index is associated with two or more variables with large variance decomposition proportions, these variables may cause collinearity problems. Belsley et al. (1980) suggest that a large proportion is 50 percent or more.

regulation. Extensive regulation often contains certain protection measurements against monopolistic behavior and cartel forming, which may improve competition among banks.

Finally, the history of a country's economic system has a negative impact on the degree of banking competition. Countries with a formerly centrally planned economy are characterized by a less competitive banking sector than countries with a capitalistic tradition. The changeover from a centrally planned economy to a developed free market economy with sufficient competition requires an immense behaviorial shift. Apparently, this transition was not yet fully completed during the years of our sample (i.e. $1995 - 2004$).

5.3 Relative importance of variables

To assess the relative importance of each of the explanatory variables in the final specification, we calculate the squared partial correlation (SPC) corresponding to each covariate. In the linear regression model, the SPC reflects how much of the variance in the dependent variable that is not associated with any other predictors, is associated with the variance in a particular covariate. It provides a measure of the economic significance of an explanatory variable. The SPC of an explanatory variable (say X_ℓ) is calculated as

$$\text{SPC}(X_\ell) = (R^2 - R^2_{-\ell})/(1 - R^2_{-\ell}), \tag{5}$$

where R^2 is the fraction of explained variance of the full model (containing all explanatory variables) and $R^2_{-\ell}$ the R^2 corresponding to the model without covariate X_ℓ. According to the SPC's provided in Table 4, the dummy variable for countries with a history of socialism is the most important explanatory variable. Apparently, such a past has a very strong impact on competition in the banking industry. Of the remaining variables, the Economic Freedom financial investments index is most important, followed by real annual GDP growth, and the Economic Freedom index for regulation.

5.4 Comparison to existing empirical literature

Our findings based on 76 countries and a modified P-R model differ substantially from the results established by C&L. Using P-R statistics for 22 countries, they find that activity

restrictions and foreign ownership are the only two significant variables (see their Table 5, page 580). These two variables do not play a significant role in our determinants-of-competition model. However, our model indicates that a related variable, namely the investment climate, is an important determinant of banking competition. Also, as in C&L, concentration does not significantly affect competition when we correct for other factors such as contestability, institutional framework and macro-economic situation. However, when we regress the H statistic on the five-bank concentration ratio only, its coefficient turns out significantly negative. This underlines the fact that the role of concentration can only be assessed properly in a model that also corrects for other factors.

5.5 Robustness checks

To assess the robustness of our estimation results, we run several alternative models.

Alternative concentration measures

Similar results are obtained when the five-bank concentration ratio is replaced by the Herfindahl-Hirschman index plus the number of banks. Moreover, unweighted regressions yield much the same outcomes as the weighted ones. Also, we run regressions including the variables with limited data availability (foreign ownership and annual volume of life insurance premiums). Inclusion of these variables reduces the sample to $54-65$ countries, yet the estimation results do not differ much from the ones obtained with the larger sample of 76 countries. Moreover, the foreign ownership and life insurance premium variables do not affect competition significantly. See Table 4, models $2-4$.

Endogeneity issues

Since there might be an endogeneity problem related to market structure variables (such as the five-bank concentration ratio, the Herfindahl-Hirschman index and the number of banks), we also estimate the determinants-of-competition model by means of 2SLS, with lagged values for the market structure variables and the macro-economic correction

variables as instruments. This results in very similar outcomes and we therefore do not present the full estimation results.

Sample size

As an additional robustness test, we repeat the entire analysis for the set of countries that have at least 15 (instead of only 10) banks in our data set. This reduces out final data set to 61 countries, but the estimation results hardly change relative to the larger sample.

Equilibrium tests

One of the key assumptions underlying the P-R model is that the banks analyzed are in a state of long-run competitive equilibrium; see Panzar and Rosse (1987) and Nathan and Neave (1989). In equilibrium, risk-adjusted rates of returns are equalized across banks and both returns on assets (ROA) and returns on equity (ROE) are uncorrelated with input prices. An empirical test for long-run competitive equilibrium is obtained from the regression model in Equation (1), with the dependent variable replaced by ROA or ROE. Testing for $H_0 : H = 0$ (equilibrium) against $H_1 : H < 0$ (disequilibrium) in this model provides a direct empirical way to test for long-run equilibrium. We find that most of the countries in our sample (80%) are in equilibrium. As an additional robustness check, we estimate the determinants-of-competition model excluding the countries that fail the equilibrium test at a 5% significance level, but this does not affect our main results.

The role of bank size

Both the theoretical and empirical literature examine the relationship between bank size and competition. Small banks usually operate on a local level and are primarily focused on retail banking, whereas large banks are active on international markets and with an emphasis on wholesale banking. Furthermore, large banks may be in a better position to collude with other banks. Reputation is likely to be related to size and may help to exert market power to increase margins. Large banks are expected to be more successful in

creating fully or partly new banking products and services than small banks, e.g. because of economies of scale in product development. This enables them to exploit monopolistic power. Bikker et al. (2006b) show that large banks have significantly more market power than small banks. Because of the substantial differences in market power across banks of different sizes, the factors that affect competition may also differ across small and large banks.

To deal with possible size effects, we use the extended P-R model of Bikker et al. (2006b) to obtain size-dependent H statistics for the whole range from small to large banks. Subsequently, we estimate the determinants-of-competition model in Equation (3) for each size quantile of the H statistic. This yields size-dependent coefficients for each of the explanatory variables, reflecting the impact of a covariate on the market power of a bank of a particular size quantile.

The major difference vis-a-vis the earlier estimates is that the activity restrictions variable, a proxy for contestability, plays a significant role for large banks. They are less competitive the more tightly bank activities are restricted. Large internationally operating banks are generally involved in a broader class of financial services than smaller locally operating banks that usually stick to the traditional banking activities. Activity restrictions lead to reduced competition in the market for more sophisticated financial services, which mainly affects large banks. Only large banks in former socialist countries are less competitive than in the rest of the world.

6 Conclusions

Using a measure for banking competition obtained from the Panzar-Rosse model, this paper aims to explain competition in the banking industry across 76 countries. Traditionally, market structure indicators, such as the number of banks and banking concentration, have been seen as the dominant determinants of competition. However, we find that these variables have no significant impact on competition, provided that other relevant explanatory variables are included in the model specification. Similarly, there is no evidence that

interindustry competition strengthens banking competition.

According to the theoretical literature, contestability should have a major impact on competition. This is confirmed by our empirical analysis, where the foreign investment climate turns out to play an important role. The fewer restrictions on foreign investments, the more competitive the banking sector becomes. Additionally, activity restrictions make large banks less competitive. Furthermore, we find that a country's institutional framework is a major determinant of banking competition. Extensive regulation, which often includes antitrust policies, significantly improves the competitive climate. Competition is substantially lower in countries with a socialist legal history, for instance in Eastern Europe. Finally, real growth of GDP, a proxy for the business cycle, indicates that collusion markups are procyclical. Only large banks in former socialist countries are less competitive than in the rest of the world.

Finally, we make several policy recommendations. The competitive climate in the banking industry benefits from extensive regulation (particularly antitrust policies), a favorable foreign investment climate, and the absence of financial activity restrictions. However, the most important lesson that follows from our analysis is not to base antitrust policy rules on traditional measures of competition such as banking concentration and market shares. These commonly used measures turn out to be completely unrelated to the degree of competition in the banking industry.

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Table 1: Potential explanatory variables, their description, year of measurement, and data source

abbreviation	description	year	source
included variables			
CR5	five-bank concentration ratio based on total assets		
act_restr	activity restrictions: the sum of four measures that indicate whether bank activities in the securities, insurance and real estate markets and ownership and control of nonfinancial firms are unrestricted, permitted, restricted, or prohibited	2004	Worldbank
EF_foreign_inv	Economic Freedom Foreign Investments Index	2004	Heritage Foundation
EF_regulation	Economic Freedom Regulation Index		
marketcap_gdp	stock market capitalization of listed companies as % of GDP	2004	Worldbank (WDI)
gdp_cap	GDP per capita (constant 2000 US$)	2004	Worldbank (WDI)
growth_gdp	annual real growth rate of GDP	2004	Worldbank (WDI)
legal_soc	dummy variable for countries with a socialist legal history		
EU15_dum	dummy variabe for EU15 countries		
excluded variables (multicollinearity)			
EF_prop_rights	Economic Freedom Property Rights Index	2004	Heritage Foundation
EF_banking	Economic Freedom Banking Freedom Index		
inflation	GDP deflator (annual %)	2004	Worldbank (WDI)
limited data availability			
foreign_ownersh	foreign ownership: a measure of the degree of government ownership of banks, calculated as the fraction of the banking system's assets that is in banks that are 50% or more foreign owned	2003	Barth, Caprio, and Levine (2004)
life_insur	annual volume of life insurance premiums as a fraction of GDP	2004	Beck et al. (2000) (database updated February 2007)
alternative concentration measures			
HHI	Herfindahl-Hirschman index based on total assets	2004	Bankscope
number_banks	number of banks in country	2004	Bankscope

Table 2: Sample information and estimates of H statistic

country	ID	# obs.	# banks	ζ	p-value	H	$\sigma(H)$	$H(2004)$	$\sigma(H)$
Argentina	AR	378	99	0.13	0.02	0.43	0.10	0.64	0.12
Armenia	AM	59	12	0.03	0.28	0.50	0.10	0.43	0.12
Australia	AU	183	32	0.14	0.00	0.25	0.26	-0.35	0.17
Austria	AT	1,188	194	-0.06	0.00	-0.02	0.11	0.12	0.05
Bahrain	BH	80	10	-0.08	0.06	0.56	0.12	0.43	0.10
Belgium	BE	452	75	-0.02	0.00	0.56	0.13	0.67	0.12
Bolivia	BO	113	16	0.00	0.30	0.93	0.05	0.95	0.07
Brazil	BR	818	167	0.05	0.10	0.37	0.07	0.50	0.10
Canada	CA	391	65	-0.09	0.04	0.30	0.19	0.20	0.10
Chile	CL	186	33	0.01	0.08	1.03	0.06	1.00	0.06
Colombia	CO	233	40	0.10	0.04	0.47	0.16	0.75	0.13
Costa Rica	CR	149	37	-0.04	0.44	0.82	0.23	0.80	0.27
Croatia	HR	276	47	-0.11	0.02	0.46	0.10	0.04	0.03
Cyprus	CY	112	19	-0.02	0.38	-0.11	0.27	-0.09	0.11
Czech Republic	CZ	185	33	0.00	0.88	0.80	0.15	0.79	0.17
Denmark	DK	778	99	0.02	0.08	0.22	0.05	0.15	0.05
Ecuador	EC	112	29	-0.02	0.19	0.63	0.23	0.64	0.16
El Salvador	SV	69	14	-0.03	0.06	0.37	0.12	0.44	0.14
Estonia	EE	56	12	-0.04	0.55	0.42	0.15	0.15	0.13
Finland	FI	76	14	-0.03	0.06	0.41	0.20	0.46	0.17
France	FR	2,543	396	-0.05	0.00	0.61	0.08	0.86	0.05
Germany	DE	15,786	2,296	-0.01	0.00	0.70	0.04	0.87	0.03
Ghana	GH	84	15	-0.04	0.21	0.66	0.28	0.62	0.18
Greece	GR	144	28	0.01	0.51	0.56	0.08	0.51	0.10
HongKong	HK	282	37	-0.01	0.06	0.00	0.15	-0.09	0.13
Hungary	HU	129	26	0.30	0.00	0.17	0.13	0.78	0.22
Iceland	IS	83	25	0.00	0.72	-0.02	0.28	0.02	0.29
India	IN	499	75	0.01	0.51	0.42	0.13	0.40	0.09
Ireland	IE	199	34	-0.03	0.01	1.30	0.25	1.42	0.23
Israel	IL	130	17	0.00	0.30	0.09	0.09	0.09	0.07
Italy	IT	5,264	817	-0.02	0.00	0.09	0.05	0.08	0.03
Ivory Coast	CI	56	11	-0.09	0.17	0.39	0.46	-0.04	0.19
Japan	JP	2,940	562	0.01	0.00	0.44	0.07	0.41	0.02
Jordan	JO	93	11	0.05	0.07	0.20	0.05	0.20	0.05
Kazakhstan	KZ	114	23	-0.14	0.11	0.50	0.11	0.28	0.16
Kenya	KE	186	38	0.13	0.01	0.76	0.11	0.62	0.10
Korea	KR	102	19	-0.02	0.12	0.50	0.33	0.86	0.45
Latvia	LV	136	29	0.01	0.36	0.56	0.12	0.52	0.11
Lebanon	LB	391	59	0.06	0.00	0.53	0.06	0.40	0.05
Lithuania	LT	66	13	0.04	0.50	0.44	0.14	0.39	0.19
Luxembourg	LU	947	137	0.02	0.00	0.27	0.07	0.33	0.06
Macedonia	MK	58	12	-0.32	0.01	1.03	0.32	0.05	0.06
Malaysia	MY	304	43	0.00	0.99	0.54	0.08	0.54	0.07
Mauritius	MU	50	12	-0.02	0.44	0.58	0.13	0.58	0.12
Mexico	MX	104	31	-0.16	0.22	0.84	0.22	0.29	0.28
Moldova	MD	61	12	0.04	0.09	0.64	0.21	0.58	0.17
Morocco	MA	66	13	-0.02	0.12	0.31	0.30	0.41	0.25
Netherlands	NL	288	50	-0.01	0.02	1.01	0.11	1.03	0.12
Nigeria	NG	305	63	0.01	0.05	0.69	0.06	0.75	0.07
Norway	NO	350	64	0.00	0.16	0.54	0.07	0.57	0.05
Pakistan	PK	161	24	0.01	0.23	0.54	0.13	0.43	0.16
Panama	PA	131	44	0.00	0.93	0.56	0.07	0.56	0.06
Paraguay	PY	142	26	0.01	0.07	0.68	0.06	0.75	0.08
Peru	PE	148	26	0.22	0.00	0.70	0.10	1.37	0.13
Philippines	PH	286	49	0.02	0.00	0.57	0.07	0.56	0.05
Poland	PL	249	50	-0.48	0.03	0.08	0.11	0.00	0.01
Portugal	PT	207	32	0.00	0.69	-0.21	0.17	-0.26	0.18
Romania	RO	134	29	-0.01	0.36	0.59	0.07	0.59	0.07

Table 2 – continued from previous page

country	**ID**	**# obs.**	**# banks**	ε	p-value	H	$\sigma(H)$	$H(2004)$	$\sigma(H)$
Russian Federation	RU	614	203	0.00	0.92	0.41	0.04	0.41	0.04
Saudi Arabia	SA	86	10	-0.01	0.38	0.46	0.10	0.48	0.11
Singapore	SG	93	20	0.24	0.33	0.33	0.47	0.51	0.69
Slovakia	SK	90	21	-0.12	0.00	0.38	0.13	0.10	0.04
Slovenia	SI	103	20	-0.16	0.00	0.27	0.13	0.26	0.09
South Africa	ZA	152	32	0.04	0.47	1.19	0.49	1.65	0.83
Spain	ES	1,127	166	-0.01	0.19	0.65	0.11	0.53	0.15
Sri Lanka	LK	68	12	-0.02	0.06	0.59	0.23	0.67	0.16
Sweden	SE	391	90	0.01	0.19	0.58	0.08	0.52	0.08
Switzerland	CH	2,109	403	-0.01	0.00	0.62	0.06	0.63	0.04
Thailand	TH	117	18	0.01	0.43	0.55	0.11	0.49	0.12
Trinidad & Tobago	TT	65	11	-0.04	0.03	0.07	0.13	0.30	0.12
Turkey	TR	182	51	-0.88	0.19	0.34	0.20	0.00	0.00
Ukraine	UA	181	41	0.02	0.25	0.45	0.06	0.44	0.06
United Kingdom	GB	804	131	-0.01	0.14	0.76	0.07	0.75	0.07
United States	US	53,025	9,361	0.01	0.00	0.48	0.01	0.46	0.00
Uruguay	UY	141	38	-0.01	0.55	0.54	0.10	0.52	0.06
Venezuela	VE	240	54	-0.03	0.13	0.85	0.07	0.72	0.09
total/average		**100,972**	**17,385**			0.50	0.14	0.48	0.13

This table displays the countries included in the sample, as well as the country ID's, the number of observations, and the number of banks considered for each country. Additionally, this table reports for each country the values of the H statistics and the corresponding standard error measured over the period $1995 - 2004$.

Table 3: Some sample statistics

variable	average	high	low
included variables			
CR5	70.6	Estonia (100%), Singapore (99%)	Germany (26%), Japan (35%), Italy (37%),
act_restrict	9.7	Costa Rica (15)	United Kingdom (5)
EF_foreign_inv	2.4	many countries (5)	many countries (1)
EF_regulation	3.0	many countries (5)	many countries (1)
marketcap_gdp	68.7	many countries (5)	many countries (1)
gdp_cap (%)	11,320.4	Switzerland (231%), Belgium (218%), United Kingdom (133%), United States (139%).	Armenia (0.6%), Paraguay (2.9%9, Uruguay (2.5%)
real_growth_gdp (%)	-0.3	Armenia (6.4%), Panama (5.7%), Uruguay (4.5%)	Dominican Republic (-49.2%), Venezuela (-15.6%), Zambia (-13.4%)
EU15_dum	0.20		
legal_soc	0.21		
excluded variables			
EF_prop_rights	2.5	many countries (5)	many countries (1)
EF_banking	2.4	many countries (5)	many countries (1)
inflation_gdp (%)	5.5	Venezuela (31.2%)	Japan (-2.1%)
limited data availability			
foreign_ownersh (%)	0.3	Estonia (98.9%), Luxembourg (94.6%)	Denmark (0%), Israel (1.2%)
life_insur	0.03	Luxembourg (26.3%), United Kingdom (8.9%), United States (4.2%)	many countries (0%)
alternative concentration measures			
HHI	1,609.0	Estonia (5767), Finland (3665)	Germany (262), United States (160)
number_banks	187.5	Estonia (7), Moldova (7), Morocco (7)	Germany (1061), United States (9026)

Table 4: Estimation results

	coeff.	*std.dev.*	*t-value*	*p-value*	*SPC*
Model 1: standard					
intercept	0.603	0.485	1.242	0.219	
CR5	-0.001	0.001	-0.754	0.453	0.009
act_restr	-0.010	0.015	-0.664	0.509	0.007
log(marketcap_gdp)	-0.016	0.040	-0.386	0.701	0.002
log(gdp_cap)	0.011	0.038	0.286	0.776	0.001
real_growth_gdp	-0.023	0.008	-2.841	0.006	0.109
EF_foreign_inv	-0.132	0.041	-3.186	0.002	0.133
EF_regulation	0.128	0.052	2.462	0.016	0.084
EU15_dum	-0.129	0.092	-1.398	0.167	0.029
legal_soc	-0.435	0.078	-5.567	0.000	0.320
# obs.	76				
R2	0.84				
adj. R2	0.82				
Model 2: incl. foreign_ownersh					
intercept	0.927	0.531	1.747	0.086	
CR5	-0.001	0.001	-0.510	0.612	0.005
act_restr	-0.014	0.016	-0.859	0.394	0.013
log(marketcap_gdp)	-0.040	0.042	-0.958	0.343	0.017
log(gdp_cap)	0.004	0.039	0.099	0.921	0.000
real_growth_gdp	-0.023	0.008	-2.768	0.008	0.124
EF_foreign_inv	-0.140	0.043	-3.242	0.002	0.163
EF_regulation	0.101	0.054	1.880	0.066	0.061
EU15_dum	-0.177	0.098	-1.813	0.075	0.057
legal_soc	-0.398	0.093	-4.267	0.000	0.252
foreign_ownersh	-0.157	0.140	-1.119	0.268	0.023
# obs.	65				
R2	0.87				
adj. R2	0.84				
Model 3: incl. life_insur					
intercept	0.301	0.737	0.409	0.684	
CR5	-0.001	0.001	-0.773	0.443	0.0110
act_restr	-0.018	0.017	-1.012	0.316	0.0186
log(marketcap_gdp)	0.007	0.056	0.124	0.901	0.0003
log(gdp_cap)	0.027	0.047	0.578	0.566	0.0061
real_growth_gdp	-0.022	0.010	-2.258	0.028	0.0863
EF_foreign_inv	-0.130	0.053	-2.465	0.017	0.1012
EF_regulation	0.131	0.057	2.287	0.026	0.0883
EU15_dum	-0.124	0.110	-1.122	0.267	0.0228
legal_soc	-0.440	0.090	-4.918	0.000	0.3094
log(life_insur)	-0.029	0.046	-0.632	0.530	0.0073
# obs.	65				
R2	0.85				
adj. R2	0.82				
Model 4: incl. life_insur & foreign_ownersh					
intercept	0.493	0.807	0.612	0.544	
CR5	-0.001	0.002	-0.477	0.636	0.005
act_restr	-0.020	0.018	-1.082	0.285	0.027
log(marketcap_gdp)	-0.029	0.060	-0.482	0.632	0.006
log(gdp_cap)	0.032	0.051	0.637	0.528	0.010
real_growth_gdp	-0.021	0.011	-1.941	0.059	0.082
EF_foreign_inv	-0.146	0.056	-2.622	0.012	0.141
EF_regulation	0.109	0.060	1.808	0.078	0.072
EU15_dum	-0.174	0.118	-1.475	0.148	0.049
legal_soc	-0.421	0.110	-3.828	0.000	0.259
log(life_insur)	-0.135	0.157	-0.860	0.395	0.019
foreign_ownersh	-0.043	0.048	-0.904	0.371	0.017
# obs.	54				
R2	0.87				
adj. R2	0.84				

This table displays the estimation results of the cross-country regressions of the H statistic on various explanatory variables. Apart from coefficients, standard errors, t-values and p-values this table also reports the squared partial correlation (SPC) for each variable, which is a measure for the economic significance of a covariate.