Determinants of bank market structure: Efficiency and political economy variables

Francisco González*
University of Oviedo
School of Economics and Business

Abstract

This paper analyzes how bank efficiency and political economy variables influence bank market structure in 69 countries. Results for more than 2,500 banks over the 1996-2002 period indicate that the ability of the efficiency-structure hypothesis to explain bank market structure varies across countries, depending on national political economy variables. Increased market monitoring and a better quality contracting environment amplify the positive influence of bank efficiency on market share and market concentration. Stricter bank entry requirements and more generous deposit insurance schemes, however, mitigate the influence of bank efficiency on market share and market concentration.

JEL classification: G18, G21, G28.

Keywords: banking structure, efficiency, regulation, supervision, institutions.

* I am grateful to Ana Isabel Fernández, Juan Fernández de Guevara, Ana Rosa Fonseca, Fernando Gascón, Víctor González, Ximo Maudós, seminar participants at Valencia University, an anonymous referee and the editor for helpful comments and suggestions. Financial support provided by the Spanish Science and Technology Ministry (MCT), Project SEC2002-04765 is gratefully acknowledged. An earlier version of this paper has been published as the working paper no. 219/2005 of working paper series of the Fundación de las Cajas de Ahorro (FUNCAS).

Correspondence to: Francisco González Rodríguez, Department of Business Administration, University of Oviedo. Avenida del Cristo s/n, 33071. Oviedo. Spain. Tel.: +34-985103698. Fax: +34-985103708. E-mail: fgonzale@uniovi.es.

Determinants of bank market structure: Efficiency and political economy variables

Abstract

This paper analyzes how bank efficiency and political economy variables influence bank market structure in 69 countries. Results for more than 2,500 banks over the 1996-2002 period indicate that the ability of the efficiency-structure hypothesis to explain bank market structure varies across countries, depending on national political economy variables. Increased market monitoring and a better quality contracting environment amplify the positive influence of bank efficiency on market share and market concentration. Stricter bank entry requirements and more generous deposit insurance schemes, however, mitigate the influence of bank efficiency on market share and market concentration.

JEL classification: G18, G21, G28.

Keywords: banking structure, efficiency, regulation, supervision, institutions.

1. Introduction

Market structure attracts attention in the economics and industrial organization literature because of its connection with market competitiveness and social welfare. Two potential determinants of market structure come to the fore in the literature: differences in company efficiency levels, and regulatory or institutional barriers to enter, expand in, or abandon markets. We use a panel database of 2,622 banks in 69 countries over the 1996-2002 period to analyze how bank efficiency and the characteristics of bank regulation, supervision, and institutions influence the structure of national bank markets, particularly market concentration and bank market share. We also interact the potential determinants to analyze whether the influence of bank efficiency on market structure varies across countries depending on the characteristics of bank regulation, supervision, or institutions.

The determinants of market structure are important in banking for at least two reasons. First, bank market structure influences not only the competitiveness of the banking system but also companies' access to funding and thereby their investment. Several authors explore this connection by examining the effect of the development and structure of banking systems on economic growth.[1] Second, as banking is highly regulated, it is useful to assess the effects of regulation on market structure. Our analysis complements other studies that examine how well regulation controls bank risk-taking. As far as we know, no one else has considered the effect of bank regulation on bank stability through its effect on market structure. [2]

The influence of firm efficiency on market structure is typically tested as part of a more general analysis of the market concentration-performance relation. Researchers have examined whether the positive relation that we see between concentration and performance means that companies in more concentrated markets are more efficient (the efficiency-structure or EFS hypothesis), or that companies in more concentrated markets can extract monopolistic rents (the structure-conduct-performance or SCP hypothesis).[3] Differences in what drives the concentration-performance relation are not the only issue on which the two hypotheses diverge. The endogeneity of market concentration is another one. While market concentration is taken as exogenous by the SCP hypothesis, it is endogenous and depends on firm efficiency according to the EFS hypothesis. Both hypotheses also have different policy implications. If the SCP hypothesis dominates, antitrust enforcement would be

socially beneficial; if the EFS hypothesis dominates, policies that penalize or impair mergers would be socially costly.

Most authors trying to differentiate between the hypotheses estimate regressions using profitability as the dependent variable. Market structure is treated as an exogenous variable on the right-hand side of the equation. Berger (1995), Goldberg and Rai (1996), and Berger and Hannan (1997), however, do consider the potential endogeneity of market structure by analyzing whether greater bank concentration results from the increased market share of more efficient organizations. In the US market, Berger (1995) and Berger and Hannan (1997) obtain contradictory results that on the whole do not support the forecasts of the EFS hypothesis, since only scale efficiency has a positive influence on market share, and none of the efficiency measurements has a positive effect on market concentration. In Europe, Goldberg and Rai (1996) fail to find a clear relation between market structure and bank efficiency for a sample of banks in 11 countries.

Yet these authors do not control for the influence of political economy variables on market structure or on efficiency. Our results suggest that these factors may explain the inconsistent results across studies that use bank samples in a single country to distinguish the EFS and SCP hypotheses.

Our research differentiates the direct effect of political economy variables on market structure and the indirect effect they may have by influencing structure via efficiency effects. For instance, differences across countries in barriers to entry in the banking sector would directly affect bank market structure by determining the number of market participants. A poor legal environment, though, could restrict market development and make it harder for more efficient banks to take over less efficient ones.

The political economy variables considered are (1) the characteristics of bank regulation (legal restrictions on bank entry and on non-traditional bank activities, and the generosity of deposit insurance); (2) bank supervision (private and official); and (3) the quality of institutions and enforceability of contracts in a country. Our panel-data structure serves to control for unobservable bank heterogeneity and avoids bias that would arise from omission of relevant explanatory variables. The analysis controls for the potential endogeneity of

bank efficiency and political economy variables by applying a two-stage least squares random effect estimator.

The results confirm that political economy variables influence market structure directly but also affect the relation between efficiency and structure. Greater market monitoring and better-quality institutions are associated with greater market concentration and higher growth rates of more efficient banks. Stricter entry restrictions and more generous deposit insurance are also associated with greater market concentration and market share, but not with higher growth rates of more efficient banks.

The remainder of this paper is organized as follows. Section 2 discusses the data and the proxies used for market structure, bank efficiency, and political economy variables. Section 3 describes the methodology. Results are presented in Section 4. Section 5 concludes the paper.

2. Data and Variables

We use three main data sources. Bank-level information to estimate bank efficiency and market share comes from Fitch-IBCA Ltd. BankScope Database. Whenever they are available, we use consolidated bank balance-sheet and income-statement data. All data are expressed in US dollars, converted to constant 1996 dollars. Information on bank market concentration for each country comes from the Bank Concentration Database at the World Bank, which is based on Fitch IBCA's Bankscope Database. Information on the regulatory and supervisory variables comes from the World Bank's Bank Regulation and Supervision Database, defined following Barth et al. (2004). Macroeconomic data are obtained from the International Financial Statistics of the International Monetary Fund (IMF).

We obtain information for 2,622 banks in 69 countries, and analyze a period of seven years (1996-2002) whose midpoint is 1999, which is the year corresponding to the World Bank's Bank Regulation and Supervision Database.[4] Table 1 reports the mean per country value for market structure and bank efficiency. Table 2 provides descriptive statistics of political economy variables for the whole sample.

2.1. Market structure

Following Demirgüc-Kunt et al. (2004) and Beck et al. (2006), we measure bank market concentration (CONC) as the fraction of bank assets held by the three largest commercial banks in a country. Market concentration scores in our sample range from 0.247 for Luxembourg to 1 for Finland, Iceland, and Sweden. All bank assets were in three or fewer banks in the latter three countries during at least one year in the sample period.

Bank market share (MS) for each bank in each year is taken as a second measure of market structure. It is calculated as the fraction of bank assets to total assets of commercial banks in the country. The mean values of market share vary in our sample between 0.0006 for Switzerland and 0.2877 for Iceland.

2.2. Bank efficiency

Following Fare et al. (1994), Leightner and Lovell (1998), and Wheelock and Wilson (1999), among others, we use a non-parametric method, Data Envelopment Analysis (DEA), to measure bank efficiency. The DEA frontier represents the set of efficient observations for which no other production unit or linear combination of units employs as little or less of every input without changing the output quantities generated (input orientation) or produces as much or more of every output without changing the input quantities (output orientation). Efficiency scores vary between 0 and 1, with 1 being fully efficient. [5]

The literature offers two competing approaches to identify relevant inputs and outputs: the production approach or the intermediation approach. Like Berger and Mester (1997) and DeYoung and Nolle (1998), we adopt an intermediation or asset approach, which requires a definition of input and output that is valid for all the countries in the sample. Accordingly, we use three inputs: (1) personnel expenses, (2) the book value of fixed assets, and (3) loanable funds (the sum of deposits and non-deposit funds). For output, we use (1) total loans and (2) non-interest income. We verify the robustness of the results by breaking down the output vector. Short-term and long-term loans are considered separately, and non-interest income is broken down into commission, trading, and other operating income. Results are robust across the different definitions.

We calculate a frontier for each individual country and a bank's efficiency is measured relative to each country's own frontier. Banks are equally weighted in these country-specific estimations. Thus, rather than compare efficiencies across banks in different countries, we analyze differences in levels of efficiency between banks in the same country, and consider whether the influence of efficiency differences on the structure of a national market varies across countries depending on legal and institutional frameworks. The efficiency of each bank in each year in its national market is estimated according to both the input and the output orientation and imposing both constant and variable returns to scale.

(Insert Table 1 about here)

2.3. Bank regulation

The first regulatory variable is restrictions on bank entry (ENTRY). Our measure of entry restrictions specifies whether particular documents are required to obtain a license to operate a bank. We include a variety of submissions that banking authorities use in deciding whether to grant a license: (1) a draft of by-laws; (2) the intended organizational chart; (3) the first 3-year financial projections; (4) financial information on main potential shareholders; (5) the background and experience of future directors; (6) the background and experience of future managers; (7) the sources of funds to capitalize the new bank; and (8) the intended differentiation of the new bank from other banks. Submissions are assigned a value of 1 if required and a value of 0 otherwise. The entry restriction variable ranges from 3 for Chile to 8 for countries such as Australia, Austria, or Switzerland, where higher values indicate more restrictions. We also check that the basic results do not change when we measure entry restrictions by the fraction of rejected entry applications.

We expect higher barriers to entry to increase bank market concentration. Moreover, if market competitiveness depends on the number of participants (Claessens and Laeven, 2004), the degree of restrictions on banking may also affect the likelihood that more efficient firms will take over less efficient firms. Thus, stricter entry restrictions may indirectly reduce both market concentration and the market share of more efficient banks. Jayaratne and Strahan (1998), for example, find evidence that long-standing branching

restrictions in US banking have served as entry barriers that prevented more efficient banks from expanding at the expense of less efficient rivals.

The second regulatory variable is whether banks are allowed to take part in activities that generate non-interest income (RESTRICT). Average RESTRICT measures indicate whether bank activities in the securities, insurance, and real estate markets and bank ownership and control of non-financial firms are: (1) unrestricted, (2) permitted, (3) restricted, or (4) prohibited. Although this indicator can in theory range from 4 to 16, where higher values indicate more restrictions on bank activities and non-financial ownership and control, in our sample it varies between a minimum value of 5 for the US and a maximum value of 14 for Ecuador and El Salvador.

Empirical studies demonstrate that restrictions on bank activities have a negative influence on bank performance and stability (Barth et al., 2004; Beck et al., 2006). Claessens and Laeven (2004) have shown that more strictly regulated bank markets are less competitive. According to this evidence, stricter restrictions could reduce market concentration by making it more difficult for more efficient banks to gain market share at the expense of less efficient banks. Hence, we predict RESTRICT will have an indirect negative effect on bank market share and market concentration.

The third regulatory variable is the presence and the generosity of explicit deposit insurance in a country. We use a dummy variable (INS) that takes a value of 1 if there is explicit deposit insurance and 0 otherwise. To measure the generosity of deposit insurance, we follow Demirgüc-Kunt and Detragiache (2002) and define the variable HAZARD as the sum of eight dummy variables. All these dummies are positively related to the moral hazard of deposit insurance, so a higher value of HAZARD would indicate a greater moral hazard problem caused by deposit insurance. In our sample, HAZARD ranges from a value of 1 for Switzerland to 8 for Mexico. HAZARD is measured only for countries with explicit deposit insurance, which reduces the sample to 42 countries and 2,085 banks.

Recent empirical evidence confirms the traditional argument that more generous deposit insurance weakens the market discipline enforced by depositors, and encourages banks to take greater risk (e.g., Demirgüc-Kunt and Detragiache, 2002; Hovakimian et al., 2003). The effect of deposit insurance on market structure and on its relation to efficiency is less

clear-cut, however. We therefore make no *a priori* forecast of the influence of explicit deposit insurance, treating it as an empirical issue.

2.4. Bank supervision

We use the same variables as Barth et al. (2004) to gauge both the intensity of private monitoring (MONITOR) and official supervision (OFFICIAL) of banks. We measure private supervision by adding a value of 1 for each of nine characteristics of a country: (1) if an outside licensed audit is required of bank financial statements; (2) if auditors are licensed or certified; (3) if the income statement includes accrued or unpaid interest or principal on non-performing loans; (4) if banks are required to produce consolidated financial statements; (5) if off-balance sheet items are disclosed publicly; (6) if banks must disclose risk management procedures; (7) if subordinated debt is allowable (required) as a part of regulatory capital; (8) if bank directors are legally liable if information disclosed is erroneous or misleading; and (9) the percentage of the top 10 banks that are rated by international credit rating agencies. Higher values indicate more private oversight.

A country's official supervisory power is measured by adding a value of 1 for each affirmative answer to 14 questions intended to gauge the power of supervisors to undertake prompt corrective action, to restructure and reorganize troubled banks, and to declare a deeply troubled bank insolvent. This variable can range from 0 to 14, where a higher value indicates more official supervisory power.

International institutions, such us the Bank for International Settlements, the International Monetary Fund, and the World Bank, are encouraging countries to strengthen both official and private bank supervision. These recommendations are frequently discussed in the context of increasing bank stability, but, as far as we know, there are no studies analyzing the influence of different supervisory policies on the growth of more efficient banks and market structure.

2.5. Institutions

We use the Kaufman et al. (2001) KKZ index as an indicator of the quality of a country's legal environment. This is calculated as the average of six indicators: voice and

accountability in the political system; political stability; government effectiveness; regulatory quality; rule of law; and control of corruption.[6] We examine the robustness of our results by including alternative measures of the quality of the legal and institutional environment: (1) the law and order index of the International Country Risk Guide and (2) the property rights index from the Economic Freedom index used initially by La Porta et al. (1998). Results are not significantly different for these alternatives.

For a market to function well, firms must be able to rely on contracts and their legal enforceability. Weak legal systems and poor institutional infrastructure impede market development (e.g., La Porta et al., 1997, 1998; Levine et al., 2003). Therefore, we forecast that bank efficiency is more positively related to market share when the legal system works well.

2.6. Macroeconomic variables

Finally, we include macroeconomic characteristics as control variables. We follow Smirlock (1985) and Demirgüc-Kunt et al. (2004), among others, in selecting macroeconomic variables that might have an impact upon market structure: the inflation rate (INFLATION) and the growth of deposits (GROWTHD). Demirgüc-Kunt et al. (2004) have shown that banks have wider margins and greater profitability in inflationary environments. The growth of deposits is employed because rapid growth should expand profit opportunities for existing banks (Smirlock, 1985). We also include the natural logarithm of gross domestic product (LNGDP) as an explanatory variable of market concentration and market share to control for the influence of country size.

(Insert Table 2 about here)

2.7. Correlations

Table 3 reports the correlation matrix. The four measures of bank efficiency and both measures of market structure are positively correlated. These correlations are consistent with the EFS hypothesis that more efficient banks have a larger market share and are present in more concentrated markets. Several country characteristics are also significantly correlated with market structure. CONC and MS appear on average to be significantly

higher in countries with lower entry barriers, less official supervisory power, and a weaker institutional environment.

(Insert Table 3 about here)

3. Methodology

The first regressions estimated to analyze the influence of bank efficiency and political economy variables on market concentration and market share are:

$$CONC_{jt} = \alpha_0 + \alpha_1 EFF^{IV}{}_{it} + \alpha_2 Z^{IV}{}_{jt} + \alpha_3 M_{jt} + \alpha_4 \sum_{t=1996}^{2002} Y_t + \mu_{1i} + \varepsilon_{1it} \quad [1]$$

$$MS_{it} = \beta_0 + \beta_1 EFF^{IV}{}_{it} + \beta_2 Z^{IV}{}_{jt} + \beta_3 M_{jt} + \beta_4 \sum_{t=1996}^{2002} Y_t + \mu_{2i} + \varepsilon_{2it} \quad [2]$$

where $CONC_{jt}$ is the bank market concentration of country j in year t. MS_{it} is the market share of bank i in year t. EFF_{it} is the efficiency of bank i in year t. Z_{jt} is the set of political economy variables for country j in year t. The superscript IV indicates that the variable is instrumented.

One difficulty in including multiple political economy variables is that they are highly correlated (see Table 3). They are also potentially endogenous. Both make it difficult to tease out the specific effect of each variable and its importance for bank market structure. Our empirical analysis uses a number of instruments for the observed values of the variables included in Z (ENTRY, RESTRICT, INS, HAZARD, OFFICIAL, MONITOR, and KKZ) to identify the exogenous component of each variable and to control for potential simultaneity bias. Each political economy variable is regressed on the instruments proposed by Barth et al. (2004): legal origin dummy variables (English, French, German, Scandinavian, and Socialist), latitudinal distance from the equator, and religious composition dummy variables. Religious composition is measured as the percentage of population in each country that is Roman Catholic, Protestant, Muslim, or other. The

Scandinavian and the Catholic dummy variables are omitted from the regressions. The OLS is:

$$Z_{jt} = \theta_0 + \theta_1 \sum_{k=1}^{5} \text{Legal Origin}_{jk} + \theta_2 \sum_{m=1}^{4} \text{Religious composition}_{jm} + \theta_3 \text{ Latitudinal distance}_j + \theta_4 \sum_{t=1996}^{2002} Y_t + \varepsilon_{jt} \quad [3]$$

In regressions [1] and [2] we use the predicted values from the preceding regressions (Z^{IV}) instead of the observed values of the political economy variables (Z).

M_{jt} is the set of macroeconomic variables (INFLATION, GROWTHD, and LNGDP) for country j in year t. $\sum_{t=1996}^{2002} Y_t$ is a set of dummy time variables. The 1996 dummy is omitted from the regressions. These dummies capture any unobserved bank-invariant time effects not included in the regression, although their coefficients are not reported for reasons of space. Finally, μ_i are unobservable bank-specific effects that are constant over time but vary from bank to bank, and ε_{it} are white-noise error terms.

We apply the two-stage least squares random-effects estimator (EC2SLS) provided by Baltagi (2001) to address two particular econometric issues: (i) the presence of unobserved bank specific effects, eliminated by applying a random effects model to our panel database[7]; and (ii) the potential endogeneity of bank efficiency and thus a possible simultaneous-equation bias. Reverse causation, whereby market structure affects bank efficiency, is consistent with the SCP hypothesis if the relaxed environment enjoyed by firms with greater market power reduces incentives to maximize efficiency (Berger and Hannan, 1997). Failure to account for this possibility might lead to biased coefficients in tests of the efficient structure condition that bank efficiency increases concentration and market share.

We use the number of observations in each country (NOBS) as the instrument of bank effciency. NOBS is obtained multiplying the number of banks in each country by the number of years for which we have information on each bank. The number of observations is considered an appropriate instrument of bank efficiency because there is empirical evidence that efficiency levels estimated using DEA are negatively related to sample size

(Zhang and Bartels, 1998). Using NOBS as an instrument controls for the effect of differences in sample size across countries on our estimations of bank efficiency, while also satisfying the other conditions for an instrument, namely, that it does not directly affect and is not directly affected by the dependent variable.[8]

EC2SLS is the 2SLS analogue for the error components simultaneous equation model in a panel data regression. In the first stage of a typical 2SLS we would regress bank efficiency on NOBS and the other exogenous variables, i.e.:

$$EFF_{it} = \omega_0 + \omega_2 Z^{IV}{}_{jt} + \omega_2 M_{jt} + \omega_3 NOBS_j + \omega_4 \sum_{t=1996}^{2002} Y_t + \mu_i + \varepsilon_{it} \qquad [4]$$

In the second stage we would replace EFF by its predicted value (EFF^{IV}) from the preceding regression to estimate models [1] and [2]. EC2SLS is just a weighted combination of between cross-section, between time-period and within 2SLS estimates.

In models [1] and [2], positive coefficients for α_1 and β_1 are consistent with the EFS hypothesis after controlling for political economy variables. These models, however, do not distinguish the direct effect of political economy variables on market structure from the indirect effect involving efficiency. To differentiate these two effects, we introduce an interaction term for each political economy variable and for the bank efficiency measure sequentially. The models estimated using the instrumented variables are:

$$CONC_{jt} = \gamma_0 + \gamma_1 EFF^{IV}{}_{it} + \gamma_2 Z^{IV}{}_{jt} + \gamma_3 EFF^{IV}{}_{it} \text{ x } Z^{IV}{}_{jt} + \gamma_4 M_{jt} + \gamma_5 \sum_{t=1996}^{2002} Y_t + \mu_{1i} + \varepsilon_{1it} \qquad [5]$$

$$MS_{it} = \delta_0 + \delta_1 EFF^{IV}{}_{it} + \delta_2 Z^{IV}{}_{jt} + \delta_3 EFF^{IV}{}_{it} \text{ x } Z^{IV}{}_{jt} + \delta_4 M_{jt} + \delta_5 \sum_{t=1996}^{2002} Y_t + \mu_{2i} + \varepsilon_{2it} \qquad [6]$$

In models [5] and [6], γ_3 and δ_3 denote the indirect effect of each political economy variable on market structure via its influence on the EFS hypothesis. The more positive the values of γ_3 and δ_3, the more that different bank efficiencies account for differences in market structure. Negative values of γ_3 and δ_3 would indicate that the particular political economy variable reduces the validity of the EFS hypothesis.

4. Results

4.1. Efficiency and market structure

Results are reported only for the output orientation and assuming variable returns to scale (VRTS).[9] Similar results are obtained for the other three specifications. Results are robust to the omission of 5 countries for which fewer than 30 observations are available (Czech Republic, Iceland, Japan, Namibia, and Sweden).

Table 4 reports results of models [1] and [2] for the sample of 69 countries. The results are consistent with the efficiency-structure hypothesis. After controlling for political economy and macroeconomic variables, EFF^{IV} has statistically significant positive coefficients in both the market concentration and the market share equations. The positive influence of bank efficiency on bank market structure remains significant regardless of the combination of political economy variables controlled for. The influence of bank efficiency is also economically significant. For instance, using the EFF^{IV} coefficients in columns (3) and (6), a one-standard deviation improvement in bank efficiency (0.3233) would cause an increase in market concentration and in bank market share of 1.58 times and 0.26 times (respectively) the standard deviation of these variables.

Higher barriers to entry and a better-quality legal environment favor higher market concentration and market share. Greater private and official supervision, however, reduce market concentration and are associated with smaller market share. Restrictions on bank activities and the presence of explicit deposit insurance do not have a clear influence, as their coefficients vary depending on the dependent variable. The coefficients on these political economy variables capture the total effect of the respective country variable on market structure, although without distinguishing the direct effect from the indirect effect involving efficiency.

(Insert Table 4 about here)

4.2. Influence of political economy variables on the EFS hypothesis

Interaction terms for the efficiency variable and each political economy variable are incorporated in models [5] and [6] to identify their indirect effect on market structure. A positive (negative) coefficient of an interaction term is consistent with a positive (negative) influence of the political economy variable on the EFS hypothesis and is therefore also consistent with a positive (negative) indirect effect on market concentration and market share. Interaction terms are incorporated sequentially instead of simultaneously so as to avoid correlation problems between political economy variables.

Results for market concentration are reported in Table 5 and for market share in Table 6. We see that stricter entry restrictions ($ENTRY^{IV}$) and the presence of explicit deposit insurance (INS^{IV}) in a country reduce the validity of the EFS hypothesis, given negative and statistically significant coefficients on the interaction terms. The reduced support for the EFS hypothesis in countries with stricter entry requirements is consistent with the reduced market competitiveness found by Claessens and Laeven (2004) in these environments. Controlling for $EFF^{IV}xENTRY^{IV}$, $ENTRY^{IV}$ has a positive coefficient, indicating its positive direct effect on market structure for reasons other than those related to the efficiency hypothesis. Thus, our results suggest that higher bank entry barriers cause higher market concentration while at the same time reducing the validity of the EFS hypothesis.

(Insert Table 5 about here)

(Insert Table 6 about here)

Greater private monitoring and a better-quality institutional environment, however, are consistent with higher support for the EFS hypothesis as indicated by statistically significant positive coefficients of the interaction terms ($EFF^{IV}xMONITOR^{IV}$ and $EFF^{IV}xKKZ^{IV}$). Positive signs are consistent with our expectations. As private monitoring is a necessary condition for well-functioning markets, it is positively related to the EFS hypothesis in the national bank market. The positive influence of KKZ^{IV} confirms that greater market concentration occurs with the growth of more efficient organizations when markets have strong legal systems and a solid institutional infrastructure. Negative

coefficients for $MONITOR^{IV}$ in column (5) in Tables 5 and 6 indicate that the origin of the net negative relation observed between $MONITOR^{IV}$ and market structure in Table 4 must lie in the negative influence of this variable on market structure for reasons other than those related to the efficiency hypothesis.

Restrictions on non-traditional bank activities and the extent of official supervisory power in the interaction terms ($EFF^{IV}xRESTRICT^{IV}$ and $EFF^{IV}xOFFICIAL^{IV}$) do not have statistically significant coefficients. This means that the negative influence of official supervisory power on market structure suggested in Table 4 arises for reasons other than those related to the efficiency hypothesis. The negative coefficient for $OFFICIAL^{IV}$ in column (4) in Table 5 confirms this conclusion.

4.3. Robustness checks

In further analysis we examine whether the results vary when we use the generosity of deposit insurance ($HAZARD^{IV}$) instead of the mere presence of deposit insurance (INS^{IV}) in a country. This analysis reduces the sample to the 42 countries with explicit deposit insurance. Results (not reported here) are largely consistent with the earlier analysis.

The results are also robust to measuring market concentration in model [3] using country value-weighted average efficiency instead of individual bank efficiencies. Bank size is taken as the weight for bank efficiency in each country.

Finally, the basic results do not change when we introduce an additional dummy explanatory variable to control for a developed or developing country, or when we control for government and foreign bank ownership in a country using the variables provided by Barth et al. (2004).

5. Conclusions

Controlling for individual bank effects and for the endogeneity of bank efficiency and political economy variables in a large international panel of banks, we distinguish between the direct effect and the indirect effect of each political economy variable on market

structure in terms of the efficiency-structure hypothesis. Our results support the EFS hypothesis, as more efficient banks have, on average, larger national market share and higher market concentration.

The ability of the EFS hypothesis to explain market structure varies across countries with the characteristics of bank regulation, supervision, and institutional infrastructure. For example, bank efficiency has a more positive influence on market share and market concentration as a country has increased private monitoring and a better-quality contracting environment. Higher barriers to entry and more generous deposit insurance in a country, however, mitigate the positive influence of bank efficiency on market share and market concentration. There is no clear evidence with respect to the effect of bank activity restrictions and official supervisory power on the EFS hypothesis.

Political economy variables have a further direct effect on market structure. After controlling for bank efficiency, we find higher bank market concentration is associated with stricter bank entry restrictions, more generous deposit insurance, less private and official monitoring, and a stronger legal environment.

These results have potential implications for regulatory policy. They suggest that antitrust enforcement is not equally beneficial in every country. It may actually reduce efficiency in a country where there is greater private supervision and a stronger contracting environment, while it could improve efficiency in countries with less efficient regulatory environments and more generous deposit insurance. The analysis also supports the endogeneity of bank market structure, suggesting that coefficients estimated without controlling for endogeneity are likely to be biased.

---

[1] See Levine (2006) for a review of the evidence demonstrating that well-functioning banks promote growth. Cetorelli and Strahan (2006) provide recent evidence that competition and structure in local US markets also affect market structure in non-financial sectors.

[2] See Barth et al. (2004), Beck et al. (2006), and Demirgüc-Kunt et al. (2004).

[3] See Berger et al. (2004) for a review of the literature on the relation between bank market concentration and bank performance.

[4] Our analysis period avoids potential biases associated with the anticipation of changes in regulation and supervision resulting from proposed of the Basel II Capital Accord in 2001.

[5] DEA is frequently used to estimate efficiency in a variety of industries and national markets. DEA is appropriate here because it does not require knowledge of the specific functional form of the frontier or error and inefficiency structures (Wheelock and Wilson, 1999). While stochastic parametric models require a large sample size for reliable estimates, DEA works well with small samples, which is useful in our case as some countries in the sample have only a small number of banks.

[6] Demirgüc-Kunt et al. (2004) and Beck et al. (2006) use this index for similar purposes.

[7] The natural alternative specification of fixed effects is not feasible in our framework, given that the regulatory and supervisory variables are time-invariant. La Porta et al. (2000) use a random effects specification with the same type of database and legal origin variables.

[8] The coefficient of correlation of NOBS with bank efficiency is -0.6161, and its coefficients of correlation with market concentration and market share are -0.3704 and -0.2476, respectively. We also check that results do not change when other instruments such as the number of banks or the natural logarithm of the country's population are used.

[9] As the EFS hypothesis assumes that more efficient banks add to their market share at the expense of their less efficient counterparts, we prefer the output orientation. The use of VRTS is justified because it represents a measure of X-efficiency, analyzed primarily in parametric models.

5. References

Baltagi, Badi H. (2001) *Econometric analysis of panel data*. New York, John Wiley and Sons.

Barth, James R., Gerad Caprio, and Ross Levine. (2004) "Bank regulation and supervision: What works best?" *Journal of Financial Intermediation*, 13, 205-248.

Beck, Thorsten, Asli Demirgüc-Kunt, and Ross Levine. (2006) "Bank concentration, competition, and crisis: First results." *Journal of Banking and Finance*, 30, 1581-1603.

Berger, Allen N. (1995) "The profit-structure relationship in banking - Test of market-power and efficient-structure hypotheses." *Journal of Money, Credit, and Banking,* 27, 405-431.

Berger, Allen N., Asli Demirgüc-Kunt, Ross Levine, and Joseph G. Haubrich. (2004) "Bank concentration and competition: An evolution in the making." *Journal of Money, Credit, and Banking*, 36, 433-453.

Berger, Allen N., and Timothy H. Hannan. (1997) "Using efficiency measures to distinguish among alternative explanations of the structure-performance relationship in banking." *Managerial Finance*, 23, 6-31.

Berger, Allen N., and Loretta J. Mester. (1997) "Inside the black box: What explains differences in the efficiencies of financial institutions." *Journal of Banking and Finance*, 21, 895-947.

Cetorelli, Nicola, and Philip E. Strahan. (2006) "Finance as barrier to entry: Bank competition and industry structure in local US markets." *Journal of Finance*, 51, 437-461.

Claessens, Stijn, and Luc Laeven. (2004) "What drives bank competition? Some international evidence." *Journal of Money, Credit, and Banking*, 36, 585-592.

Demirgüc-Kunt, Asli, and Enrica Detragiache. (2002) "Does deposit insurance increase banking system stability? An empirical investigation." *Journal of Monetary Economics*, 49, 1373-1406.

Demirgüc-Kunt, Asli, Luc Laeven, and Ross Levine. (2004) "Regulations, market structure, institutions, and the cost of financial intermediation." *Journal of Money, Credit, and Banking*, 36, 593-622.

DeYoung, Robert, and Daniel E. Nolle. (1998) "Foreign-owned banks in the US: Earning market share or buying it?" *Journal of Money, Credit, and Banking*, 28, 622-636.

Fare, R., S. Grosskopf, M. Norris, and Z. Zhang. (1994) "Productivity growth, technical progress, and efficiency change in industrialized countries." *American Economic Review*, 84, 66-83.

Goldberg, Lawrence G., and Anoop Rai. (1996) "The structure-performance relationship for European banking." *Journal of Banking and Finance*, 20, 745-771.

Hovakimian, Armen, Edward J. Kane, and Luc Laeven. (2003) "How country and safety-net characteristics affect bank risk-shifting." *Journal of Financial Services Research*, 23, 177-204.

Jayaratne, Jith, and Philip E. Strahan. (1998) "Entry restrictions, industry evolution, and dynamic efficiency: Evidence from commercial banking." *Journal of Law and Economics*, 41, 239-273.

Kaufman, Daniel, Aart Kraay, and Pablo Zoido-Lobaton. (2001) "Governance matters II: Update indicators for 2000/01." Mimeo, World Bank.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny. (1997) "Legal determinants of external finance." *Journal of Finance*, 52, 1131-1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny. (1998) "Law and finance." *Journal of Political Economy*, 106, 1113-1155.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny. (2000) "Agency problems and dividend policies around the world." *Journal of Finance*, 55, 1-33.

Leightner, Jonathan E., and Knox Lovell. (1998) "The impact of financial liberalization on the performance of Thai banks." *Journal of Economics and Business*, 50, 115-131.

Levine, Ross. (2006) "Finance and growth: Theory, evidence, and mechanisms." In *Handbook of Economic Growth*. Eds. Philippe Aghion and Steven N. Durlauf, Amsterdam: North-Holland Elsevier Publishers, pp. 865-934.

Levine, Ross, Norman Loayza, and Thorsten Beck. (2003) "Financial intermediation and growth: Causality and causes." *Journal of Monetary Economics*, 46, 31-77.

Smirlock, Michael. (1985) "Evidence on the (non) relationship between concentration and profitability in banking." *Journal of Money, Credit, and Banking*, 17, 69-83.

Wheelock, David C., and Paul W. Wilson. (1999) "Technical progress, inefficiency, and productivity change in US banking, 1984-1993." *Journal of Money, Credit, and Banking*, 31, 212-234.

Zhang, Yun, and Robert Bartels. (1998) "The effect of sample size on the mean efficiency in DEA with an application to electricity distribution in Australia, Sweden and New Zealand." *Journal of Productivity Analysis*, 9, 187-204.

Table 1

Descriptive statistics of market structure and bank efficiency

Mean per country values. CONC is the fraction of assets held by the three largest commercial banks in each country; MS is the bank market share in the national market. Efficiency is estimated per country over the 1996-2002 period using DEA and following both the input and the output orientation and imposing both constant (CRTS) and variable (VRTS) returns to scale. The inputs considered are: (1) personnel expenses, (2) the book value of fixed assets and (3) loanable funds. The outputs used are: (1) total loans and (2) non-interest income.

Country	# of observations	Market structure		Bank efficiency			
		CONC	MS	Input orientation		Output orientation	
				CRTS	VRTS	CRTS	VRTS
Argentina	385	0.4484	0.0178	0.4223	0.7172	0.4223	0.5840
Australia	151	0.6264	0.03953	0.1581	0.6117	0.1645	0.6814
Austria	167	0.7812	0.0279	0.3189	0.4447	0.3189	0.4221
Bangladesh	150	0.5878	0.0434	0.5553	0.6763	0.5553	0.6781
Bolivia	88	0.5651	0.0766	0.8217	0.9075	0.8217	0.9147
Brazil	131	0.4536	0.0124	0.4498	0.6631	0.44.78	0.6751
Chile	107	0.6033	0.0617	0.7206	0.8610	0.7206	0.8534
China-People's Rep.	43	0.7313	0.0326	0.6402	0.9465	0.6402	0.6892
Colombia	173	0.3757	0.0380	0.4380	0.5791	0.4380	0.6399
Croatia	194	0.0354	0.6863	0.3415	0.5223	0.3415	0.5688
Cyprus	33	0.8777	0.0707	0.7813	0.8144	0.7813	0.8229
Czech Republic	10	0.8250	0.0213	0.8802	0.8945	0.8802	0.8883
Denmark	354	0.8217	0.0192	0.2716	0.4410	0.2716	0.3596
Ecuador	79	0.6070	0.0352	0.7540	0.8344	0.7540	0.8408
El Salvador	41	0.7851	0.1071	0.4448	0.7474	0.4448	0.7970
Finland	36	0.9818	0.1634	0.7097	0.8312	0.7097	0.8224
France	656	0.5081	0.0073	0.2815	0.4159	0.2815	0.4289
Germany	329	0.6347	0.0070	0.5313	0.6009	0.5313	0.5860
Ghana	59	0.7656	0.1105	0.5799	0.6963	0.5799	0.6653
Greece	64	0.7214	0.0420	0.7793	0.8346	0.7793	0.8308
Guatemala	207	0.3547	0.0335	0.6114	0.9960	0.6114	0.6191
Hong Kong	207	0.7452	0.0334	0.4799	0.7098	0.4799	0.7384
Hungary	67	0.6283	0.0624	0.5858	0.7865	0.5858	0.7469
Iceland	16	0.9922	0.2877	0.8497	0.9353	0.8497	0.8220
India	351	0.3433	0.0187	0.3773	0.6034	0.3773	0.6432
Indonesia	302	0.5324	0.0195	0.3024	0.3983	0.3024	0.4225
Ireland	41	0.7204	0.0210	0.6958	0.7942	0.6958	0.8161
Israel	88	0.7591	0.0794	0.7853	0.9032	0.7853	0.9124
Italy	612	0.5000	0.0111	0.2345	0.3873	0.2345	0.3994
Jamaica	39	0.9091	0.1765	0.5610	0.7721	0.5610	0.7771
Japan	20	0.5850	0.0222	0.9332	0.9774	0.9332	0.9633
Jordan	34	0.8941	0.2059	0.5416	0.7772	0.5416	0.8430
Kenya	196	0.5737	0.0344	0.6086	0.7348	0.6086	0.6622
Korea Rep.	124	0.4537	0.0513	0.5975	0.7897	0.5975	0.6959
Lithuania	54	0.8981	0.1239	0.7721	0.8507	0.7721	0.8458
Luxembourg	386	0.2524	0.0122	0.3653	0.4479	0.3653	0.4204
Malaysia	204	0.4594	0.0334	0.6568	0.7727	0.6568	0.7773
Mauritius	36	0.8769	0.1599	0.6486	0.8562	0.6486	0.7657

Mexico	167	0.6333	0.0389	0.6933	0.8655	0.6933	0.7595
Morocco	34	0.5579	0.1217	0.8905	0.9537	0.8905	0.9595
Namibia	21	0.9285	0.2711	0.8835	0.9387	0.8835	0.9525
Netherlands	90	0.8274	0.0503	0.5393	0.7209	0.5393	0.7051
Nigeria	59	0.4421	0.0211	0.7021	0.7608	0.7021	0.7709
Norway	68	0.9109	0.1027	0.8324	0.9144	0.8324	0.9182
Oman	42	0.8491	0.1653	0.8560	0.8841	0.8560	0.8889
Pakistan	136	0.6896	0.0513	0.7177	0.7995	0.7177	0.7961
Panama	147	0.3780	0.0275	0.5612	0.7634	0.5612	0.6628
Paraguay	121	0.5100	0.0569	0.6559	0.7634	0.6559	0.7404
Peru	115	0.6980	0.0517	0.7502	0.8482	0.7502	0.8531
Philippines	159	0.4628	0.0414	0.6822	0.8017	0.6822	0.8156
Poland	208	0.5800	0.0324	0.5400	0.7186	0.5400	0.7117
Portugal	121	0.7975	0.0550	0.5397	0.6591	0.5397	0.6534
Romania	57	0.7605	0.0499	0.6755	0.8358	0.6755	0.8027
Saudi Arabia	39	0.5853	0.1795	0.7599	0.8670	0.7599	0.8750
Singapore	72	0.9153	0.0816	0.7099	0.9094	0.7099	0.9085
Slovakia	84	0.7270	0.0758	0.6432	0.7548	0.6432	0.7410
Slovenia	86	0.6637	0.0790	0.7219	0.9212	0.7219	0.9030
South Africa	71	0.8151	0.0918	0.4587	0.8394	0.4587	0.7429
Spain	486	0.7960	0.0143	0.4394	0.5589	0.4394	0.5595
Sri Lanka	37	0.7879	0.1469	0.7819	0.8998	0.7819	0.9109
Sweden	19	0.9903	0.1561	0.8271	0.8833	0.8271	0.8885
Switzerland	55	0.8578	0.0006	0.7968	0.9052	0.7968	0.9226
Thailand	66	0.0635	0.0965	0.5607	0.6929	0.5607	0.7032
Trinidad and Tobago	39	0.7668	0.1747	0.9168	0.9509	0.9167	0.9515
Tunisia	88	0.4984	0.0795	0.7756	0.8650	0.7756	0.8665
Turkey	53	0.5417	0.0575	0.6403	0.8232	0.6403	0.8413
UK	42	0.4178	0.0105	0.7799	0.8503	0.7799	0.8300
US	2391	0.3104	0.0028	0.0446	0.1096	0.0446	0.1919
Venezuela	135	0.5319	0.0412	0.6664	0.7378	0.6664	0.7357
Mean		0.5323	0.0312	0.4044	0.5415	0.4045	0.5426
Std. dev.		0.1970	0.0744	0.3095	0.3519	0.3095	0.3233
Minimum		0.2408	0.000006	0.0018	0.0066	0.0018	0.0024
Maximum		1	0.9334	1	1	1	1

Table 2
Descriptive statistics of political economy variables

CONC is the fraction of assets held by the three largest commercial banks in each country, MS is the bank market share in the country market, ENTRY measures the restrictiveness of entry into banking, RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business, INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise, HAZARD is an index of moral hazard measuring the generosity of deposit insurance, OFFICIAL measures official supervisory power, MONITOR measures market monitoring, KKZ is an indicator of the quality of institutional development, INFLATION is the annual change in the consumer price index, GROWTH is the growth rate of the total deposits, LN(GDP) is the natural logarithm of GDP.

	Forecasted influence on CONC and MS						
	Direct effect	Indirect Effect (EFS hypothesis)	Mean	Minimum	Maximum	Std. Deviation	# of observations
ENTRY	+	-	7.3498	3	8	0.9591	11,542
RESTRICT		-	9.6691	5	14	2.3272	11,542
INS			0.7941	0	1	0.4044	11,542
HAZARD			5.3928	1	8	1.6163	9,177
OFFICIAL			11.4750	3	14	2.7086	11,542
MONITOR			7.1537	3	9	1.3428	11,542
KKZ		+	4.0919	-7.20	11.91	4.8305	11,542
INFLATION			5.4319	-3.9758	75	8.7643	11,542
GROWTHD			10.5130	-18.0938	102.5705	12.3416	11,542
LN (GDP)			12.5820	7.6724	16.0441	2.4048	11,542

Table 3
Correlations

	MS	CONC	EFF-IN $_{CRTS}$	EFF-IN $_{VRTS}$	EFF-OUT $_{CRTS}$	EFF-OUT $_{VRTS}$	ENTRY	RESTRICT	INS	HAZARD	OFFICIAL	MONITOR	KKZ	INFLATION	GROWTHD
CONC	0.275***														
EFF-IN $_{CRTS}$	0.234***	0.445***													
EFF-IN $_{VRTS}$	0.349***	0.435***	0.848***												
EFF-OUT $_{CRTS}$	0.233***	0.446***	0.999***	0.848***											
EFF-OUT $_{VRTS}$	0.397***	0.414***	0.839***	0.910***	0.838***										
ENTRY	-0.065***	-0.157***	-0.246***	-0.271***	-0.246***	-0.237***									
RESTRICT	0.063***	-0.225***	-0.087***	-0.087***	-0.087***	-0.052***	0.071***								
INS	-0.190***	-0.185***	-0.271***	-0.312***	-0.271***	-0.279***	0.215***	-0.253***							
HAZARD	-0.007	-0.161***	-0.246***	-0.250***	-0.246***	-0.201***	0.362***	0.538***	-0.014						
OFFICIAL	-0.075***	-0.370***	-0.157***	-0.226***	-0.157***	-0.174***	0.332***	0.264***	0.060***	0.271***					
MONITOR	-0.009	-0.126***	-0.196***	-0.186***	-0.196***	-0.128***	0.313***	0.078***	-0.096***	0.143***	0.292***				
KKZ	-0.166***	-0.131***	-0.418***	-0.441***	-0.418***	-0.388***	0.130***	-0.317***	0.366***	-0.015	0.032***	0.289***			
INFLATION	0.071***	0.120***	0.214***	0.206***	0.214***	0.181***	-0.021***	0.229***	-0.109***	0.157***	0.045***	-0.143***	-0.430***		
GROWTHD	0.089***	0.169***	0.293***	0.305***	0.293***	0.272***	-0.137***	0.025***	-0.170***	-0.059***	-0.021**	-0.121***	-0.365***	0.472***	
LN (GDP)	-0.302***	-0.408***	-0.607***	-0.600***	-0.606***	-0.533***	0.183***	0.022**	0.444***	0.350***	0.061***	0.168***	0.646***	-0.223***	-0.366***

*** Significant at 1 % level. ** Significant at 5 % level. * Significant at 10 % level.

Table 4
Determinants of bank market structure

Results of the two-stage least squares random effect estimator provided by Baltagi (2001), using the number of observations in each country as the instrument for bank efficiency. The dependent variable is market concentration (CONC) in Panel A and market share (MS) in Panel B. EFF^{IV} is the instrumented measure of bank efficiency. ENTRY measures the restrictiveness of entry into banking. RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise HAZARD is an index of moral hazard measuring the generosity of deposit insurance. OFFICIAL measures official supervisory power. MONITOR measures market monitoring. KKZ is an indicator of the quality of institutional development. We control for the potential endogeneity of the aforementioned political economy variables using as instruments four legal origin dummy variables, the latitudinal distance from the equator and four religious dummy variables. The superindex IV indicates that the variable is being instrumented. INFLATION is the annual change in the consumer price index. GROWTHD is the growth rate of total deposits. LN (GDP) is the natural logarithm of GDP. Year dummy variables are included for all estimations, but are not reported. T-statistics are shown in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

	Expected sign							
			Panel A. Dependent variable: Market Concentration			Panel B. Dependent variable: Market Share		
	Direct effect	Indirect effect	(1)	(2)	(3)	(4)	(5)	(6)
EFF^{IV}			0.9005*** (33.17)	0.8464*** (32.40)	0.9610*** (32.01)	0.0635*** (5.60)	0.0535*** (4.80)	0.0601*** (5.30)
$ENTRY^{IV}$	+	-	0.0940*** (8.50)	0.1441*** (11.66)	0.2826*** (17.82)	-0.0055 (-1.27)	0.0009 (0.17)	0.0114* (1.91)
$RESTRICT^{IV}$		-	-0.0308*** (-7.21)	-0.0956 (-0.98)	-0.0019 (-0.30)	0.0108*** (6.63)	0.0145*** (6.77)	0.0183*** (7.93)
INS^{IV}			-0.0460 (-1.49)	0.0176 (0.51)	-0.4324** (-9.55)	0.0572*** (5.16)	0.0683*** (5.75)	0.0449*** (3.47)
$OFFICIAL^{IV}$				-0.0277*** (-8.71)	-0.0377*** (-10.55)		-0.0023 (-1.59)	-0.0037** (-2.45)
$MONITOR^{IV}$				-0.0269*** (-2.76)	-0.0878*** (-7.76)		-0.0100** (-2.39)	-0.0199*** (-4.24)
KKZ^{IV}		+			0.0364*** (18.26)			0.0035** (4.71)
INFLATION			0.0004 (1.59)	0.0004 (1.49)	0.0012*** (3.94)	0.0003*** (5.91)	0.0004*** (6.24)	0.0003*** (6.25)
GROWTHD			-0.0674*** (-3.82)	-0.0631*** (-3.68)	-0.0547*** (-3.04)	-0.0042** (-1.97)	-0.0034* (-1.66)	-0.0041** (-1.96)
LN (GDP)			0.0264*** (11.78)	0.0211*** (10.03)	0.0159*** (6.84)	-0.0055*** (-6.31)	-0.0059*** (-6.95)	-0.0070*** (-7.98)
Time Dummies			Yes	Yes	Yes	Yes	Yes	Yes
R^2 overall			0.1354	0.1500	0.1604	0.1879	0.1878	0.1973
Wald χ^2			1944.40***	2241.43***	2081.20***	491.81***	510.73***	524.93***
# observations			11542	11542	11542	11542	11542	11542
# banks			2622	2622	2622	2622	2622	2622

Table 5. Market concentration and the EFS hypothesis

Results of the two-stage least squares random effect estimator provided by Baltagi (2001), using the number of observations in each country as the instrument for bank efficiency. The dependent variable is market concentration (CONC) measured as the fraction of assets held by the three largest commercial banks in each country. EFF^{IV} is the instrumented measure of bank efficiency. ENTRY measures the restrictiveness of entry into banking. RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise HAZARD is an index of moral hazard measuring the generosity of deposit insurance. OFFICIAL measures official supervisory power. MONITOR measures market monitoring. KKZ is an indicator of the quality of institutional development. We control for the potential endogeneity of the aforementioned political economy variables using as instruments four legal origin dummy variables, the latitudinal distance from the equator and four religious dummy variables. The superindex IV indicates that the variable is being instrumented. INFLATION is the annual change in the consumer price index. GROWTHD is the growth rate of total deposits. LN (GDP) is the natural logarithm of GDP. Year dummy variables are included for all estimations, but are not reported. T-statistics are shown in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

		Dependent variable: Market Concentration					
	Expected sign	(1)	(2)	(3)	(4)	(5)	(6)
EFF^{IV}		0.7238**	0.9508***	1.2679***	0.9301***	0.4255***	0.8531***
		(2.34)	(11.99)	(29.19)	(3.37)	(6.24)	(16.01)
EFF^{IV}x $ENTRY^{IV}$	-	0.0331					
		(0.78)					
EFF^{IV}x $RESTRICT^{IV}$	-		0.0015				
			(0.16)				
EFF^{IV}x INS^{IV}				-0.3308***			
				(-9.33)			
EFF^{IV}x $OFFICIAL^{IV}$					0.0068		
					(0.22)		
EFF^{IV}x $MONITOR^{IV}$						0.0684***	
						(9.05)	
EFF^{IV}x KKZ^{IV}	+						0.0214***
							(4.12)
$ENTRY^{IV}$	+	0.2548**	0.2808***	0.3351***	0.2863***	0.2703***	0.2423***
		(6.22)	(10.16)	(19.43)	(5.34)	(16.00)	(9.20)
$RESTRICT^{IV}$		-0.0046	-0.0084	-0.0376***	-0.0145	0.0114	0.0051
		(-0.40)	(-0.76)	(-4.95)	(-0.68)	(1.64)	(0.50)
INS^{IV}		-0.4536***	-0.4701***	-0.4641***	-0.5280***	-0.3470***	-0.3531***
		(-6.29)	(-6.74)	(-9.80)	(-5.16)	(-7.12)	(-5.00)
$OFFICIAL^{IV}$		-0.0351***	-0.0358***	-0.0386***	-0.0375*	-0.0377***	-0.0280***
		(-5.61)	(-6.08)	(-10.38)	(-1.90)	(-9.86)	(-4.57)
$MONITOR^{IV}$		-0.0783***	-0.0801***	-0.0733***	-0.0689	-0.1371***	-0.0746***
		(-3.98)	(-4.40)	(-6.19)	(-1.51)	(-10.23)	(-4.05)
KKZ^{IV}		0.0367***	0.0360***	0.0341***	0.0369***	0.0361***	0.0245***
		(10.49)	(10.58)	(16.22)	(4.95)	(17.03)	(5.90)
INFLATION		0.0009***	0.0009***	0.0021***	0.0007**	0.0019***	0.0017***
		(2.84)	(2.91)	(6.47)	(2.17)	(6.36)	(4.85)
GROWTHD		-0.0449***	-0.0441***	-0.0372*	-0.0004**	-0.0529***	-0.0726***
		(-3.09)	(-3.03)	(-1.89)	(-2.43)	(-3.27)	(-4.60)
LN (GDP)		0.0175***	0.0179***	0.0309***	0.0226***	0.0138***	0.0119***
		(4.48)	(4.74)	(10.85)	(2.62)	(5.55)	(3.06)
Time Dummies		Yes	Yes	Yes	Yes	Yes	Yes
R^2 overall		0.1549	0.1570	0.1533	0.1436	0.1746	0.1765
Wald χ^2		791.33***	895.21***	2079.15***	308.79***	1951.90***	902.02***
# observations		11542	11542	11542	11542	11542	11542
# banks		2622	2622	2622	2622	2622	2622

Table 6. Market share and the EFS hypothesis

Results of the two-stage least squares random effect estimator provided by Baltagi (2001), using the number of observations in each country as the instrument for bank efficiency. The dependent variable is bank market share (MS). EFF^{IV} is the instrumented measure of bank efficiency. ENTRY measures the restrictiveness of entry into banking. RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise HAZARD is an index of moral hazard measuring the generosity of deposit insurance. OFFICIAL measures official supervisory power. MONITOR measures market monitoring. KKZ is an indicator of the quality of institutional development. We control for the potential endogeneity of the aforementioned political economy variables using as instruments four legal origin dummy variables, the latitudinal distance from the equator and four religious dummy variables. The superindex IV indicates that the variable is being instrumented. INFLATION is the annual change in the consumer price index. GROWTHD is the growth rate of total deposits. LN (GDP) is the natural logarithm of GDP. Year dummy variables are included for all estimations, but are not reported. T-statistics are shown in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

	Expected sign	Dependent variable: Market Share					
		(1)	(2)	(3)	(4)	(5)	(6)
EFF^{IV}		0.2031*** (3.42)	0.0442** (2.52)	0.1122*** (7.09)	0.0865* (1.95)	0.0032 (0.17)	0.0588*** (5.19)
EFF^{IV}x $ENTRY^{IV}$	-	-0.0110* (-2.44)					
EFF^{IV}x $RESTRICT^{IV}$	-		0.0023 (1.14)				
EFF^{IV}x INS^{IV}				-0.0617*** (-4.72)			
EFF^{IV}x $OFFICIAL^{IV}$					-0.0025 (-0.51)		
EFF^{IV}x $MONITOR^{IV}$						0.073*** (3.47)	
EFF^{IV}x KKZ^{IV}	+						0.0003 (0.33)
$ENTRY^{IV}$	+	0.0266*** (3.38)	0.0147** (2.48)	0.0194*** (3.05)	0.0121 (1.39)	0.0108** (2.40)	0.0110* (1.95)
$RESTRICT^{IV}$		0.0161*** (0.16)	0.0171*** (7.31)	0.0126*** (4.71)	0.0171*** (4.92)	0.0200*** (10.95)	0.0187*** (8.62)
INS^{IV}		0.0318** (2.43)	0.0387*** (2.89)	0.0456*** (3.43)	0.0438*** (2.88)	0.0530*** (4.54)	0.0469*** (3.33)
$OFFICIAL^{IV}$		-0.0040*** (-3.32)	-0.0041** (-3.05)	-0.0041*** (-2.62)	-0.0022 (-0.71)	-0.0040*** (-3.71)	-0.0036*** (-2.73)
$MONITOR^{IV}$		-0.0205*** (-5.41)	-0.0197*** (4.84)	-0.0177*** (-3.66)	-0.0207*** (-2.83)	-0.0252* (-6.78)	-0.0198*** (-4.94)
KKZ^{IV}		0.0031*** (4.79)	0.0040*** (5.38)	0.0028*** (3.54)	0.0029** (2.51)	0.0036*** (6.38)	0.0034* (3.78)
INFLATION		0.0003*** (5.79)	0.0003*** (5.60)	0.0003*** (6.81)	0.0003*** (6.70)	0.0003*** (5.98)	0.0003*** (4.90)
GROWTHD		-0.0038* (-1.71)	-0.0049** (-2.23)	-0.0065*** (-2.93)	-0.0033 (-1.22)	-0.0051** (-2.23)	-0.0049* (-1.92)
LN (GDP)		-0.0070*** (-9.41)	-0.0069*** (-8.57)	-0.0048*** (-4.80)	-0.0063*** (-4.78)	-0.0076*** (-11.42)	-0.0073*** (-8.90)
Time Dummies		Yes	Yes	Yes	Yes	Yes	Yes
R^2 overall		0.1614	0.1997	0.1720	0.2039	0.1938	0.1976
Wald χ^2		690.77***	620.19***	520.28***	377.32***	817.48***	637.43***
# observations		11542	11542	11542	11542	11542	11542
# banks		2622	2622	2622	2622	2622	2622