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Do legal and institutional environments matter for banking system performance?

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ABSTRACT

Using data on 52 countries' banking systems from 2005 to 2014, we explore how the legal and institutional environment influences banking system performance. Using panel data and controlling for financial and economic development indicators, we find evidence of several relationships related to banking system performance. First, a higher degree of legal protection for both lenders and borrowers positively affects banking system performance. Second, there is a positive relationship between the degree of law enforcement and banking system performance. Third, better regulatory quality positively affects banking system performance. Fourth, neither the degree of information sharing nor the control of corruption has a significant effect on banking sector performance. Finally, we find no significant differences in banking sector performance by type of economy.

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1. Introduction

As a result of the global financial crisis and the Eurozone sovereign debt crisis, international organisations such as the Basel Committee, the World Bank and the International Monetary Fund have promoted reform programmes encompassing revised regulatory frameworks. Doing Business provides enlightening data on the reforms implemented between 2005 and 2018.¹ The 186 economies covered by Doing Business implemented 462 reforms in areas related to obtaining credit (i.e., the degree of legal protection and information sharing),² 265 reforms related to the degree of law enforcement and/or contracts, 221 reforms designed to improve dealing with insolvency, and 213 reforms aimed at strengthening the legal protection of minority investors. However, there is little consensus regarding how specific regulations as well as legal and institutional aspects might influence bank performance.³

Based on the consequences of the recent financial turmoil, we hypothesise that any negative impact on banking system performance may be moderated by institutional

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factors. Thus, a clear legal framework, an efficient judicial system, a solid macroeconomic equilibrium and adequate supervision can attenuate the effect of channels of contagion in financial crisis events (Anginer, Cerutti, & Peria, 2017; Dungey & Gajurel, 2015). They can also improve investor confidence about information quality in capital markets (Baginski, Hassell, & Kimbrough, 2002) and increase value creation in several investment opportunities and dimensions (Aragon-Mendoza, del Val, & Roig-Dobón, 2016; Barba-Sánchez & Atienza-Sahuquillo, 2017; Durnev & Kim, 2005; Ribeiro Soriano, Roig Dobón, & Tansky, 2010). In light of this, the effect of economic fluctuations on financial systems depends to a great extent on the structural characteristics of each economy. Aspects such as the size of the capital market, the concentration of the banking industry as well as the legal and institutional system shed light on the differences observed in different countries (Anginer, Demirgüç-Kunt, Huizinga, & Ma, 2018; De la Torre, Ize, & Schmukler, 2012).

Using a sample of 52 countries for the period 2005–2014, our results show that a greater degree of legal protection and law enforcement are directly related to superior banking sector performance. However, our results suggest a substitution pattern between these variables. As regards the institutional framework, better regulatory quality positively affects banking industry performance. Additionally, our results show that a greater degree of information sharing and better control of corruption does not influence banking industry performance.

Our work contributes to the literature in three ways. First, we examine what role legal protection, law enforcement and information sharing play in banking industry performance as a whole. Second, the indicators used for the legal and institutional environment are taken from sources such as Doing Business and World Governance Indicators, which differ in several aspects from the measurements employed in previous studies.⁴ Third, besides using a more recent sample, our industry-wide approach complements previous banking performance studies carried out at the individual bank level and provides new evidence regarding the macro and industry determinants of banking system performance. Specifically, we contribute to the literature by pointing out the outstanding and unique role of legal protection, law enforcement and their impact on banking system performance. Previous studies exploring the impact of legal environment mainly focus on bank-specific aspects (Ben Naceur & Omran, 2011; Demirgüç-Kunt, Laeven, & Levine, 2004; Demirgüç-Kunt & Huizinga, 1999; Perera, Skully, & Chaudhry, 2013), whereas we use a wider dataset, which enriches the discussion concerning how regulatory quality and enforcement provide confidence to savers and investors and improve corporate governance practices in the banking industry (Djankov, Hart, McLiesh, & Shleifer, 2008).

In addition, our paper has certain implications for policymakers and market participants alike, and which relate to understanding the ramifications of the legal and institutional frameworks as well as other macroeconomic and industry features linked to banking system performance.

The rest of the paper is organised as follows. Section 2 discusses the literature review and formulates the hypotheses. Section 3 presents the data and the methodology. Section 4 reports and discusses the results. In the last section, we conclude the study.

2. Literature review and hypotheses

We analyse the relationship between institutional features and banking system performance from a law and finance perspective, and provide new evidence about banking sector performance drivers. In an effort to put our study and main hypotheses into perspective, we review earlier studies in these two areas which lay the foundations for our paper.

2.1. Legal environment

The literature suggests that the soundness of legal environments may matter for banking performance. Besides the strength of legal rights, we consider the rule of law to be equally important as part of an efficient legal system.

The differences between the legal protections offered to investors and to creditors are important in understanding why company financing structures differ across countries. Law and finance literature has evidenced the importance of the link between the legal system, investor protection and capital market development (Djankov, McLiesh, & Shleifer, 2007; La Porta, López-de-Silanes, Shleifer, & Vishny, 1998, 1999; Levine, 1998, 1999), and shows a positive influence where the main role of a stronger legal framework is to empower borrowers when fulfilling their contracts. This reduces the cost of external financing, the main mechanism through which an adequate legal framework favours financial development.

Creditors' legal rights are more complex than those of investors. First, there may be multiple creditors with different interests, such that protecting the rights of certain creditors might harm the rights of others. Second, two mechanisms can be implemented when borrowers face a company's bankruptcy: company liquidation and reorganisation. Clearly, effective legal enforcement is required to implement these rights. Along these lines, La Porta et al. (1998) construct an index of creditor legal protection, which is the most widely used in law and finance literature to measure creditors' guarantees in the event of company bankruptcy. A higher value of the index reflects greater creditor legal protection. In addition, La Porta, Lopez-De-Silanes, and Shleifer (2006) examine the effects of law enforcement on stock market development in 49 countries, devising a set of useful measures to gauge the effective legal rights of minority shareholders, which is commonly used as a proxy variable for the strength of legal frameworks. Djankov et al. (2007) extend the dataset of creditors' legal protection by including annual data from 129 countries over the period 1978–2003.

Based on the measures of creditors' legal protection proposed by La Porta et al. (1998), Levine (1998) argues that a stronger legal system is positively related to private credit over GDP ratio. Using a sample of 129 countries between 1978 and 2003, Djankov et al. (2007) provide evidence of a positive relationship between private credit over GDP and creditors' legal rights, and the degree of information sharing. They also find that the effect of a strong legal system is more important in countries with higher levels of income.

Acemoglu and Johnson (2005), however, argue that rules and regulations which increase control over transactions between private individuals (borrowers and lenders) have no effect on private credit over GDP. In contrast, Acharya, Amihud, and Litov (2011) and Vig (2013), show a negative relationship between legal protection for

creditors and the level of corporate debt, which contradicts the arguments related to the positive effect of investor protection on the volume of bank credit.

Haselmann, Pistor, and Vig (2010) analyse how exogenous shocks, such as regulatory changes in creditor law, affect the credit offering from banks. Their results show a positive influence of regulatory changes on credit offering, but indicate that when changes in the law are related to collaterals this positive effect is stronger.

In contrast to most papers that employ the La Porta et al. (1998) Index, updated by Djankov et al. (2007), our measure to capture the strength of legal rights is an index that reflects the degree to which collateral and bankruptcy laws protect the rights of both borrowers and lenders. In the case of borrowers' legal rights, a reduction can be seen in information asymmetry and moral hazard which will benefit banking system performance (Marthur & Marcelin, 2015). Corporate borrowers would be more reluctant to engage in risk-taking activities (Acharya et al., 2011) and in increasing their leverage (Vig, 2013) when creditor rights are strong. In turn, this could have a positive effect on banking system performance because of lower loan default levels. However, these potential beneficial effects assume a fixed set of borrowers. The literature suggests that stronger creditor rights increase bank lending (Djankov et al., 2007). If this increase in lending facilitates access to credit to a wider set of borrowers who are less creditworthy, bank performance might suffer if higher loan default rates exceed collateral recovery rates (Houston, Lin, Lin, & Ma, 2010). Therefore, and to the best of our knowledge, the influence of the strength of both borrowers and lenders' legal rights on banking system performance has not been explored at length in the literature. This leads us to develop and test the following hypotheses:

H1a: A greater degree of legal protection for borrowers and lenders positively influences banking system performance.

H1b: A greater degree of legal protection for borrowers and lenders negatively influences banking system performance.

The literature has also highlighted the importance of the quality of legal systems (usually measured by legal enforcement). In this sense, some studies examine the relative importance between creditors' rights and the degree of enforcement on the volume of credit provided by the banking sector. For instance, Qian and Strahan (2007) argue that it is creditors' rights and not the degree of legal enforcement that would explain the volume of bank credit. Bae and Goyal (2009) suggest that legal enforcement, and not the mere existence of a set of laws, is the key aspect affecting the volume of bank credit.

Demirgüç-Kunt and Huizinga (1999) analyse a sample of 80 developed and developing countries and find that better enforcement of contracts and the legal system are related to less corruption, which is negatively associated with banking system performance. Demirgüç-Kunt et al. (2004) explore the influence of institutions, bank regulation and market structure on bank-level net interest margins and overhead costs for an international sample of 1,400 banks. They find that tighter regulations which curb banking institution freedom to conduct their business (restrictions on bank entry and activities) can help to improve banking system performance. They also find that bank regulations are rendered insignificant when controlling for

institutional development indicators, and consequently argue that bank regulations cannot be analysed in isolation from the institutional framework.

However, other studies such as Leaven and Majnoni (2005) find opposite evidence. Their results suggest that better contract enforcement and a better judicial system play a key role in improving the net interest margins by reducing the cost of financial intermediation. Ben Naceur and Omran (2011) provide similar evidence by suggesting that the regulatory and institutional framework seem to have a positive influence on bank performance. Said authors find that corruption increases costs of intermediation whilst an improvement in law enforcement reduces financing costs. Nevertheless, few studies have actually addressed the possible effect of law enforcement on banking performance. This leads us to develop and test the following hypotheses:

H2a: A greater degree of law enforcement positively influences banking system performance.

H2b: A greater degree of law enforcement negatively influences banking system performance.

2.2. Institutional environment

We focus on the following institutional features: the degree of information sharing, regulatory quality, and the control of corruption. From a theoretical point of view, the degree of information sharing plays a fundamental role in reducing adverse selection, moral hazard and in disciplining borrowers. To help with this, information sharing offices have been set up by countries, and include: public credit registries and private credit bureaus.⁵

As regards adverse selection, Pagano and Jappelli (1993) develop a credit market model that analyses what role information sharing plays in lessening adverse selection. In this model, each bank holds private information about the credit quality of a certain group of borrowers. If banks were to share such information, informational asymmetries would be eliminated, thus allowing banks to improve the pool of selected borrowers, reduce default rates and increase the volume of credit provided by the banking sector. As a result, the model predicts that by reducing the earnings derived from private information, competition is increased in the credit market, thus generating an increase in the volume of credit provided by the banking industry as a whole. However, and in relation to this last point, the effect on the volume of lending is uncertain (Martin & Javalgi, 2018). On the one hand, the volume of credit provided by the banking sector may increase for one group of borrowers whose credit risk is low, yet on the other hand it may decrease for those with a higher credit risk, thus rendering the net effect uncertain.

From a moral hazard perspective, Padilla and Pagano (1997) develop a two-period model assuming imperfect competition and heterogeneity of borrowers in the banking industry, where the performance of each loan depends on the intrinsic characteristics of each borrower. Additionally, the model assumes that banks are able to establish long term relationships with specific borrowers, which allows them to maintain private information about them. In the initial period, and as a consequence of

this privileged position, banks can obtain informational rents by raising the interest rates charged to their clients. This increased rate of interest reduces borrower incentive to perform well for fear that the return from their efforts will be partially appropriated by the bank through higher interest rates charged in the future. In this way, borrowers tend to make little effort and act poorly in the initial period of the model. On the other hand, Brown, Jappelli, and Pagano (2009) find that information sharing improves the availability of credit at lower rates for firms.

Increased competition in the banking industry resulting from greater information sharing reduces bank profits in the second period, but not in the first when the banks still have private information (Alvarez & Jara, 2016). Consequently, a greater degree of information sharing reduces the market power of the banks and informational earnings, thus curbing interest rates, moral risk and default rates while increasing the volume of credit provided by the banking sector.

One final benefit derived from a greater degree of information sharing is that, because of the existence of a historical register of borrowers' financial behaviour that is accessible to the banking system as a whole, borrowers tend to fulfil payment of their financial commitments. Padilla and Pagano (2000) show that this imposes greater discipline on borrowers since being known as a defaulter would entail punishment from institutions, reflected in a higher interest rate or in simply being refused access to the financial system. In this way, borrowers strive to maintain a good credit image, thus reducing default rates and interest and increasing the credit granted by the banking sector.

In sum, the theory shows that a greater degree of information sharing reduces information asymmetries, moral hazard and default rates, and increases borrower incentive to honour repayment of their financial commitments. Several papers support this rationale, suggesting a positive impact of information sharing, for example, on increasing the volume of credit provided by banking institutions (Brown et al., 2009; Djankov et al., 2007), lowering the default rate (Jappelli & Pagano, 2002), decreasing the cost of credit (Brown et al., 2009), increasing corruption-related lending (Barth, Lin, Lin, & Song, 2009), influencing the level of constraint in financial access (Triki & Gajigo, 2014), impacting syndicated bank loans (Ivashina, 2009), influencing tax evasion (Beck, Lin, & Ma, 2014), and finally on how a greater degree of information sharing might actually contribute to triggering a banking crisis (Büyükkarabacak & Valev, 2010; Houston et al., 2010).

Additionally, when examining the interaction between the degree of information sharing and creditor legal protection with the level of bank credit, Djankov et al. (2007) provide evidence of a positive relationship. However, the authors find that the effect of a stronger legal system is more important in countries with higher income whereas information sharing proves relatively more important in poorer countries. The authors also suggest that a greater degree of information sharing could be a substitute for a stronger legal system in terms of encouraging a greater level of available bank credit. Nevertheless, evidence provided by Nana (2014) fails to show any pattern of substitution among the variables mentioned. Quite the opposite, the results illustrate that legal rights, the degree of enforcement and the degree of information sharing each have an independent effect on the ratio of private credit to GDP.

Empirical evidence suggests that a greater degree of credit information among lenders increases credit availability. By improving lenders' knowledge of borrower characteristics and by enhancing borrower incentives to repay, information sharing helps to price and reduce the risk of any given loan. To the best of our knowledge, the influence of the degree of information sharing on banking performance has not been explored at length in the literature. This leads us to set out and test the following hypothesis:

H3: A greater degree of information sharing has a negative impact on banking system performance.

We also include regulatory quality to reflect the strength of the institutional framework. Empirical cross-country studies have analysed the impact of regulatory and supervisory policies on banking performance, employing different measures of both performance and regulations (Barth, Caprio, & Levine, 2004, 2008, Barth, Lin, Ma, Seade, & Song, 2013; Ben Naceur & Omran, 2011; Delis, Molyneux, & Pasiouras, 2011; Demircuc-Kunt et al., 2008; Pasiouras, Gaganis, & Zopounidis, 2006, Pasiouras, Tanna, & Zopounidis, 2009). Despite the above literature, and because bank regulations and supervisory practices comprise a wide range of activities such as capital regulation, entry regulations, activities restrictions, supervisory power and independence, external governance and private sector-monitoring (Barth et al., 2013), the relationship between regulation and bank performance remains an empirical question (Psillaki & Mamatzakis, 2017).

Related literature (Barth et al., 2013; Mamatzakis, Kalyvas, & Piesse, 2013, 2017) has shed some light on the possible effect of credit, labour and business market regulations on bank performance. On the one hand, credit market regulations, which encourage competition and effective governance of financial institutions, exert a positive effect on banking performance (Barth et al., 2013). Conversely, regulations limiting the abilities of bank management economies of scale or scope would negatively affect banks' performance. On the other hand, stringent labour market regulations may lead to a loss in efficiency and productivity for firms (Scarpetta & Tressel, 2004), which in turn may trigger a loss in bank cost efficiency. Finally, business market regulations that discourage market competition and business activity as well as firms' investment decisions may affect bank performance through spillover effects (Klapper, Laeven, & Rajan, 2006).

Our measure of regulatory quality reflects government ability to formulate and implement sound policies and regulations to allow and promote private sector development (Kaufmann, Kray, & Mastruzzi, 2012). Considering the regulatory framework of the credit and labour market as well as the business sector as key features in promoting private sector development leads us to formulate the following hypothesis:

H4: A higher regulatory quality of banking systems may not significantly impact their performance.

Our final measure related to institutional framework features is the control of corruption, which reflects the extent to which public authorities exercise their power for private benefit. Despite the extensive body of literature that has examined both whether

and how corruption affects economic development, few studies have explored the role that corruption plays in the field of financial intermediation and banking. According to Chen, Nam Jeon, Wang, and Wu (2015), a higher level of corruption may hinder the increase of credit supply and with it the likelihood of borrower default by raising the cost of credit. On the other hand, firms with higher productivity and efficiency can offer higher bribes and, thus, may be more likely to receive more loans. The empirical evidence on the effect of corruption on financial performance is mixed. On the one hand, Dinc (2005) reports that state-owned banks significantly increase their lending in election years, suggesting that politicians may be using their power to influence bank credit for their own benefit. Similarly, Khwaja and Mian (2005) provide evidence that politically connected firms are able to obtain more loans from banks but end up with a higher default rate. Charumilind, Kali, and Wiwattanakantang (2006) report that politically connected firms can obtain better access to long-term bank loans and need less collateral. On the other hand, Detragiache, Gupta, and Tressel (2008) and Weill (2011) show that the lending growth rate diminishes amid an environment with more severe corruption. In a similar vein, Park (2012) shows that the rate of non-performing loans increases in countries that face higher corruption levels. More recently, Chen et al. (2015) find that higher levels of corruption increase banks' risk-taking. The authors also find evidence that the impact of monetary policy on banks' risk-taking behaviour is more pronounced when there is greater and more severe corruption. To the best of our knowledge, the influence of corruption on banking performance has not been explored directly by previous studies.

H5a: An institutional environment with a higher level and severity of corruption negatively affects banking system performance.

H5b: An institutional environment with a higher level and severity of corruption positively affects banking system performance.

3. Data and methodology

3.1. Data

Our data set comprises country-level information from several sources. First, information related to the characteristics of each country's financial system was obtained from the latest revised version of the Financial Development and Structure Dataset (Demirgüç-Kunt et al. 2018).⁶ Second, the macroeconomic statistics for each country were obtained from the information available in World Development Indicators from the World Bank. Third, information on the legal and institutional environment was obtained from both Doing Business and the Worldwide Governance Indicator.

Our final dataset is a panel data comprising 342 observations from 52 countries for the period 2005–2014, of which 31 countries belong to emerging economies and the remaining 21 countries to advanced economies.⁷ Data are limited to 2014 because of methodological changes in certain key variables provided by Doing Business.

Based on prior literature, we consider banking industry return on assets (ROA) as the dependent variable. The inclusion of ROA as a measure of performance is justified as this measure is a proxy for banks' ability to manage their assets in such a way

as to generate profits (Athanasoglou, Brissimis, & Delis, 2008; García-Meca, García-Sánchez, & Martínez-Ferrero, 2015; Liang, Xu, & Jiraporn, 2013; Goddard, McKillop, & Wilson, 2008). One advantage of ROA over other measures of performance, such as Net Interest Margin (NIM), is the fact that ROA considers incomes from activities other than the core banking business, i.e., it assumes that banks engage in activities such as securitisation, brokerage, insurance, and so on. In other words, two banks may exhibit different NIM because of cross-subsidisation of activities, which would not reflect better or worse performance.

As control variables, we have incorporated a collection of variables that are specific to the banking industry and the macroeconomic environment. As regards the first group of variables, we incorporate the variable 'BankConc' as a proxy for the degree of competition, which represents the degree of concentration in the banking industry. To control for economies' financial structures and for their level of financial development, we incorporate both the capitalisation of the stock market over GDP (MarketCap) and the amount of private credit through bank deposits over GDP (PrivateCredit). In both indicators, a higher value would give us information pointing to a market that is more oriented towards the stock market or the banking industry (Beck & Demirgüç-Kunt, 2009). As regards the level of banking sector development, some studies suggest a negative impact on banking performance, arguing that a larger banking sector would increase the competitive environment, which would eventually drive the performance of banks downward. However, and with regard to stock market development, there is no consensus vis-à-vis its effect on the profitability of the banking industry in the sense that greater stock market growth might increase competition within the banking industry or improve its performance at certain stages of economic development across countries (Demirgüç-Kunt & Huizinga, 1999; Demirgüç-Kunt & Levine, 2004; Ben Naceur & Omran, 2011).

Considering the importance of savings deposits for banking institutions, we incorporate a proxy variable of the demand for deposits (BankDeposit), which reflects business opportunities and represents a stable source of financing for banks. Moreover, taking account of the fact that deposit insurances are offered in several countries as part of a financial system safety net to promote stability, and because deposits are considered a source of agency problems (Berger, 1995), we find it interesting to explore their possible effect on banking system performance.

In order to capture the instability or insolvency risk of the banking industry, we include the variable 'Z-Score', which indicates the number of standard deviations a banking industry's rate of return (ROA) must drop below its expected value before the banking system enters insolvency. In other words, if ROA follows a normal distribution, the Z-score represents the inverse of the probability of insolvency. A higher Z-score thus indicates a more stable banking industry (Beck et al., 2009). Finally, we incorporate stock market volatility which, according to Albertazzi and Gambacorta (2009), captures the evolution in the level of uncertainty and general risk in a specific market (MarketVol).

In relation to the group of macroeconomic variables frequently cited in the banking literature that might impact banking system performance (Athanasoglou et al., 2008; Perry, 1992), we include the annual rate of both inflation (Inflation), and growth of GDP (GGDP). As regards variables related to the legal and institutional framework, the central objective of our study, we incorporate the following set of variables: the index of the strength of legal rights (LegalRights) measures the degree to which a country protects borrowers and lenders in order to facilitate credit activity. Constructing this variable considers eight factors related to legal rights in terms of collateral laws and two aspects associated with bankruptcy laws. The first eight factors bear a close relationship with the rights of the borrower and only the last two factors refer to the rights of the bank. A value of 1 is assigned to each of them when they are present in the laws of each country, and zero when they are not. The advantage of this variable, compared to that used in prior studies, is that it considers the legal protection of both lender and borrower, and does not focus solely on the legal protection of the creditor. This is critical in relation to the banking industry, as little legal protection for the borrower could inhibit access to credit (Nana, 2014).

Additionally, and in order to measure the degree of efficiency of the judicial systems in resolving a legal dispute in a specific country, we incorporate the 'RuleofLaw' variable as a proxy variable for the degree of enforcement of laws and/or contracts. This variable captures agents' perceptions of the extent to which a society's rules are adhered to, and particularly the quality of contract enforcement, property rights, and the courts, among other aspects. In other words, this variable reflects the risk of contracts being ignored and the risk of expropriation of private property. At this point, it is important to point out that, as a proxy variable for legal enforcement, previous studies often employ the index proposed by La Porta et al. (2006), which basically measures the effectiveness of minority shareholder rights.⁸

In addition, and in relation to the institutional environment, we incorporate the proxy variables 'CreditRegistry' and 'CreditBureau', which reflect the number of individuals or companies registered in a public (CreditRegistry) and private (Credit Bureau) agency in relation to their credit information (unpaid debts, outstanding credit, and so on) both current and over the last five years.

Consequently, these variables reflect the effect of several regulations adopted by countries in order to facilitate the accessibility and quality of the credit information available in a certain banking industry, and whose aim is to support decision-making when granting credit. Prior studies have generally employed a dummy variable equal to 1 for the existence of either a public or private credit registry, and zero in its absence, ignoring the coverage of the adult population on whom credit information registers are held by either private or public agencies.

Finally, we incorporate two further variables related to the institutional framework. 'RegulQuality' measures the perception of a government's ability to devise and implement sound policies and regulations to encourage private sector development. Similarly, and as a proxy variable of the level of corruption present in a certain economy, we include the 'ControlCorrupt' variable, which reflects perceptions concerning to what extent public power is exercised for private benefit.⁹ All of the variables mentioned are summed up in Table 1.

Table 1. Definition of variables.

Abbreviation	Variable	Definition
Dependent variable:		
ROA	Return on Assets	Average Return on Assets (Net Income/Total Assets). Source: Demirgüç-Kunt et al. (2013)
Independent variables:		
Macroeconomic and industry-specific characteristics:		
GGDP	GDP growth	Annual percentage growth rate of gross domestic product. Source: World Development Indicators
Inflation	Inflation rate	Current period inflation rate. Source: World Development Indicators
BankConc	Bank Concentration	Assets of three largest banks as a share of assets of all commercial banks. Source: Demirgüç-Kunt et al. (2013).
MarketCap	Stock Market Capitalisation	Value of listed shares to GDP. Source: Demirgüç-Kunt et al. (2013)
Z-Score	Bank z-score	Z-score is estimated as $(ROA + \text{equity/assets})/sd(ROA)$; $sd(ROA)$ is the standard deviation of ROA. Source: Demirgüç-Kunt et al. (2013).
BankDeposit	Bank Deposits to GDP	Demand, time and saving deposits in deposit money banks as a share of GDP. Source: Demirgüç-Kunt et al. (2013)
PrivateCredit	Private Credit to GDP	Private credit by deposit money banks as a share of GDP. Source: Demirgüç-Kunt et al. (2013)
MarketVol.	Stock Market Volatility	Standard deviation of a country stock index divided by average return. Source: Datastream, Authors' own calculation
Legal and Institutional Variables		
<i>Legal:</i>		
LegalRights	Strength of Legal Rights Index	It measures the degree to which collateral and bankruptcy laws protect the rights of both borrowers and lenders in order to facilitate lending. The index ranges from 0 to 10, with higher scores indicating that these laws are better designed to expand access to credit. Source: http://www.doingbusiness.com .
RuleofLaw	Rule of Law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Source: http:// www.govindicators.org
<i>Institutional:</i>		
CreditRegistry	Public Credit Registry Coverage	Number of individuals and firms listed in a public credit registry with current information on repayment history, unpaid debts, or outstanding credit. The number is expressed as a percentage of the adult population. Source: http://www.doingbusiness.com .
CreditBureau	Private Credit Bureau Coverage	Number of individuals or firms listed by a private credit bureau with current information on repayment history, unpaid debts, or outstanding credit. The number is expressed as a percentage of the adult population. Source: http://www.doingbusiness.com .
RegulQuality	Regulatory Quality	Reflects the perception of government ability to formulate and implement sound policies and regulations that permit and promote private sector development. Source: http://www.govindicators.org
ControlCorrup	Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and major forms of corruption, as well as 'capture' of the state by elites and private interests. Source: http// www.govindicators.org

3.2. Methodology

To analyse the potential effect of variables related to the legal and institutional framework on banking system performance, we propose equation (1), which takes the following form:

$$ROA_{i,t} = \alpha + \sum_{j=1}^2 \theta_j Legal_{i,t} + \sum_{k=1}^4 \delta_k Institutional_{i,t} + \omega_l Control_{i,t} + C_i + y_t + \varepsilon_{i,t}$$

where ROA_{it} represents the return on assets of the country's banking system 'i' in year 't', $LEGAL_{it}$ represents the vector of the legal environment determinants (LegalRights and RuleofLaw); $Institutional_{it}$ is the vector of the institutional determinants (CreditRegistry, CreditBureau, RegulQuality and ControlCorrup); $Control_{it}$ represents the vector of the control variables. In addition, a set of fixed effects is included at different aggregation levels to control for unobservable time-invariant and time-variant fixed effects. In particular, fixed effects are included at the country level (c_i) and year level (y_t). Finally ε_{it} measures the stochastic error.

The definitions of all the variables are provided in [Table 1](#). Banking performance is defined at a country's banking system level, treating each banking system in terms of a single agent (Hawtrey & Liang, 2008). Consequently, equation (1) is estimated employing two-way fixed effects OLS data panel regressions. We have selected this estimation method since panel data allow us to control for both country-fixed effects and time-fixed effects within the same model. That is, panel data regressions control by unobservable heterogeneity and give us more reliable estimations than other OLS estimation procedures (Arellano, 2003; Baltagi, 1995).

Additionally, we also use a dynamic GMM panel estimator to check the robustness of our results. Specifically, use of the GMM system is justifiable because past shocks to the dependent variable may directly affect the contemporaneous explanatory variable in the form of a lagged dependent variable. The appropriateness of the set of instruments is formally evaluated by the Hansen test of over-identifying restrictions and the Arellano-Bond tests for error autocorrelation (Arellano & Bond, 1991).

4. Results

4.1. Descriptive analysis

Panel A of [Table 2](#) presents the mean, standard deviation as well as maximum and minimum values used in our analysis. Panel B in [Table 2](#) presents the mean (standard deviation) of the segmented variables in accordance with the upper and lower third of ROA. Additionally, panel B of [Table 2](#) shows the 't' statistics for the differences in means in order to pinpoint the existence of significant differences in each of the variables employed in the analysis.

Panel B of [Table 2](#) shows how banking systems with the highest profits on their assets tend to display both higher rates of economic growth (GGDP) and higher levels of inflation (Inflation). As regards the variables of the industry itself, we see how banking systems exhibiting poorer performance tend to evidence higher rates of stock market capitalisation over GDP (MarketCap), higher rates of private credit provided by the banking sector in relation to GDP (PrivateCredit) and a greater concentration

Table 2. Panel A reports the mean, standard deviation and minimum and maximum values for the total sample. Panel B reports the mean (standard deviation) and the test of difference of means for each of the variables used in the segmented analysis for the upper and lower thirds of banking performance. *** indicates the 1% significance level; ** 5% significance level; 10% significance level.

Panel A: Description of total sample

Variables	Obs	Mean	Std Dev.	Minimum	Maximum
ROA	342	0.782	1.167	-8.522	4.241
BankConc	342	63.61	18.23	28.80	100
MarketCap	342	57.21	42.98	1.164	263.7
Z-score	342	12.15	6.27	0.016	29.19
GGDP	342	2.32	3.56	-14.72	11.11
Inflation	342	3.57	3.54	-4.47	28.18
BankDeposit	342	67.90	35.43	15.12	217.5
MarketVol	342	0.065	0.181	-0.334	0.618
PrivateCredit	342	77.11	40.20	12.96	174.03
LegalRights	342	6.05	2.13	2	10
RuleofLaw	342	0.883	0.864	-1.689	2.029
Credit Registry	342	10.74	20.22	0	100
Credit Bureau	342	50.23	37.05	0	100
RegulQuality	342	0.944	0.710	-1.623	1.914
ControlCorrup	342	0.850	0.949	-1.268	2.464
Total Obs.					

Panel B: Descriptors for the upper and lower thirds of return on assets

	ROA		Difference of means Upper third vs. lower third (Statistic t)
	Upper third	Lower third	
GGDP	1.64(0.11)	0.26(0.08)	10.47***
Inflation	2.26(0.42)	0.74(0.19)	3.27***
MarketCap	14.56(1.33)	21.33(1.70)	-3.12***
PrivateCredit	14.53(1.09)	35.08(2.19)	-8.37***
BankConc	19.73(1.15)	22.64(1.34)	-1.64*
BankDeposit	15.39(32.26)	28.32(1.89)	-5.58***
Z-Score	4.73(0.34)	3.85(0.26)	2.05**
MarketVol	0.04(0.01)	0.02(0.003)	3.92***
LegalRights	1.78(0.12)	2.08(0.14)	-1.61*
RuleofLaw	0.01(0.023)	0.38(0.026)	-10.34***
CreditRegistry	5.52(0.523)	4.17(15.47)	1.70**
CreditBureau	19.61(1.25)	16.68(1.28)	1.63*
RegulQuality	0.14(0.022)	0.37(0.024)	-6.96***
ControlCorrup	0.03(0.022)	0.38(0.028)	-9.52***

in the banking industry (BankConc). As for other features, greater banking system stability (Z-Score) is associated with higher rates of return on assets in the banking industry, and lower stock market volatility (MarketVol) is associated with lower rates of return on assets in the banking industry.

As regards legal environment features, we observe that banking systems with lower banking performance (ROA) show a higher degree of legal protection (LegalRights) and a higher degree of enforcement (RuleofLaw).

Institutional environment features are presented in Panel B of Table 2. On average, the number of individuals or companies registered both in a private bureau (CreditBureau) or a public registry (CreditRegistry) is much higher for banking systems that tend to evidence superior banking performance. We also see how banking systems that perform better exhibit lower regulatory quality and control of corruption, on average. Finally, in order to observe the times series variation in the indicators, in Table 3 we report means and standard deviations per year.

Table 3. The table reports the means (standard deviation) of the variables employed in the study per year.

Period	ROA	BankConc	Marketcap	Z-Score	GGDP	Inflation	BankDeposit	MarketVol.	PrivateCredit	Legal Rights	RuleofLaw	Credit Registry	Credit Bureau	Regul Quality	Control Corrup
2005	1.27 (0.65)	67.5 (20.7)	59.4 (42.8)	12.5 (6.22)	3.87 (2.32)	3.42 (2.64)	61.4 (33.8)	0.24 (0.15)	66.9 (36.6)	6 (2.09)	0.95 (0.77)	6.25 (15.3)	38.5 (37.9)	1.02 (0.60)	0.96 (0.88)
2006	1.33 (0.72)	65.6 (20.0)	66.1 (47.8)	12.4 (6.79)	4.83 (2.24)	3.56 (2.41)	62.3 (34.3)	0.18 (0.14)	70.1 (38.7)	6 (2.16)	0.90 (0.86)	6.96 (15.4)	39.8 (37.7)	0.96 (0.69)	0.91 (0.95)
2007	1.28 (0.70)	64.1 (18.8)	75.2 (51.7)	12.5 (6.55)	4.58 (2.42)	3.68 (2.52)	63.7 (33.1)	-0.04 (0.13)	73.9 (40.6)	6 (2.15)	0.91 (0.87)	8.30 (17.0)	43.8 (36.4)	0.99 (0.70)	0.91 (0.97)
2008	0.69 (0.93)	64.3 (17.9)	58.1 (40.9)	10.8 (5.95)	1.83 (2.94)	5.74 (3.63)	67.0 (33.5)	-0.19 (0.07)	79.5 (42.1)	6.2 (2.18)	0.92 (0.88)	9.47 (17.4)	47.9 (35.4)	1.01 (0.70)	.91 (0.96)
2009	0.40 (1.41)	63.9 (17.1)	45.6 (34.9)	11.45 (6.39)	-2.87 (4.1)	2.29 (3.35)	69.3 (34.4)	0.19 (0.13)	82.9 (43.3)	6.1 (2.16)	0.89 (0.84)	10.5 (18.7)	49.8 (34.9)	0.96 (0.70)	0.85 (0.95)
2010	0.66 (1.05)	62.3 (17.6)	53.0 (43.1)	11.9 (6.23)	2.85 (3.1)	3.66 (5.0)	67.3 (34.9)	0.08 (0.12)	78.9 (42.7)	6.1 (2.28)	0.83 (0.93)	11.17 (19.4)	51.4 (35.5)	0.89 (0.80)	0.79 (1.01)
2011	0.51 (1.87)	62.3 (18.1)	48.1 (39.6)	11.44 (6.01)	2.74 (3.35)	4.33 (2.24)	67.0 (35.9)	-0.05 (0.15)	76.8 (40.7)	5.9 (2.22)	0.79 (0.93)	11.86 (18.9)	52.35 (35.4)	0.86 (0.79)	0.75 (0.98)
2012	0.60 (1.20)	61.8 (18.3)	46.7 (36.6)	12.3 (12.2)	.19 (3.04)	3.74 (3.69)	69.1 (36.6)	0.12 (0.13)	78.5 (40.2)	5.9 (2.16)	0.81 (0.95)	13.4 (23.2)	59.2 (37.4)	0.87 (0.80)	0.78 (1.01)
2013	0.48 (0.86)	61.1 (17.1)	59.5 (41.2)	13.3 (6.52)	1.54 (2.47)	2.45 (2.83)	77.3 (39.2)	0.06 (0.14)	83.2 (39.2)	6.1 (2.02)	0.90 (0.81)	15.7 (27.7)	61.6 (38.4)	0.95 (0.64)	0.82 (0.92)
2014	0.39 (1.27)	61.6 (17.1)	61.8 (44.3)	13.6 (6.44)	2.46 (2.11)	2.16 (2.95)	80.4 (41.2)	0.06 (0.12)	83.9 (38.3)	6 (2.05)	0.96 (0.86)	17.0 (29.6)	65.4 (37.7)	0.92 (0.70)	0.80 (0.96)

4.2. Explanatory analysis

The estimations for checking our proposed hypotheses are displayed in [Table 5](#), which shows the results for the different estimations of equation (1), considering the individual and simultaneous effects of the variables related to the legal and institutional environment separately in each estimation (columns 1 to 9). In this step, we analyse the potential effect of the proxy variables related to the legal environment (LegalRights and RuleofLaw) and only two variables concerning the institutional environment, specifically the proxy variables of information sharing (CreditRegistry and CreditBureau). In this way, we examine the impact of the control variables linked to both the macroeconomic environment and the banking industry, and especially the effect of the legal and institutional environment variables with respect to our performance variable measured as the return on assets (ROA).

The results presented in [Table 4](#) show a relationship that is both positive and statistically significant between economic growth (GGDP) and banking system performance (ROA) in all of the estimations carried out, and which concurs with results reported by previous studies in the sense that greater economic growth favours the demand for credit, reduces the provisions for credit losses and favours income for activities other than the core banking business. In other words, it favours income from diversification that includes activities such as trading and securitisation, brokerage commissions, advisory fees and so on (Goddard, Molyneux, & Wilson, 2004, among others). Likewise, the inflation rate has a positive and statistically significant relation with banking sector performance. This result supports the argument that banks are capable of anticipating inflationary expectations and, therefore, of adjusting their income before they are hit. Consequently, they are able to improve their performance (Demirgüç-Kunt et al., 2004; Perry, 1992).

In relation to the control variables of the banking industry itself, and with regard to the degree of competition (BankConc), we see a negative and statistically significant effect in all the estimations presented in [Table 4](#). This result supports the arguments initially proposed by Berger (1995) and supported by several subsequent papers. Once the quality of the legal and institutional environment has been accounted for, a higher degree of banking concentration negatively affects banking institution performance. Our results support the argument that superior operational efficiency will mean that banks pass their lower costs on to their customers through lower loan interest rates and higher deposit interest rates, which will eventually have a negative effect on the net interest margin and, consequently, on banking sector performance.

As regards the influence of banking industry stability on its performance, [Table 4](#) shows a positive and statistically significant effect. These results reveal the importance of a stable and solid banking industry, which reflects both the quality of the regulatory framework and the role of the supervisory authorities. Less risk of banking institution insolvency, translated into a higher Z-Score, would allow them access to lower financing costs, which would entail a higher net interest margin and, consequently, a higher return on assets.

Likewise, one important aspect that should also be explored is the possible effect of the degree of capital market uncertainty, and indeed of the economy as a whole, on banking industry performance. In light of the above, the 'MarketVol' variable, which

Table 4. Legal Determinants of Banking Performance. This table reports the regression results of equation (1) regarding the determinants of banking performance. The dependent variable is the ROA in all columns. LegalRights is the strength of the legal rights index and RuleofLaw is the rule of law indicator. Both variables reflect the legal environment. CreditRegistry is the public credit registry coverage and CreditBureau is the private credit bureau coverage. Both variables reflect the institutional environment. The control variable BankConc is bank concentration, MarketCap is the stock market capitalisation, Z-Score is the bank z-score, GGDP is the annual GDP growth rate, INFLATION is the annual inflation rate, BankDeposit is the ratio of bank deposits to GDP, PrivateCredit is the ratio of private credit to GDP and MarketVol is stock market volatility. Detailed definitions for each variable can be found in Section 3. We estimate all regressions by using two-way fixed effects OLS data panel regressions. Robust standard errors in parentheses. *** indicates the 1% significance level; ** 5% significance level; 10% significance level.

VARIABLES	Dependent Variable: Industry ROA										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
LegalRights	0.205** (0.079)	0.194*** (0.055)			0.171** (0.056)						0.170** (0.057)
Ruleoflaw			1.090* (0.487)	1.041** (0.327)	0.967** (0.341)						1.021** (0.316)
CreditBureau						-0.006 (0.004)	-0.003 (0.003)				
CreditRegistry								-0.013 (0.013)	-0.008 (0.007)	-0.010 (0.007)	
BankConc		-0.010** (0.004)		-0.010** (0.004)	-0.001** (0.004)		-0.011** (0.004)		-0.011** (0.004)	-0.009* (0.004)	
MarketCap		-0.001 (0.002)		-0.003 (0.002)	-0.002 (0.002)		-0.000 (0.003)		-0.000 (0.002)	-0.003 (0.002)	
Z-Score		0.173*** (0.034)		0.175*** (0.035)	0.174*** (0.034)		0.173*** (0.034)		0.174*** (0.034)	0.175*** (0.034)	
GGDP		0.132*** (0.038)		0.133*** (0.038)	0.131*** (0.037)		0.134*** (0.039)		0.134*** (0.039)	0.132*** (0.037)	
Inflation		0.097*** (0.029)		0.097*** (0.029)	0.093*** (0.028)		0.101*** (0.029)		0.099*** (0.030)	0.090** (0.028)	
BankDeposit		-0.004 (0.006)		-0.006 (0.007)	-0.005 (0.007)		-0.004 (0.006)		-0.005 (0.007)	-0.007 (0.007)	
MarketVol		0.673* (0.303)		0.624* (0.308)	0.696* (0.312)		0.588* (0.293)		0.605* (0.307)	0.717* (0.327)	
PrivateCredit		0.001 (0.008)		0.001 (0.008)	0.001 (0.008)		0.002 (0.008)		0.003 (0.008)	0.002 (0.009)	
Observations	342	342	342	342	342	342	342	342	342	342	
R-squared	0.165	0.451	0.170	0.455	0.4591	0.163	0.445	0.164	0.447	0.462	
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	

captures local stock market volatility, presents a positive and statistically significant relationship on ROA, which might be explained by a reduction in the financing costs resulting from greater demand for deposits due to greater stock market uncertainty.

However, as can be seen in Table 4, the variables associated with each country's financial development (PrivateCredit and MarketCap) are not statistically significant when it comes to explaining their effect on banking industry performance. Nevertheless, and in relation to the main variables in our study, we see that when incorporating the degree of legal protection (LegalRights) separately, we find a positive and statistically significant effect on ROA in column (1) and column (2). This effect is consistent with our hypothesis H1a in the sense that a greater degree of legal protection both for the borrower and the lender would permit better collateral. In

other words, it would drive repayment of debt, thereby reducing the amount of unpaid debts and increasing the number of loans granted. In addition, due to the negative consequences for the company administration of being faced with financial constraints, greater legal protection may lead creditors to force a change in the administration during company reorganisation such that borrowers may be less willing to take risks (Acharya, Amihud, & Litov, 2011).

In order to complement the analysis of the effect of the legal environment on banking system performance, we include the proxy variable for the degree and quality of contract enforcement (RuleofLaw). The results in Table 4, columns (3) and (4), show a positive and statistically significant relationship between the degree of enforcement and bank sector performance, thus supporting our hypothesis H2a.

However, when the degree of legal protection is included with the degree of enforcement (Column 5) in the model, the effect of 'RuleofLaw' drops (0.967) compared to the results displayed in column (4), although not in statistical significance. Compared to column (2), the effect of 'LegalRights' also drops (0.171), although not in statistical significance. This would not, however, suggest a substitution pattern between the degree of law enforcement and the degree of legal protection. Indeed, both a greater degree of legal protection for borrower and lender and a higher degree of legal enforcement are required to facilitate the obtaining and granting of credit.

As regards our two proxy variables of information sharing, results in Table 4 (columns (6) to (9)) fail to provide evidence of a significant effect on banking industry performance. In other words, a higher degree of credit information held by either a public registry or a private bureau does not affect banking system performance. Thus, our results do not support our hypothesis H3.

Along the same lines, when the influence of the degree of legal protection, the degree of law enforcement and the degree of information sharing, measured by CreditRegistry, are included simultaneously in the same regression, column (10) displays the same results as in previous columns. In conclusion, a legal environment with a higher degree of legal protection for both borrowers and lenders, in addition to a higher degree of enforcement of laws and contracts, positively affects banking system performance.

It is important to point out that the findings revealed by Table 4 regarding the variables linked to the legal and institutional environment are related to the banking system performance in three ways. First, a greater degree of legal protection for borrower and lender that promotes the obtaining and granting of credit has a positive effect on banking sector performance. Second, a better enforcement system, i.e., less risk of contracts going unfulfilled and/or less risk of private property expropriation, positively affects banking system performance. Finally, greater coverage of individuals and firms regarding their credit information does not affect banking industry performance.

At this point, it is worth including in the analysis the potential effects of the two remaining proxy variables related to the institutional environment and which shape the institutional framework where banking institutions carry out their operations and relationships with customers, regulatory authorities and supervisory entities, among other agents. In this sense, policies and regulations that aim to promote private sector development (RegulQuality) and control corruption (ControlCorrup) are dimensions that might impact banking system performance.

In this sense, [Table 5](#) displays the results for the different estimations carried out by equation (1), including separately in each estimation the individual (columns 1 and 3) and simultaneous (columns 2 and 4) effects of the aforementioned variables ('RegulQuality' and 'ControlCorrup') as well as legal protection for lender and borrower.

First, and in line with the results in [Table 5](#), columns (1) and (2) show a positive and statistically significant effect of regulatory quality on banking industry performance. However, columns (3) and (4) fail to provide any evidence of a statistically significant effect of control of corruption on ROA. These results are not consistent with our hypotheses H4, nor with H5a or indeed H5b.

Second, these estimations continue to evidence a positive and statistically significant effect of the strength of legal rights on banking industry performance.

Finally, as regards the banking industry and macroeconomic environment variables, results in [Table 5](#) remain similar to those reported in the initial estimations in [Table 4](#).¹⁰

Table 5. Legal determinants of banking performance. This table reports the regression results of equation (1) regarding the determinants of banking performance. The dependent variable is the ROA in all columns. LegalRights is the strength of the legal rights index and RuleofLaw is the rule of law indicator. Both variables reflect the legal environment. RegulQuality is the regulatory quality indicator and ControlCorrup is the control of corruption indicator. Both variables are two alternative measures for the institutional environment. The control variable BankConc is bank concentration, MarketCap is stock market capitalisation, Z-Score is the bank z-score, GGDP is the annual GDP growth rate, INFLATION is the annual inflation rate, BankDeposit is the ratio of bank deposits to GDP, PrivateCredit is the ratio of private credit to GDP and MarketVol is stock market volatility. Detailed definitions for each variable can be found in [Section 3](#). We estimate all regressions by using two-way fixed effects OLS data panel regressions. Robust standard errors in parentheses. *** indicates the 1% significance level; ** 5% significance level; 10% significance level.

VARIABLES	Dependent Variable: Industry ROA			
	(1)	(2)	(3)	(4)
LegalRights		0.177*** (0.048)		0.183** (0.059)
RegulQuality	1.416*** (0.228)	1.389*** (0.213)		
ControlCorrup			0.442 (0.313)	0.378 (0.304)
BankConc	-0.005 (0.004)	-0.005 (0.005)	-0.010** (0.004)	-0.009* (0.004)
MarketCap	-0.002 (0.003)	-0.002 (0.002)	-0.000 (0.002)	-0.001 (0.002)
Z-Score	0.173*** (0.034)	0.173*** (0.033)	0.169*** (0.035)	0.170*** (0.034)
GGDP	0.124*** (0.036)	0.122*** (0.036)	0.130*** (0.038)	0.129*** (0.038)
Inflation	0.091*** (0.026)	0.087*** (0.025)	0.102*** (0.028)	0.098*** (0.028)
BankDeposit	-0.006 (0.006)	-0.006 (0.006)	-0.004 (0.006)	-0.004 (0.006)
MarketVol	0.584 (0.323)	0.661* (0.328)	0.576* (0.296)	0.658* (0.307)
PrivateCredit	-0.001 (0.008)	-0.002 (0.008)	0.002 (0.008)	0.001 (0.008)
Observations	342	342	342	342
R-squared	0.470	0.474	0.448	0.453
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

4.3. Robustness checks

As a robustness check, we carried out the same estimations of Equation (1) shown in Table 4 using a dynamic Generalized Method of Moments (System GMM) panel estimator. The results, reported in Table 6, are consistent with the results shown in the previous section.

Table 6. Legal determinants of banking performance – GMM. This table reports the regression results of equation (1) regarding the determinants of banking performance. The dependent variable is the ROA in all columns. LegalRights is the strength of legal rights index and RuleofLaw is the rule of law indicator. Both variables reflect the legal environment. RegulQuality is the regulatory quality indicator and ControlCorrup is the control of corruption indicator. Both variables are two alternative measures for the institutional environment. The control variable BankConc is bank concentration, MarketCap is stock market capitalisation, Z-Score is the bank z-score, GGDP is the annual GDP growth rate, INFLATION is the annual inflation rate, BankDeposit is the ratio of bank deposits to GDP, PrivateCredit is the ratio of private credit to GDP and MarketVol is stock market volatility. Detailed definitions for each variable can be found in Section 3. We estimate all regressions by using the generalised method of moments. Auto(2) is the test of second-order serial autocorrelation of the residuals. The Hansen test is a test of over-identifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term. Robust standard errors in parentheses. *** indicates the 1% significance level; ** 5% significance level; 10% significance level.

VARIABLES	Dependent Variable: Industry ROA			
	(1)	(2)	(3)	(4)
Lagged ROA	0.195*** (0.118)	0.179*** (0.056)	0.193*** (0.047)	0.436** (0.199)
LegalRights	0.128** (0.053)			
Ruleoflaw		0.426* (0.217)		
CreditBureau			0.002 (0.002)	
CreditRegistry				0.004 (0.009)
BankConc	0.040*** (0.011)	0.047*** (0.006)	-0.015** (0.007)	-0.004 (0.033)
MarketCap	0.002 (0.004)	0.005 (0.003)	0.019*** (0.002)	0.017 (0.013)
Z-Score	0.049 (0.039)	0.013 (0.030)	0.137*** (0.027)	-0.122 (0.142)
GGDP	0.064** (0.027)	0.041* (0.022)	-0.023* (0.012)	-0.003 (0.037)
Inflation	-0.055 (0.046)	-0.022 (0.018)	0.121*** (0.021)	0.015 (0.168)
BankDeposit	-0.004 (0.007)	-0.014 (0.009)	-0.011 (0.013)	0.003 (0.071)
MarketVol	0.011 (0.282)	0.585*** (0.173)	0.811*** (0.196)	1.437*** (0.334)
PrivateCredit	-0.019** (0.008)	-0.019 (0.012)	-0.020** (0.008)	-0.005 (0.030)
Observations	305	305	305	305
Year FE	YES	YES	YES	YES
F-Test	16.45	15.46	16.82	30.25
Auto(2)	0.156	0.157	0.189	0.175
Hansen p-value	0.849	0.345	0.872	0.876

5. Conclusions

We began this study by posing the question ‘Do legal and institutional environments impact banking system performance?’ First, our results show how important it is to have a legal framework that strengthens legal protection for both creditors and borrowers alike. A greater degree of legal protection allows banking systems to improve the quality of the collaterals, improve debt recovery rates in the event of borrower default and even force the payment of debt, which positively affects banking sector performance. Furthermore, more legal protection can impose a greater degree of discipline on the borrower, i.e., the administration of the company, which is then reflected in less willingness to take risks when faced with the possibility of a change of administration in the event of default.

Additionally, a legal framework that favours legal protection of both creditors and borrowers must also provide the necessary conditions to facilitate the enforcement of laws and/or contracts. Along these lines, our results show that a greater degree of enforcement of contracts and/or laws positively affects banking system performance. Furthermore, our results do not suggest a substitution pattern between the degree of legal protection and the degree of law enforcement: rather, both aspects are necessary to facilitate the obtaining and granting of credit.

Our results also suggest that an institutional framework which promotes the existence of public and private entities for registering and making credit information available, for both companies and individuals, would not have a positive effect on banking industry performance. In addition, and with regard to the efficiency of regulatory systems, it is regulatory quality and not the control of corruption which presents a statistically significant effect on banking sector performance, which does not support our hypotheses.

Finally, the bodies responsible for regulating and supervising the banking sector must focus their interest as much on promoting a set of good corporate governance practices in banking institutions as on providing an adequate legal and institutional framework in order to endow the banking system with stability and confidence, which is critical to the smooth running of the economy as a whole. Regulators and supervisors have to improve measures and guidance to control risk governance at banks. These include strengthening existing regulation, raising supervisory expectations for the risk management function, engaging more often with the board and management, and assessing the accuracy and usefulness of the information provided to the board. Supervisors should also have tools at their disposal to address governance improvement needs and governance failures. They should have mechanisms available for improvement and remedial action, and should ensure accountability for a bank’s corporate governance. Among the tools, mention can be made of the ability to force changes in the bank’s policies and practices, the composition of the board of directors or senior management, or other corrective actions (Basel Committee & Banking Supervision, 2015).

Certain limitations to our research must also be considered. First, comparable data are only available up to 2014, which prevents us from making more public policy recommendations. Moreover, we had no variables available to proxy legal protection at the banking level. In this sense, a rational extension of this paper would be to include an indicator for legal protection at the banking level. The quality of banking

corporate governance might also be included as a variable. Finally, the possibility of including a greater number of countries in an effort to secure more general conclusions should also be considered.

Notes

1. Source: <http://www.doingbusiness.com>.
2. Credit reference agencies or information sharing offices are institutions established to gather and collect information related to the financial obligations of commercial and individual borrowers towards financial institutions. Before 2008, information sharing offices were predominately established in OECD countries. After the 2008 financial crisis, establishing information sharing offices became a more important financial policy issue in developing countries (Asongu & Nwachukwu, 2017).
3. Over the period from 2005 to 2016, 330 reforms took place in areas related to obtaining credit, 157 reforms related to the degree of law enforcement and/or contracts, 159 reforms related to improving insolvency, and 147 reforms aimed at strengthening the legal protection of minority investors.
4. In section 3, we discuss the advantages offered by these indicators compared to those employed in previous studies.
5. In this section, the degree of information sharing is used interchangeably with public credit registries and private credit bureaus.
6. The updated July 2018 version contains data spanning 1960 to 2016. Information for 2017 is reflected when available. Available at: <https://www.worldbank.org/en/publication/gfdr/data/financial-structure-database>
7. Appendix 1 displays the list of countries that make up our sample and a summary of the main variables related to the financial system as well as the legal and institutional environment.
8. See also Kaufmann et al., (2012) as an interesting source that describes and discusses governance indicators.
9. The variables that measure the legal and institutional arrangements change according to the country's legal orientation (e.g., French civil law and common law). The value of the variable will be directly related to the type of legal orientation.
10. In order to test whether economic development affects the degree to which banking system performance is influenced by the legal and institutional environment, we segment the explanatory analysis, distinguishing between advanced economies (AEs) and emerging and developing economies (EMs). Based on Albertazi and Gambacorta (2009), the explanatory analysis is carried out by estimating equation 1 but replacing the variables 'LegalRights', 'Ruleof Law' and 'CreditRegistry' by two interacted terms of each variable with a dummy 'AE' (that takes the value 1 if the country belongs to an advanced economy) and with its complement to 1 'EM' (that takes the value 1 if the country belongs to an emerging economy). Each estimation is carried out separately for each variable. Finally, we are not able to find any significant difference between both types of economies with regard to these variables.

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Appendix

Appendix 1. Summary of main indicators by country. All country-level variables are averages for the period 2005–2014. The total number of countries is 52.

Country Name	Type of Economy	ROA	Bank Concentration	Private Credit	Legal Rights	Credit Registry	Credit Bureau	Rule of Law	Regulatory Quality	Control of Corruption
Argentina	Ems	2.37	46.03	11.45	5	33.04	97.56	-0.61	-0.73	-0.398
Australia	Aes	1.07	68.21	115.9	9.2	0	99.54	1.77	1.75	1.97
Austria	Aes	0.54	72.29	92.71	6	1.41	44.19	1.87	1.53	1.68
Belgium	Aes	0.15	73.82	59.36	5	65.12	0	1.38	1.29	1.49
Bulgaria	Ems	1.46	44.51	56.05	9	27.03	3.78	-0.081	0.62	-0.16
Brazil	Ems	1.52	55.39	46.11	3	25.55	54.75	-0.18	0.05	-0.06
Canada	Aes	0.63	79.98	122.7	7	0	100	1.77	1.59	1.96
Switzerland	Aes	0.08	89.65	155.9	8	0	24.3	1.82	1.61	2.09
Chile	Ems	1.51	50.43	67.12	4.6	31.78	22.34	1.33	1.47	1.47
China	Ems	1.02	49.27	117.19	4.3	27.3	0	-0.45	-0.22	-0.44
Colombia	Ems	1.84	67.58	31.76	5	0	52.35	-0.39	.26	-0.28
Costa Rica	Ems	1.43	58.55	40.42	3	12.5	44.02	0.49	0.47	0.59
Czech Republic	Ems	1.52	65.19	42.52	6.5	4.13	59.25	0.94	4.13	59.25
Germany	Aes	0.10	74.83	91.58	7.4	0.75	96.09	1.70	1.56	1.79
Denmark	Aes	0.35	81.67	182.2	8.8	0	7.56	1.95	1.78	2.34
Dominican Republic	Ems	1.97	70.23	20.39	3	29.37	51.66	-0.60	-0.15	-0.78
Ecuador	Ems	1.61	53.47	21.91	2	25.44	40.5	-1.14	-1.12	-0.72
Spain	Aes	0.38	60.39	154.8	6	47.69	9.53	1.12	1.10	1.07
Estonia	Ems	0.88	95.65	77.72	6.25	0	19.57	1.14	1.37	1.02
Finland	Aes	0.62	95.80	79.56	8	0	15.52	1.95	1.72	2.29
France	Aes	0.22	62.30	90.24	4.5	28.51	0	1.46	1.21	1.42
United Kingdom	Aes	0.26	55.48	158.9	10	0	94.08	1.72	1.74	1.75
Greece	Aes	-0.84	65.92	96.89	4	0	50.32	0.65	0.71	0.07
Guatemala	Ems	1.61	65.02	27.08	6.3	15.11	11.77	-1.04	-0.21	-0.67
Hong Kong SAR, China	Ems	1.31	63.80	172.5	10	0	79.26	1.62	1.96	1.76
Hungary	Ems	0.36	50.27	54.80	7	0	15.69	0.78	1.04	0.44
India	Ems	0.99	31.23	44.35	7.5	0	9.91	0.02	-0.37	-0.43
Ireland	Aes	-0.64	69.32	131.4	9	0	100	1.73	1.69	1.64
Italy	Aes	0.17	52.56	84.95	3	14.82	78.92	0.43	0.86	0.21
Japan	Aes	0.24	42.31	99.15	6.8	0	77.97	1.35	1.13	1.45
Korea, Rep.	Ems	0.58	63.54	97.46	6	0	92.36	0.98	0.91	0.53
Mexico	Ems	1.71	55.76	15.52	5.3	0	73.55	-0.51	0.34	-0.38
Netherlands	Aes	0.32	84.16	115.4	4.9	0	79.62	1.82	1.74	2.08
Norway	Aes	0.82	93.94	97.26	6	0	100	1.94	1.48	2.10
New Zealand	Aes	1.08	71.70	136.8	10	0	98.93	1.86	1.74	2.32
Panama	Ems	1.36	46.63	72.08	5	0	50.46	-0.09	0.37	-0.34
Peru	Ems	2.32	75.72	27.95	6.2	26.01	48.83	-0.59	0.38	-0.34
Poland	Ems	1.29	38.44	44.42	8.5	0	67.53	0.63	0.92	0.53
Portugal	Aes	-0.35	84.99	143.9	3	77.41	14.97	1.06	0.93	1.03
Paraguay	Ems	2.69	52.87	32.14	3	15.18	48.43	-0.83	-0.42	-0.93
Romania	Ems	0.75	56.87	30.93	8.7	9.05	29.78	0.07	0.54	-0.16
Russian Federation	Ems	1.36	29.58	39.11	5	0	30.42	-0.82	-0.36	-0.98
El Salvador	Ems	1.33	65.01	40.74	5	23.70	70.82	-0.66	0.19	-0.37
Slovak Republic	Ems	0.88	65.99	40.44	8	1.51	38.52	0.54	1.05	0.29
Slovenia	Ems	0.16	54.61	66.51	4.4	2.93	46.06	0.99	0.72	0.89
Sweden	Aes	0.56	95.92	115.0	7.25	0	99.75	1.91	1.66	2.22
Turkey	Ems	2.14	44.18	35.27	4	14.63	41.88	0.07	0.33	0.05
Uruguay	Ems	1.05	64.71	23.57	4	38.69	94.60	0.62	0.42	1.27
United States	Aes	0.83	34.38	53.29	9	0	100	1.60	1.44	1.37
Venezuela, RB	Ems	2.88	40.85	18.44	2	0	10.46	-1.67	-1.54	-1.22
Croatia	Ems	0.92	56.23	63.55	6.4	0	60.24	0.17	0.49	0.08
Egypt, Arab Rep.	Ems	0.93	58.26	34.52	3	2.61	7.29	-0.31	-0.39	-0.66