

# The Impact of Institutional Quality on Bank Lending Activity: Evidence from Bayesian Model Averaging\*

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## Abstract

*The paper investigates the link between macroeconomic shocks, the institutional environment and the responses of bank lending activities to the financial crisis. We hypothesize that property rights and the enforcement of rules are crucial for well-functioning markets, especially in transition and emerging market economies where new institutions were created. The empirical analysis adopts panel regression models with bank fixed effects. Our rich dataset contains 10,565 banks from 66 countries across the whole world. The uncertainty caused by selection of regressors is reduced by Bayesian model averaging. In addition, we put a special emphasis on the dynamic changes of probability to involve selected variables into the model. We identify ownership structures and confirm inverse effects of institutional environment on the government and private banks. We show negative effects of economic freedom, openness and globalization on the lending activity of government banks while low regulations increase lending activity of private banks. We argue that economic and financial openness reduces information asymmetries and increase competition in private banking sector which results in lower net interest margins. On the contrary, lending activity of government bank is supported by political constraints.*

## 1. Introduction

The drop in bank lending activity was generally caused by the worsening quality of credit portfolios, liquidity shocks, and lack of investment demand after the financial crisis (Busch et al., 2010; Ciccarelli, et al., 2010; Bassett et al., 2014; Fidrmuc, et al., 2015; Kořak et al., 2015; Gambetti and Musso, 2016). However, economic uncertainty during the crisis period points to the important role of institutional factors. In response to the economic turmoil the banks' lending activity is affected particularly by legal protection of creditors (Fernández et al., 2013), increasing information asymmetries (Beltran et al., 2017; Banerji and Basu, 2017), moral hazard (Antzoulatos and Tsoumas, 2014; Duran and Lozano-Vivas, 2015), bank competition (Fungáčová et al., 2014), and central bank transparency (Horváth and Vaško, 2016). Moreover, Brei and Schclarek (2016) emphasize the different responses of government-owned and private banks during the crisis.

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This paper aims to extend this line of research and identify specific institutions which the new banking regulatory framework should focus on. We differentiate between the positive and negative effects of regulation to improve the optimal policy design for the efficient recovery after the financial crisis. In addition, we differentiate between government owned and private banks to emphasize the role of economic freedom, openness and globalization on the lending activity.

There is a large body of literature that argues that a higher level of financial frictions and underdeveloped financial markets are associated with a stronger transmission mechanism of monetary policy and banks' dependency on the liquidity provided by the local central bank. From this perspective, well-developed stock markets reduce the amplitude of business cycles because well-developed financial markets help to deal with financial frictions more efficiently than the banking sector (Fidrmuc and Scharler, 2013). Ma and Lin (2016) show that economies with well-developed financial markets tend to have deeper and more efficient financial intermediaries which limit monetary policy efficiency after the financial crisis. Moreover, Brei and Schclarek (2013) suggest that government can play more active counter-cyclical role. They find that the government owned banks increase their lending activity, while the private banks tightened business lending standards after the financial crisis in 2007.

There are also studies showing the contradictory effects of banking regulation. Gavalas (2015) finds that the new bank capital requirements increase the marginal costs of funding resulting in higher lending interest rates and credit supply tightening. However, Beck et al. (2005) argue that private monitoring of banks (third pillar of Basel II) helps ease information costs and increases integrity of the banking sector, especially in countries with sound legal institutions, with positive impact on bank lending activities.

Our paper makes several contributions to the literature on the role of institutional environment associated with the banking sector. Firstly, we use 17 different indicators of the quality of institutional environment and cover a wide range of branches with various, often conflicting effects on bank lending activity. Secondly, using Bayesian Model Averaging (BMA) proposed by Koop (2003), we deal with the uncertainty of model selection and identify the probability of each variable to be involved in the model. In robustness analysis, we focus on dynamic changes of the probability in time and different regions. Thirdly, we use a rich dataset of 10,565 banks from 66 countries and provide comprehensive empirical analysis of the difference in the quality of institutions across the entire world<sup>1</sup> with a special emphasis on the differences between private and government owned banks.

The paper is organised as follows. Section 2 contains the literature review. A detailed overview of methods and data is provided in Sections 3 and 4, where the Bayesian framework is introduced. Section 5 presents the results of the econometric models and section 6 presents robustness analysis in several ways. Section 7 presents some concluding remarks.

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<sup>1</sup> It is generally agreed that the U.S. and economies of emerging Europe have been hit particularly hard by the financial crisis (Fadejeva et al., 2017). However, the balance sheets' shocks of banks in the U.S. and Europe were transmitted to Latin America, Asia, and other countries (Dekle and Lee, 2015; Vithessonthi, 2016; Hanisch, 2017).

## 2. Literature Overview

Institutions are generally believed to be a major precondition for ownership rights, investment security, and long-term growth. There are several studies which have handled the effects of the quality of institutions on bank lending. Seen from this perspective, financial development decreases firms' dependency on funds provided by banks when a sudden negative shock obliges them to tighten their lending activities. The country's financial development is related to its legal and institutional framework (La Porta et al., 1997, 1998; Levine, 2005; Rajan and Zingales, 1998) and the negative effects of a financial crisis will be emphasized in sectors in which growth is dependent on funds provided by banks (Krozsner et al., 2007; Dell'Ariccia et al., 2008; Fernández, et al., 2013). Moreover, a better institutional environment results in lower net interest margins (Marcelin and Mathur, 2014) and higher financial leverage (An, et al., 2016).

Djankov et al. (2008b) and Miletkov and Wintoki (2012) show that creditors protection and the quality of property rights institutions are associated with more developed financial systems. Currently, property rights and the enforcement of rules are crucial for well-functioning markets (Ostrom, 1998). In related research, Djankov et al. (2008a) show that financial development is also related to debt enforcement rules. Property rights and enforcement rules are especially important for transition economies where new institutions were created (Raiser et al., 2008). Ranciere, Tornell and Vamvakidis (2010) view the general expectations of bailout policies (including not only bailouts of banks but also the retention of unsustainable exchange rate pegs) as one of the major motivations for foreign currency borrowing.

Creditor rights are strongly correlated with stronger legal creditor protection and information sharing among creditors related to enhancing credit availability (Pagano and Jappelli, 1993; Djankov et al., 2008b; Brown et al., 2009). An important contribution is provided by Houston et al. (2010). They follow previous literature and argue that stronger creditor rights tend to greater bank risk taking. Especially, they use microeconomic data from the Bankscope database and provide cross-country analysis of the impact of creditor rights and information sharing on bank lending activity in 79 countries (2,430 banks) and show that credit rights increase the likelihood of that country experiencing a financial crisis. Obviously, these arguments are very different from general expectations that stronger creditor rights tend to risk-reducing strategies of banks (Acharya et al., 2011) or higher return on equity (Hartwell, 2015). At the same time, Acharya et al. (2011) point out that the existence of stronger creditor rights is not always desirable because of their negative effects on corporate risk-taking, operating performance, and the demand for debt. Bose et al. (2012) emphasize the negative effects of property rights. Based on information asymmetries, they argue that stronger property rights increase capital formation but, on the other hand, encourage bad borrowing practices.

Other arguments concentrate on possible policy failures such as corruption, asymmetric information or the shadow economy. Asymmetric information problems cause banks to impose higher interest rates, especially in those countries with poor institutions, embryonic and/or non-existent stock markets, and non-existent credit

information bureaus (Boot and Thakor, 2000; Marcelin and Mathur, 2014). Barth et al. (2009) and Houston et al. (2011) show that credit availability is associated with corruption in lending. They show that borrower and lender competition, as well as information sharing via credit bureau/registries, reduce corruption in bank lending. They also emphasize the effects of the ownership structures of firms and banks, legal environment, firm competition, media concentration, and state ownership of media.

State ownership is a particularly important determinant of the institutional environment, especially bank and firm ownership. Generally, increasing government size limits the financial development of the country, especially trade and financial openness (Chinn and Ito, 2006; Ito, 2006; Herwartz and Walle, 2014). Based on this association, La Porta et al. (2002) show that a higher degree of public ownership of banks is associated with a lower level of banking sector development and lending activity. Marcelin and Mathur (2015) contribute that decreasing government size in firms caused by privatization which allows firms to improve efficiency while driving the development of the financial sector but it is common only in countries with better regulatory and legal frameworks. However, Micco and Panizza (2006), De Hass et al. (2012), Cull and Martínez Pería (2013), and Bertay et al. (2015) show that the government owned banks are less sensitive to business cycle fluctuations than the private banks. Moreover, Brei and Schclarek (2013) emphasize active counter-cyclical role of the government owned bank after the financial crisis despite their findings that government-owned banks lend at a higher rate. On the other hand, Iannotta et al. (2011) does not find differences of government owned and private banks' sensitivity on business cycles fluctuations. Even they confirm that European government owned banks were subject to political influence which lowered the default risk and increased the insolvency risk in 2000–2009.

The negative effects of ownership are not related only to the size of government. Dheera-aumpon (2013) points out negative effects of concentrated bank control and possible business relationships with other firms in the market. It is generally agreed that a perfect market tends to achieve an optimal allocation of resources. However, bank regulation is necessary under incomplete information, moral hazard, and monopolistic power. Thus, the main positive effect of bank regulation is reducing financial market vulnerability at the macro as well micro level. While the low-risk environment provides positive effects in the long run, there is particular negative effect on bank lending activity in the short term. Fidrmuc and Hainz (2013) contribute with the evidence of cross-border lending if the national regulations differ. Beck et al. (2006) show that traditional bank regulation which involves empowering official regulatory institutions to monitor, discipline and influence banks directly, does not improve the integrity of bank lending. They point out that forcing banks to disclose accurate information to the private sector leads to greater obstacles in obtaining bank loans because of corrupted bank officials. They emphasize the role of private monitoring, which has a particularly beneficial effect on bank lending with sound legal institutions.

In addition, there are significant negative effects of excessive taxation on bank lending activity. Chiorazzo and Milani (2011) show that corporate income tax affects loss provisions with negative implications on the stability of the banking system. Chaudhry et al. (2015) show that bank taxation is an alternative to prudential regulations. They recommend taxation as the corrective measure to reduce risk-taking

by the banking sector because tax revenues could be underpinned by taxpayers as a 'fair contribution' to public finances.

Institutions have become increasingly popular in economics after the financial crisis in 2007. Especially the role of securitization increasing availability of credit risk transfer mechanisms changed the role of banks from their traditional function based on lending disposable funds from creditors to debtors (Shin, 2009). Keys et al. (2010) show that securitization had a moral hazard effect on lender screening. It is not surprising that banks with higher social responsibility are associated with higher financial performance after the financial crisis (Cornett et al., 2016). Out of direct reach of supervisory institutions and state control, the regulative order of markets depends on many practices of wellbeing known as informal institutions. Granville and Leonard (2010) show the direct impact of informal institutions on property rights and technological progress in the countries. Informal institutions have positive impact also on the growth of the private sector which tends to the integrity of bank lending (Steer and Sen, 2010). Obviously, formal and informal institutions must be fully compatible (Kouba, 2009). Finally, according to Pitlik and Kouba (2015) matured informal institutions, e.g. high level of social trust, can reduce transaction costs both at macroeconomic and at firm level.

To sum up, the variety of institutional factors has resulted in a surge of research creating different institutional indices and documenting their potential importance for various factors of the institutional environment. However, we must be very careful in the interpretation of the empirical results because it is often not clear which aspects of institutional quality are proxied by a particular institutional index. From this perspective, our findings imply that institutional quality can be understood in two ways. Firstly, institutional quality is the ability to perform property rights and to resolve the insolvency of creditors by risk-reducing strategies of banks. Secondly, there are negative effects of excessive market regulations and limited financial openness increasing costs of funding and tightening of credit supply.

### 3. Data

The literature witnesses many attempts to measure the quality of the institutional environment in order to employ a numerical variable empirically. Traditionally, the original institutional indices focused both on economic and political broad economic categories or protection against expropriation. The economic freedom index presents the individual component indices describing various aspects of economic institutions (property rights, corruption, fiscal freedom, government spending, business freedom, monetary freedom, trade freedom, investment freedom), which were summarized into a joint index of economic freedom. Other institutional indices identify special economic institutions such as, for example, different aspects of globalization or taxation. Following this approach, there are many authors who concentrate on institutional weaknesses that restrict free market, growth and entrepreneurship. These aspects include, for example, top marginal tax rate (Gwartney et al., 2013; Heidera and Ljungqvist, 2015), economic, social and political globalization (Dreher and Axel, 2006), and financial openness (Chinn and Ito, 2006 and 2008). To assess political risks, we take into account a country's underlying political and regulatory structure. One of the suitable indicators is the political

constraint index offered by Henisz (2002 and 2004). This index identifies a measurable number of veto points in a political system, multiple branches of the government and judicial independence. The interpretation of the political constraint index is that a political system with no checks and balances would have no constraints on the leading politicians because nobody dominates the power to veto key decisions.

In addition, we collected macroeconomic fundamentals and microeconomic data from banks' financial statements for 66 countries. The dataset consists in 10,565 banks, especially commercial banks, savings banks, cooperative banks, mortgage banks and investment banks from all over the whole world. In total we have 83,072 yearly observations of unbalanced panel dataset in the period 2000–2015. To obtain banking controls we use the Bankscope database, which provides detailed data including balance sheets and key financial indicators of the banks. The detailed description of the used variables is presented in Table A1. Detailed information about the structure of our sample at the country level is in Table A2. Table A3 presents descriptive statistics and Table A4 shows possible correlations between the variables.

As a part of data preparation, we drop outliers data below 1 percentile and over 99 percentiles related to each country. Thus, we do not reflect the largest and smallest banks in the country. Moreover, we drop all negative values of total assets, deposits and short-term funding, liquid assets, gross loans and impaired loans (non-performing loans). Most of the data was obtained as the ratios. The data at levels was transformed by chain indices and natural logarithms.

#### 4. Methods

Using our rich dataset, we focus on the share of gross loans to total assets of the bank  $i$  in time  $t$ . Our panel regression model is specified as:

$$loans_{it} = \sum_{s=1}^S \beta_s shocks_{sct} + \sum_{m=1}^M \beta_m bcontr_{mit} + \sum_{l=1}^L \beta_l inst_{lct} + \mu_i + \varepsilon_{it}, \quad (1)$$

where the variable *shocks* represent selected macroeconomic fundamentals (GDP, deflator, monetary policy changes),  $s$ , in a country  $c$ . The second set of variables, denoted by *bcontr*, represents selected banking controls (performance, liquidity, financial leverage, interest rate margin, funding specifics),  $m$ , in a bank  $i$ . The last set of variables, *inst*, includes determinants of institutional environment quality (e.g. economic freedom, property rights). Finally, we include bank fixed effects,  $\mu$ , and a residual,  $\varepsilon$ . We apply the forward orthogonal deviations transformation suggested by Arellano and Bover (1995) to eliminate the fixed effects which subtracts the average of all future observations of a variable.<sup>2</sup> We omitted both year and country dummies due to make models more parsimonious.<sup>3</sup>

<sup>2</sup> We employ software Matlab and transform the code for BMA on cross-sectional data provided by Koop (2003). We add panel data structure and use forward orthogonal deviation transformation to subtract fixed effect and heteroskedasticity.

<sup>3</sup> The probability of the best selected model decreases from 78% to 38% after we include year dummies because of omitted variable bias. Therefore, we decide to use panel data model and cross-sectional models for each particular year without time dummies. Moreover, we expect that all information about the analysed

The number of regressors (26 regressors) leads to very imprecise inference using conventional methods (OLS or MLM), especially wide confidence intervals. Therefore, we employ the Bayesian Model Averaging framework to reduce uncertainty with the model selection, which is widely used in financial econometrics as robust to model uncertainty (Feldkircher et al., 2014; Hasan et al., 2017; Fidrmuc, et al., 2017). The empirical analysis is based on the regression where the share of gross loans to total assets of a bank  $i$  and time  $t$ , where  $i \times t = 1, \dots, N$  are regressed on an intercept  $\alpha$  and number of explanatory variables selected from a set of  $k$  variables in a matrix  $X$  of dimension  $N \times K$ . Let us assume that  $\text{rank}(\iota_N : X) = K + 1$ , where  $\iota_N$  is an  $N$ -dimensional vector of ones, and define  $\beta$  as the full  $k$ -dimensional vector of regression coefficients:

$$y = \alpha \iota_N + X_r \beta_r + \varepsilon, \quad (2)$$

where we assume  $r = 1, \dots, R$  models, denoted by  $M_r$  and  $X_r$  is an  $N \times k_r$  matrix containing (or all) columns of  $X$ . The  $N$ -vector of errors,  $\varepsilon$ , is assumed to be  $N(0_N, h^{-1}I_T)$ . Thus,  $R = 2^K$  because there are  $2^K$  possible subsets of  $X$  and  $2^K$  possible choices for  $X_r$  (Koop, 2003).

We consider up to 26 regressors to be included in the model. That means  $2^{26}$  different models to deal with, which is far too many to evaluate. To solve this problem, we apply the Markov chain Monte Carlo techniques (MC<sup>3</sup>) pioneered by Madigan and York (1995). The results are based on taking 2,200,000 draws and discarding the first 200,000 draws models as burn-in replications.

In a Bayesian framework we receive posterior model probabilities  $p(M_r|y)$ , for  $r = 1, \dots, R$ , where each model depends upon a vector of parameters  $\theta_r$  and is characterized by prior  $p(\theta_r|M_r)$  likelihood  $p(y|\theta_r, M_r)$  and posterior  $p(\theta_r|y, M_r)$ . To obtain posterior model probabilities we use g-prior suggested by Zellner (1986) and follow commonly used rule applied by Fernandez and Steel (2009), where  $g = \frac{1}{N}$  if  $N > K^2$  and  $g = \frac{1}{K^2}$  if  $N \leq K^2$ . Thus, we put more weight on data and use relatively non-informative prior.

Let us assume a vector of parameters  $\phi$  which is the function of  $\theta_r$  for each of  $r = 1, \dots, R$ . Then we should obtain results for every model under consideration and average them where the weights in the averaging are the posterior model probabilities:

$$p(\phi|y) = \sum_{r=1}^R p(\phi|y, M_r) p(M_r|y), \quad (3)$$

alternatively, if  $g(\phi)$  is a function of  $\phi$ , the rules of conditional expectation imply that

$$E[g(\phi)|y] = \sum_{r=1}^R E[g(\phi)|y, M_r] p(M_r|y), \quad (4)$$

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country specifics (e.g. regulatory environment, money demand) is covered by macroeconomic fundamentals and institutional environment indexes.

where  $E[g(\phi)|y, M_r]$  and  $p(M_r|y)$  are calculated by posterior simulation. (Koop, 2003).

Additionally, we apply Bayesian model selection (BMS) approach (Koop, 2003) and present results from the single model with the highest marginal likelihood. Thus, the model selected by BMS is the one containing explanatory variables identified by BMA and are attaching most weight to.

Except the basic model, we differentiate between private and government banks, where we define government owned banks as those with nonzero government ownership obtained from the Bureau van Dijk Ownership Database. In the robustness analysis, firstly, we calculate posterior model probabilities analytically and using the MC<sup>3</sup> algorithm to show convergence and stability of the results. Secondly, we show dynamic changes of probability to involve selected variables into the model. For this purpose, we apply cross-sectional regression in each particular year.

## 5. Results

Table 1 presents results of the Bayesian Model Averaging approach. The first column provides information about the probability to include the regressor in the model. The mean is the mean impact of the regressor, calculated as a weighted average of estimates or forecasts from all models with weights given by  $p(M_r|y)$ . It is very important that the posterior mean of the regressors that we prefer to include in the model is greater than its posterior standard deviation. We show that economic activity, financial central bank assets and all banking controls should be included in the model in the first place, because their posterior probability is nearly one hundred percent. Along with these factors we should include in the model economic and social globalization, top marginal tax rate, freedom from corruption, government spending, monetary freedom, investment freedom and financial freedom.

The last two columns present Bayesian Model Selection results (BMS). The model selection results present the best selected single model estimates and act as though it were true. Actually, BMA approach ensures parsimony by averaging over many small models while BMS ensures parsimony by choosing 15 variables. The BMA results incorporate uncertainty about which model generated the data; therefore we assume greater posterior standard deviation of BMA than BMS results. The BMS results confirm the important role of economic activity and central bank operations. While the financial assets of the central bank affect the supply of loans, economic activity affects both loan supply and demand. Increasing economic activity pushes up the demand for loans via transaction motives; simultaneously it improves the quality of credit portfolios of banks and stimulates loan supply.

The negative effect of shareholder equity ratio represents a positive effect of financial leverage on the banks' lending activity which is evidence of involving borrowed funds in the purchase of assets because the bank expects that returns from assets will exceed the borrowing costs. Increasing/decreasing net interest margin is related to higher/lower supply of credit provided by the selected bank. Lower cost to income ratio indicates higher efficiency but a number of factors can affect this ratio, including a bank's business model or regulatory changes. We expect that a positive relation between the cost to income ratio and lending activity is caused by higher



**Table 1 Baseline Regressions**

<i>Explanatory</i>		<i>BMA</i>			<i>BMS</i>	
<i>Variables</i>		<i>Prob.</i>	<i>Mean</i>	<i>St. Dev.</i>	<i>Mean</i>	<i>St. Dev.</i>
1 GDP		1.0000	0.1324	0.0089	0.1322	0.0082
2 Deflator		0.0049	-0.0001	0.0031	-	-
3 Policy Interest Rate		0.0264	0.0000	0.0003	-	-
4 Central Bank Financial Assets		0.9998	0.0184	0.0033	0.0186	0.0033
5 Shareholder Equity Ratio		1.0000	-0.0744	0.0032	-0.0744	0.0032
6 Net Interest Margin		1.0000	0.2686	0.0036	0.2685	0.0036
7 Cost to Income Ratio		1.0000	0.0346	0.0041	0.0345	0.0041
8 Deposit to Asset Ratio		1.0000	-0.1208	0.0073	-0.1208	0.0073
9 Liquid Assets/Deposits, Short t.fund		1.0000	-0.0949	0.0011	-0.0949	0.0011
10 Political Constraints		0.0059	-0.0001	0.0017	-	-
11 Financial Openness		0.0360	0.0004	0.0023	-	-
12 Economic Globalization		1.0000	0.0052	0.0005	0.0053	0.0004
13 Social Globalization		1.0000	0.0048	0.0007	0.0048	0.0007
14 Political Globalization		0.0098	0.0000	0.0001	-	-
15 Business Regulations		0.0046	0.0000	0.0001	-	-
16 Freedom to Trade Internationally		0.0769	0.0008	0.0032	-	-
17 Top Marginal Tax Rate		1.0000	-0.0163	0.0010	-0.0165	0.0010
18 Property Rights Index		0.0073	0.0000	0.0000	-	-
19 Freedom from Corruption		1.0000	0.0018	0.0003	0.0018	0.0002
20 Fiscal Freedom		0.0179	0.0000	0.0001	-	-
21 Government Spending Index		1.0000	0.0013	0.0002	0.0014	0.0002
22 Business Freedom		0.1183	0.0001	0.0002	-	-
23 Monetary Freedom		1.0000	0.0026	0.0003	0.0026	0.0003
24 Trade Freedom		0.0190	0.0000	0.0001	-	-
25 Investment Freedom		1.0000	0.0023	0.0001	0.0023	0.0001
26 Financial Freedom		1.0000	0.0017	0.0001	0.0017	0.0001
Mean number of regressors in models			16.3267		-	
Prob of top 10 models out of total No of models			0.9662		-	
No of countries			66		66	
No of banks			10,565		10,565	
No of observations			83,072		83,072	

Notes: Bayesian Model Averaging results (BMA) provides posterior probability to include each regressor into the model, where mean is interpreted as the estimated coefficient. Bayesian Model Selection results (BMS) provide estimation results of the best selected model from 2,200,000 draws. Omitted variables are not selected to be involved in the best model.

Source: Own estimation.

regulatory requirements after a financial crisis when lending activity falls down. Negative effect of deposit to asset ratio is caused by maturity transformation because accepting deposits from many customers enables fewer longer-term loans. Finally, a higher share of liquid assets does not allow creation of illiquid credits.

Creating networks among actors at multi-continental distances (Economic Globalization) is supported by the spread of ideas, information and people (Social Globalization) and conditioned by reduction of a variety of restrictions on investment, especially openness to foreign investments, access to foreign exchange, low restrictions on payments, transfers, and capital transactions (Investment Freedom). Moreover, maintaining price stability without microeconomic interventions is the ideal state for the free market (Monetary Freedom). Thus, based on our theoretical assumptions, globalization, freedom and monetary stability contribute to the financial development of the market and better allocation of funds. Thus, it is not surprising that these factors increase the lending activity of banks because they result in lower net interest margin (Marcelin and Mathur, 2014).

Banking security and independence of banks from government control increase competition and financial institutions provide various types of financial services to individuals and companies (Financial Freedom). Our arguments are in line with Houston et al. (2010) who show that stronger creditor rights may increase lending activity of banks because they tend to greater risk taking.

In addition, lower corruption has positive impact on bank lending activity which is associated with information sharing, limited concentration of ownership, and efficient functioning of the regulatory authorities. The government spending index is associated with excessive government expenditures, including consumption, transfers and the size of government. Our results confirm the theoretical assumptions that decreasing government size improves efficiency of fund allocation and drives the development of the financial sector. Finally, we show that the top marginal tax rate index has negative impact on bank lending. A higher level of the index represents higher income thresholds for higher marginal tax rates. The results show that progressive taxation reduces bank lending activity in the country. It consists with the results provided by Chiorazzo and Milani (2011) or Chaudhry et al. (2015) who argue that corporate income tax and value added tax paid on bank inputs tend to affect banking output prices.

On the contrary, we do not confirm our expectations that political constraints, trade openness and financial openness (Chinn and Ito, 2006; Ito, 2006; Herwartz and Walle, 2014) affect bank lending activity in general.

The second part of our empirical results focuses on differences between the government owned banks and private banks (Table 2). We hypothesize that an ideal banking and financing environment is characterized by a minimum level of government interference and independent central bank supervisions. The regulation of financial institutions is limited to enforcing contractual obligations and preventing fraud, credit is allocated on market terms. Banks are free to extend credit, accept deposits, and conduct operations in foreign currencies. Foreign financial institutions operate freely and are treated the same as domestic institutions.

Our results show significant differences between the both of bank groups (142 government owned banks in 38 countries and 10,423 banks in 66 countries). Private banks are positively affected by economic activity while lending activity of

**Table 2 Differences between Government Owned and Private Banks**

<i>Explanatory Variables</i>	<i>Gov. Banks</i>		<i>Priv. Banks</i>	
	<i>Mean</i>	<i>St. Dev.</i>	<i>Mean</i>	<i>St. Dev.</i>
1 GDP	-	-	0.1303	0.0084
2 Deflator	-	-	-	-
3 Policy Interest Rate	-0.0213	0.0133	-	-
4 Central Bank Financial Asset	0.0630	0.0221	0.0213	0.0033
5 Shareholder Equity Ratio			-0.0687	0.0032
6 Net Interest Margin	0.2561	0.0339	0.2691	0.0036
7 Cost to Income Ratio	-0.0997	0.0525	0.0361	0.0041
8 Deposit to Asset Ratio	-0.3283	0.0479	-0.1076	0.0075
9 Liquid Assets/Deposits, Short t.fund	-0.1607	0.0145	-0.0944	0.0011
10 Political Constraints	0.1600	0.0757	-	-
11 Financial Openness	-0.0629	0.0243	-	-
12 Economic Globalization	-0.0023	0.0024	0.0056	0.0004
13 Social Globalization	0.0092	0.0024	0.0045	0.0007
14 Political Globalization	-0.0002	0.0022	-	-
15 Business Regulations	-0.0291	0.0181	-	-
16 Freedom to Trade Internationally	-0.0814	0.0268	-	-
17 Top Marginal Tax Rate	-	-	-0.0163	0.0010
18 Property Rights Index	-	-	-	-
19 Freedom from Corruption	-	-	0.0018	0.0002
20 Fiscal Freedom	-	-	-	-
21 Government Spending Index	-	-	0.0014	0.0002
22 Business Freedom	-	-	-	-
23 Monetary Freedom	0.0079	0.0019	0.0026	0.0003
24 Trade Freedom	0.0064	0.0020	-	-
25 Investment Freedom	-	-	0.0023	0.0001
26 Financial Freedom	-0.0039	0.0010	0.0017	0.0001
Model Prob (analytical)	0.2852		0.7155	
Model Prob (MC <sup>3</sup> estimate)	0.2884		0.7136	
No of countries	38		66	
No of banks	142		10,423	
No of observations	683		73,747	

*Notes:* Bayesian Model Selection results (BMS) provide estimation results of the best selected model from 2,200,000 draws, where the mean is interpreted as the estimated coefficient of the regressor. Omitted variables are not selected to be involved in the best model.

*Source:* Own estimation.

government owned banks increases with policy interest rate lowering. The lending activity of private banks is also negatively affected by shareholder equity ratio which makes a bank's debt safer but increases funding costs. On the other hand, increasing overheads represented by the cost to income ratio force private banks to increase their lending activities while government owned banks are motivated to cut their activities because of their lower efficiency.

It is not surprised that higher political constraints increase lending activity of government owned banks. Dominant-party systems with limited judicial independence have no constraints on the leading politicians because nobody dominates the power to veto key decisions. In such a system government owned banks are influenced and supported by ruling political parties. The financial system stability given by low probability of policy changes is redeemed at a cost of resource allocation efficiency.

While lending activity of private banks is increased by the level of globalization, freedom and openness, the same factors affect reversely government owned bank. Low restrictions on cross-border financial transactions (Financial Openness), international economic connections allowing flows of capital, goods and services (Economic Globalization), diffusion of government policies (Political Globalization) reduce government owned bank lending.

On the contrary, revenues from trade taxes, black-market exchange rates, capital controls, visa requirements from foreign visitors and other trade barriers (Freedom to Trade Internationally) provide advantages for government owned banks over private banks. All the mentioned factors reduce competition and generally lower the level of available services. Moreover, credit allocation efficiency is limited by price controls, bureaucracy costs, costs of starting a new business, and other administrative and extra payments (Business Regulations).

Finally, we confirm stability of baseline regressions' results (Table 1) which do not differ from the subset of private banks (Table 2).

## 6. Robustness Analysis

We check the sensitivity of our analysis in several ways. Firstly, we focus on the robustness of the MC<sup>3</sup> algorithm that we apply to reduce the number of estimations. As we mentioned in the section Data and Methods, we run the MC<sup>3</sup> algorithm for 2,200,000 draws and discard the first 200,000 as burn-in. The robustness check of this approach and convergence diagnostic are approved by calculating and comparing posterior model probabilities analytically and using MC<sup>3</sup>. The results presented in Table 3 indicate convergence for both the baseline regressions and subsamples as well. Note that the best single model receives more than 78% (71% and 28% in the case of augmented regressions) of posterior model which is quite robust because model selection puts all weight on the single model ignoring the huge amount of model uncertainty (smaller standard deviation). The BMS approach also reduces parsimony by choosing 15 variables (16 and 15 variables in the case of augmented regressions).

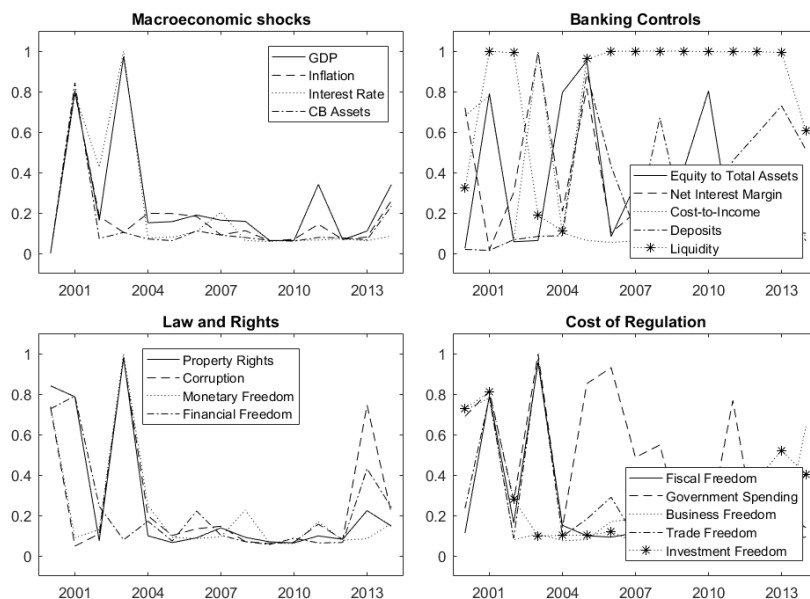
**Table 3 Convergence Diagnostic**

	<i>All Banks</i>		<i>Government Banks</i>		<i>Private Banks</i>	
	$p(M_i y)$	$p(M_i y)$	$p(M_i y)$	$p(M_i y)$	$p(M_i y)$	$p(M_i y)$
	Analytical	MC <sup>3</sup> estimate	Analytical	MC <sup>3</sup> estimate	Analytical	MC <sup>3</sup> estimate
1	0.7896	0.7888	0.2852	0.2884	0.7155	0.7136
2	0.0629	0.0619	0.1615	0.1612	0.1177	0.1196
3	0.0440	0.0442	0.0937	0.093	0.073	0.0733
4	0.0298	0.0310	0.0866	0.086	0.0277	0.0269
5	0.0239	0.0234	0.079	0.076	0.0221	0.0223
6	0.0167	0.0168	0.0752	0.0749	0.0112	0.0106
7	0.0109	0.0111	0.0628	0.0636	0.0094	0.0098
8	0.0105	0.0102	0.0599	0.0579	0.0085	0.0085
9	0.0061	0.0066	0.0541	0.0563	0.0078	0.0084
10	0.0056	0.0059	0.0421	0.0426	0.007	0.0071

Notes: Posterior Model Probabilities for top 10 Models.

Source: Own estimation.

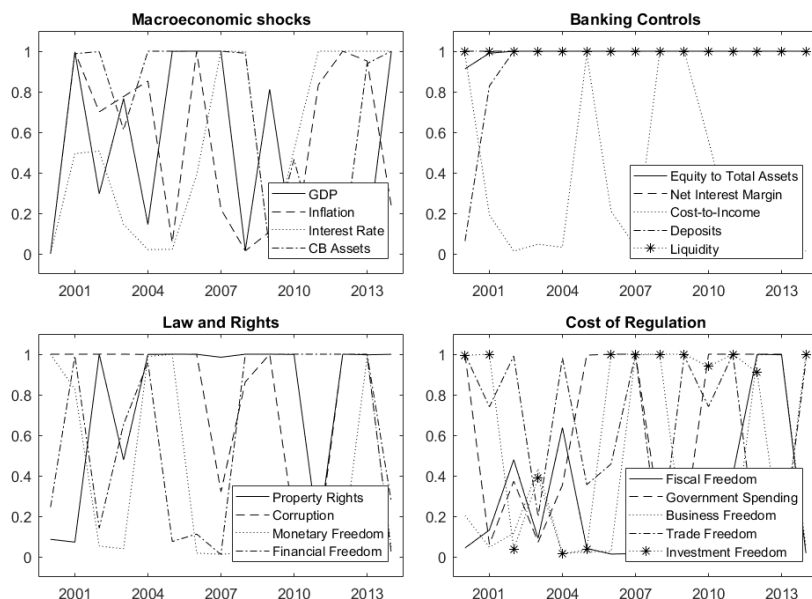
**Figure 1 Dynamic Changes of Posterior Model Probabilities for Government Owned Banks**



Notes: Posterior model probability changes of cross-sectional regressions estimated in each particular year.

Source: Own estimation.

**Figure 2 Dynamic Changes of Posterior Model Probabilities for Private Banks**



Notes: Posterior model probability changes of cross-sectional regressions estimated in each particular year.  
Source: Own estimation.

Secondly, we check the robustness of our results using dynamic changes of the probability to involve selected variables into the model in time. The estimations reflect cross-sectional regressions and put special emphasis on the cross-country differences in the quality of institutional environment. Moreover, we present this robustness check separately for government owned and private banks (Figure 1 and Figure 2). All the variables are divided into four groups. In the first group (first subplot), we show changes of probability to involve the all macroeconomic fundamentals into the model, second subplot presents changes of probability of the all selected banking controls. The third and the fourth subplots present probability changes of the impact of selected institutional indexes<sup>4</sup>. We divide institutional indexes into two groups. The first group deals with rights protection and the quality of the legal environment (property rights index, index of corruption freedom, monetary freedom, and financial freedom). The second group is associated mostly with the size of government (fiscal freedom, government spending, business freedom, trade freedom, and investment freedom).

Our results show that only bank controls (excluding cost-to-income ratio) affect private banks in the whole analyzed time period. Moreover, we show that macroeconomic fundamentals did not affect lending activity of government owned banks in the years 2005–2014, while economic activity hit private banks particularly hard before and after the crisis. Thus, our results are in line with Micco and Panizza (2006), De Hass et al. (2012), Cull and Martínez Pería (2013), Brei and Schclarek

<sup>4</sup> We select only variables available in all the analysed years. Therefore, we reduce the number of the measures of institutional environment on only 9 indexes.

(2013), and Bertay et al. (2015) which opens discussion about the counter-cyclical effects of government owned banks, especially during the crises.

Finally, we found very limited impact of the institutional environment on the lending activity of government owned banks during and after the financial crisis. On the contrary, law enforcement of private property rights (Property Rights) and restrictions on payments, transfers, and capital transactions (Investment Freedom) affect significantly private banks in times of crisis.

## 7. Conclusions

We provide a detailed analysis of 17 indices of the institutional environment, macroeconomic fundamentals and banking controls related to the liquidity, performance and funding specifics of 10,565 banks from 66 countries. The uncertainty caused by a long list of potential explanatory variables is resolved by the Bayesian Model Averaging. Our research builds upon, and is related to, previous literature related to the role of the quality of the institutional environment, especially government interference in banking systems, economic freedom and globalization. Moreover, we identify reverse impact of the institutional quality environment on government owned banks and private banks.

Our results are in line with Micco and Panizza (2006), De Hass et al. (2012), Cull and Martínez Pería (2013), or Bertay et al. (2015) and confirm that economic activity has no impact on the lending activity of government owned banks, especially after the financial crisis in 2007. However, we cannot admit suggestions of Brei and Schclarek (2013) that governments can play an active counter-cyclical role in their banking systems directly through government-owned banks.

We show that lending activity of private banks is increased by the level of globalization, freedom and openness while government owned banks are supported by political constraints, higher trade barriers and cross-border capital controls. We hypothesize that in an ideal banking and financial environment the government does not own financial institutions because government ownership of banks reduces competition and generally lowers the level of available services at the financial market. Moreover, economic and financial openness reduces information asymmetries and increase competition in private banking sector which results in lower net interest margin.

## APPENDIX

**Table A1 Definition of all Analysed Variables**

<i><b>Name and Source</b></i>	<i><b>Definition</b></i>
GDP IMF, Eurostat <a href="http://data.imf.org">http://data.imf.org</a> <a href="http://ec.europa.eu/eurostat/data/database">http://ec.europa.eu/eurostat/data/database</a>	Gross domestic product at market prices and local currency. Completely empty series provided by IMF (International Financial Statistics) were filled in by data provided by Eurostat (National Accounts Indicators).
Deflator IMF, Eurostat <a href="http://data.imf.org">http://data.imf.org</a> <a href="http://ec.europa.eu/eurostat/data/database">http://ec.europa.eu/eurostat/data/database</a>	Deflator is calculated by dividing an aggregate measured at current prices by the same aggregate measured at constant prices. It is constructed as index (2010=100). Completely empty series provided by IMF (International Financial Statistics) were filled in by data provided by Eurostat (National Accounts Indicators).
Policy Interest Rate IMF, Official websites of local central banks <a href="http://data.imf.org">http://data.imf.org</a>	Central Bank policy rate (marginal lending rate) in percent per annum. Completely empty series provided by IMF (International Financial Statistics) were filled in by manually collected data from websites of local central banks.
Central Bank Financial Assets IMF, Official websites of local central banks <a href="http://data.imf.org">http://data.imf.org</a>	Financial Assets of Central Banks in current Central Bank policy rate (marginal lending rate) at current prices and national currency. Completely empty series provided by IMF (International Financial Statistics) were filled in by manually collected data from websites of local central banks.
Shareholder Equity Ratio Bankscope Database	Shareholder Equity Ratio (Equity-to-asset ratio) is an investment leverage or solvency ratio that measures the amount of assets that are financed by owners' investments by comparing the total equity in the bank to the total assets. Equity includes common shares and premium, retained earnings, reserves for general banking risks and statutory reserves.
Net Interest Margin Bankscope Database	This ratio is the net interest income expressed as a percentage of earning assets. The higher this figure, the cheaper the funding or the higher the margin the bank is commanding. Higher margins and profitability are desirable as long as the asset quality is being maintained.
Cost to Income Ratio Bankscope Database	This is one of the most focused-on ratios currently and measures the overheads or costs of running the bank, the major element of which is normally salaries, as percentage of income generated before provisions. It is a measure of efficiency although if the lending margins in a particular country are very high then the ratio will improve as a result. It can be distorted by high net income from associates or volatile trading income.
Deposit to Asset Ratio Bankscope Database	This ratio covers total customer deposits, deposits from banks and all other deposits and short-term borrowings, divided by total assets of the bank.
Liquid assets to deposits Bankscope Database	Liquid assets to deposits and Short-term funding ratio looks at the amount of liquid assets available to borrower as well as depositors.
Political Constraints Index V Henisz (2002 and 2004) <a href="http://www-management.wharton.upenn.edu/henisz/">http://www-management.wharton.upenn.edu/henisz/</a>	The index measures political constraint, that is, to identify underlying political structures and measure their ability to support credible policy commitments. The scale ranges from 0 to 1. The low level of index means that political changes may become highly unpredictable which represents a lot of risk for the lending activities in the country.
Financial Openness Chinn and Ito (2008) <a href="http://web.pdx.edu/~ito/Chinn-Ito_website.htm">http://web.pdx.edu/~ito/Chinn-Ito_website.htm</a>	The Chinn-Ito index is an index measuring a country's degree of capital account openness. The index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. This index takes on higher values the more open the country is to cross-border capital transactions. By construction, the series has a mean of zero.



<p>Economic Globalization Comp. of Globalization Index Dreher and Axel (2006) <a href="http://globalization.kof.ethz.ch/">http://globalization.kof.ethz.ch/</a></p>	<p>Economic globalization is characterized as long-distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges. Each of the variables is transformed to an index on a scale of one to a hundred, where a hundred is the maximum value for a specific variable over the period and one is the minimum value.</p>
<p>Social Globalization Comp. of Globalization Index Dreher and Axel (2006) <a href="http://globalization.kof.ethz.ch/">http://globalization.kof.ethz.ch/</a></p>	<p>Index of social globalization is expressed as the spread of ideas, information, images and people. Each of the variables is transformed to an index on a scale of one to a hundred, where a hundred is the maximum value for a specific variable over the period and one is the minimum value.</p>
<p>Political Globalization Comp. of Globalization Index Dreher and Axel (2006) <a href="http://globalization.kof.ethz.ch/">http://globalization.kof.ethz.ch/</a></p>	<p>Index of political globalization is characterized by a diffusion of government policies. Each of the variables is transformed to an index on a scale of one to a hundred, where a hundred is the maximum value for a specific variable over the period and one is the minimum value.</p>
<p>Business regulations, Frazer Institute Economic Freedom of the World Index <a href="http://www.freetheworld.com/index.html">http://www.freetheworld.com/index.html</a></p>	<p>The index covers price controls, administrative requirements, bureaucracy costs, requirements for starting a business, extra payments (bribes) licensing restriction, and tax compliance. The more widespread different regulations are mirrored in a lower value of the index.</p>
<p>Freedom to Trade Internationally Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>The index measures a wide variety of restraints that affect international exchange: tariffs, quotas, hidden administrative restraints, and exchange rate and capital controls. The index ranges from least free to most free.</p>
<p>Top Marginal Tax Rate Gwartney et al. (2013) <a href="http://www.pwc.com/extweb/pwcpubs/nstf/do cid/9B2B76032544964C8525717E00606CBD">http://www.pwc.com/extweb/pwcpubs/nstf/do cid/9B2B76032544964C8525717E00606CBD</a></p>	<p>The indicator is comprised of the top marginal income tax rate and top marginal income and payroll tax rates. Countries with higher marginal tax rates, income and payroll (wage) tax rates that take effect at lower income thresholds received lower ratings.</p>
<p>Property Rights Index, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>The index indicates the freedom to accumulate private property, secured by laws and enforced by the state including the likelihood of expropriation. It covers also the independence of the judiciary, corruption, and contract enforcement.</p>
<p>Freedom from Corruption Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>The index is based on a 10-point scale in which a score of 10 indicates very little corruption and a score of 0 indicates a very corrupt government. The score for this component is derived primarily from Transparency International's Corruption Perceptions Index.</p>
<p>Fiscal Freedom, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>Fiscal freedom measures the fiscal burden in terms of the top income tax for households and firms and tax revenues in GDP.</p>
<p>Government Spending Index, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>This index is based on the level of government expenditures in GDP, <math>GEI = 100 - \alpha (G/GDP)^2</math>. Thus, large governments receive over-proportionally low scores.</p>
<p>Business Freedom, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>This index shows the ability to start, operate, and close a business that represents the overall burden of regulation and the efficiency of government regulations. The score is based on ten factors from the World Bank's Doing Business study.</p>
<p>Monetary Freedom, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>Monetary freedom combines price stability (weighted average inflation for previous three years) with an assessment of price controls (a penalty up to 20% if price controls are important).</p>
<p>Trade Freedom, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>Trade freedom is a composite measure of the absence of tariff (based on the weighted average tariff) and non-tariff barriers (a penalty up to 20% if non-tariff barriers are important).</p>
<p>Investment Freedom, Comp. of Economic Freedom Index <a href="http://www.heritage.org/index/explore">http://www.heritage.org/index/explore</a></p>	<p>The index evaluates the severity of restrictions related to investment including rules for foreign and domestic investment, restrictions on payments, transfers, foreign exchange and capital transactions, labour regulations, corruption, red tape, weak infrastructure, and political and security conditions.</p>

**Table A2 Number of Banks and Observations in the Analysed Countries**

<b>Developed countries</b>							
<i>Country</i>	<i>Gov. Banks</i>	<i>Priv. Banks</i>	<i>Obs</i>	<i>Country</i>	<i>Gov. Banks</i>	<i>Priv. Banks</i>	<i>Obs</i>
Austria	4	241	1931	Greece	4	6	59
Australia	2	29	138	Ireland	2	6	30
Belgium	0	23	101	Israel	3	7	97
Canada	2	47	143	Italy	16	476	3485
Germany	5	1548	15727	S. Korea	0	2	2
Denmark	7	60	478	Netherlands	1	16	77
Spain	4	96	574	Portugal	5	96	254
Finland	0	25	70	Sweden	0	77	563
France	4	185	1305	USA	9	6446	54570
United Kingdom	5	100	421	Total	73	9486	80025
<b>Emerging and Other countries</b>							
<i>Country</i>	<i>Gov. Banks</i>	<i>Priv. Banks</i>	<i>Obs</i>	<i>Country</i>	<i>Gov. Banks</i>	<i>Priv. Banks</i>	<i>Obs</i>
Albania	0	12	54	Lithuania	0	8	74
Armenia	0	12	50	Latvia	1	16	114
Angola	0	7	10	Moldova	1	8	40
Azerbaijan	1	18	57	Mongolia	0	3	4
Bulgaria	1	21	114	Malta	1	6	36
Brazil	3	51	172	Mauritius	0	8	35
Belize	0	1	2	Mexico	2	29	80
Congo	0	4	13	Malaysia	2	22	40
Chile	0	2	3	Nepal	0	23	38
Costa Rica	1	19	62	P.N.Guinea	0	1	4
Cyprus	1	15	87	Philippines	5	23	126
Czechia	2	11	53	Poland	10	28	199
Dominican Republic	0	22	48	Qatar	0	3	7
Estonia	0	5	39	Russia	13	389	649
Georgia	0	3	5	S. Arabia	3	1	7
Ghana	0	16	33	Slovenia	5	12	125
Gambia	0	1	1	Slovakia	0	10	53
Guatemala	0	13	68	Suriname	2	2	7
Guyana	0	2	18	Thailand	2	11	48
Honduras	0	12	47	Tajikistan	0	4	5
Hungary	1	9	44	Turkey	7	17	147
Kenya	3	21	104	Uruguay	1	10	36
Kyrgyzstan	0	1	4	S. Africa	0	9	46
Kazakhstan	1	16	39	Total	69	937	3047

Table A3 Descriptive Statistics

Variables <sup>1</sup>	Obs	Mean	Std. Dev.	Quantiles					Skewness <sup>2</sup>	Kurtosis <sup>2</sup>
				Min	0.25	Mdn	0.75	Max		
Gross Loans to Total Assets Ratio	83072	0.636	0.146	0.001	0.241	0.651	0.910	1.932	-0.0005	0.0033
GDP	83072	1.427	1.527	1.000	1.000	1.324	7.006	120.001	0.0522	3.7485
Deflator	83072	1.213	0.634	0.990	1.000	1.158	3.605	46.033	0.0422	2.7463
Policy Interest Rate	83072	0.360	0.313	0.007	0.019	0.304	1.000	3.333	0.0005	0.0027
Central Bank Financial Assets	83072	2.017	2.022	0.641	1.000	1.307	6.775	131.896	0.0247	1.1821
Shareholder Equity Ratio	83072	9.889	3.605	4.300	4.300	9.310	22.330	30.290	0.0014	0.0062
Net Interest Margin	83072	3.678	1.058	1.130	1.470	3.690	6.660	7.840	0.0004	0.0034
Cost to Income Ratio	83072	67.718	12.023	38.380	41.520	67.320	97.860	102.540	0.0002	0.0029
Deposit to Asset Ratio	83072	0.843	0.092	0.048	0.445	0.868	0.938	1.136	-0.0028	0.013
Liquid Assets/Deposits, Short t.fund	83072	13.997	11.501	2.670	2.820	10.640	61.110	81.130	0.0022	0.0093
Political Constraints	83072	0.415	0.053	0.000	0.210	0.400	0.550	0.720	-0.0011	0.0155
Financial Openness	83072	2.327	0.390	-1.890	0.040	2.390	2.390	2.390	-0.007	0.0552
Economic Globalization	83072	64.259	6.879	26.770	53.270	62.160	87.840	95.790	0.0015	0.0067
Social Globalization	83072	79.161	5.827	21.600	47.700	78.340	91.460	92.100	-0.0038	0.0302
Political Globalization	83072	91.990	4.146	35.710	71.608	92.280	97.880	98.160	-0.0064	0.061
Business Regulations	83072	6.775	0.504	3.520	5.440	6.810	7.790	8.660	-0.001	0.0068
Freedom to Trade Internationally	83072	8.069	0.454	4.870	6.642	8.060	9.410	9.590	-0.0002	0.0076
Top Marginal Tax Rate	83072	6.463	1.579	0.500	1.500	7.000	8.000	10.000	-0.0013	0.0041
Property Rights Index	83072	85.265	11.973	10.000	30.000	90.000	90.000	95.000	-0.0032	0.0133
Freedom from Corruption	83072	73.070	10.432	18.000	22.000	75.000	92.000	100.000	-0.0028	0.0126
Fiscal Freedom	83072	63.872	8.139	29.800	35.400	67.500	82.700	99.900	-0.0012	0.0059
Government Spending Index	83072	50.636	14.986	0.000	9.900	58.000	77.600	96.100	-0.0008	0.0031
Business Freedom	83072	85.970	8.241	40.600	55.000	89.600	94.800	100.000	-0.0017	0.0057
Monetary Freedom	83072	82.606	4.040	0.000	67.600	83.900	89.400	91.100	-0.002	0.018
Trade Freedom	83072	83.584	3.752	44.400	68.200	85.800	87.600	89.200	-0.0014	0.0075
Investment Freedom	83072	74.860	9.464	5.000	30.000	75.000	90.000	95.000	-0.0016	0.0109
Financial Freedom	83072	73.856	14.264	30.000	40.000	70.000	90.000	90.000	-0.0004	0.0021

<sup>1</sup> all variables in indexes before logarithmic transformation<sup>2</sup>  $\times 10^3$

**Table A4 Correlation Matrix**

	Loans GDP Defl IR CB Equ Mar Cost Dep Liq Pol Fin Glob Soc Pol Bus Trade Tax Prop Cor Fis Gov Bus Mon Trad Invest																									
GDP	-0.05	1.00																								
Defl.	-0.05	0.97	1.00																							
IR	0.00	-0.17	-0.14	1.00																						
CB Ass.	-0.05	0.66	0.63	-0.64	1.00																					
Equit	-0.05	0.26	0.23	-0.24	0.22	1.00																				
Margin	0.19	0.20	0.18	-0.25	0.09	0.39	1.00																			
Cost	-0.03	0.06	0.07	-0.06	0.09	-0.16	-0.09	1.00																		
Depos	-0.08	-0.27	-0.32	-0.12	-0.11	-0.29	0.06	0.03	1.00																	
Liquid	-0.33	0.18	0.20	0.11	0.15	-0.04	-0.17	0.10	-0.12	1.00																
Polcon	-0.06	-0.26	-0.23	0.14	-0.08	-0.30	-0.37	0.06	0.17	0.11	1.00															
Finop	0.09	-0.63	-0.62	-0.13	-0.20	-0.10	-0.10	0.02	0.21	-0.22	0.17	1.00														
Ecglob	0.00	-0.23	-0.22	0.50	-0.27	-0.27	-0.50	-0.03	-0.09	0.24	0.26	0.10	1.00													
Socglob	0.04	-0.57	-0.54	0.11	-0.23	-0.33	-0.44	0.05	0.22	-0.01	0.40	0.63	0.54	1.00												
Polglob	0.08	-0.38	-0.32	-0.09	-0.10	0.05	-0.13	-0.02	-0.06	-0.11	0.09	0.42	0.07	0.48	1.00											
Busreg	0.04	-0.35	-0.37	-0.02	-0.35	0.00	0.19	-0.04	0.36	-0.27	-0.03	0.29	-0.14	0.19	0.02	1.00										
Freet	0.04	-0.75	-0.70	0.39	-0.72	-0.31	-0.16	-0.05	0.23	-0.11	0.16	0.43	0.38	0.45	0.09	0.44	1.00									
Tax	0.03	0.19	0.13	-0.32	0.07	0.34	0.56	-0.04	0.14	-0.32	-0.39	-0.01	-0.75	-0.45	-0.13	0.29	-0.26	1.00								
Property	0.03	-0.61	-0.65	-0.12	-0.38	-0.16	0.00	0.00	0.54	-0.31	0.15	0.59	-0.05	0.56	0.26	0.61	0.50	0.20	1.00							
Corrupt	0.02	-0.63	-0.66	-0.02	-0.38	-0.19	-0.11	-0.01	0.49	-0.23	0.21	0.60	0.13	0.67	0.31	0.57	0.53	0.01	0.93	1.00						
Fiscal	0.00	0.51	0.43	-0.33	0.31	0.34	0.47	0.00	0.03	-0.17	-0.32	-0.26	-0.69	-0.60	-0.32	0.04	-0.56	0.83	-0.11	-0.29	1.00					
Government	0.04	0.20	0.14	-0.25	-0.05	0.34	0.57	-0.07	0.11	-0.30	-0.43	-0.16	-0.70	-0.59	-0.23	0.27	-0.20	0.84	0.11	-0.07	0.78	1.00				
Busfree	0.06	-0.13	-0.21	-0.46	0.15	0.22	0.16	-0.01	0.25	-0.28	-0.04	0.45	-0.33	0.20	0.29	0.18	-0.19	0.40	0.53	0.50	0.32	0.30	1.00			
Monfree	0.09	-0.70	-0.69	0.43	-0.76	-0.23	-0.13	-0.05	0.19	-0.20	0.10	0.41	0.31	0.41	0.16	0.41	0.73	-0.14	0.52	0.49	-0.39	-0.10	-0.05	1.00		
Trade	0.03	-0.05	-0.12	-0.55	0.36	0.05	-0.13	0.05	0.18	-0.10	0.13	0.38	0.00	0.34	0.26	-0.10	-0.25	0.03	0.28	0.27	0.09	-0.08	0.64	-0.20	1.00	
Invest	0.02	-0.51	-0.52	-0.06	-0.24	-0.33	-0.31	0.07	0.29	-0.09	0.27	0.51	0.27	0.58	0.15	0.11	0.38	-0.24	0.56	0.57	-0.32	-0.31	0.26	0.41	0.51	1.00
Finfree	0.11	-0.21	-0.26	-0.10	-0.29	0.36	0.39	-0.14	0.12	-0.36	-0.30	0.25	-0.28	-0.08	0.22	0.48	0.14	0.56	0.42	0.32	0.33	0.63	0.47	0.28	-0.03	-0.18

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