Institutional Development, Capital Ratios, and Bank Lending: Evidence from a Global Context

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Abstract

This paper examines the effect of capital ratios and institutional variables on bank lending in a global context. For this purpose, a Two-stage least square model is employed on a sample of commercial banks operating in 51 countries around the world from 2004 to 2015. Findings show that banks detaining higher capital ratios and operating in more developed institutional environments exhibit higher loan growth. Also, higher levels of institutional development alleviate pressure on lending during economic downturns. The results obtained in this paper contribute to the bank lending and the law and finance literature and have important policy implications.

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Abstract

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I- INTROUCTION

Banks play a key role in any economy by providing credit, creating liquidity and transforming maturities. Thus, their contribution to economic growth is highly crucial and has been widely documented in the literature (King and Levine 1993, Rajan and Zingales 1995, 1998, Levine et al 2000).

At the same time, banks are forced to maintain certain levels of capital and liquidity to ensure resiliency during unforeseen events. The banking industry has always been the most regulatory industry. Regulations were even more enhanced after the 2008 global financial crisis to included additional liquidity requirements (Basel III, Basel Committee on Banking Supervision, 2010). Regulators and policy makers' main aim behind rising regulatory stringency has always been ensuring stability and resiliency of the financial sector in order to prevent crisis and contagion. In fact, capital regulations bound moral hazard of banks which is caused by the existence of deposit insurance. However, such requirements do not seem to come without a cost. Many researchers have been arguing on the negative implications of capital requirements, especially on the real sector. If banks have to face higher regulatory minima, they might react by reducing lending since a reduction in loan supply increases capital ratios. Thus, one main concern is whether higher capital ratios result in a shortage of bank loans since such a negative relationship directly influences investment and has devastating consequences on the real sector and the economy in a given country.

In fact, the effect of capital ratios on lending has been highly controversial in existing literature. Berrospide and Edge (2010) find minor impact of bank capital levels on bank lending growth for large bank holdings. However, in a more recent paper, Ben Naceur et al. (2018) show that bank capital ratios have a significant negative effect on bank lending when considering a sample of large European banks . In effect, some papers provide evidence of a significant negative effect of capital ratios on lending (Bernanke and Lown (1991) , Berger and Udell (1994), Peek and Rosengren(2000), Gambacorta and Marques Ibanez (2011)) while others find a positive effect (Furlong (1992),Holmström and Tirole (1997), Brei et al. (2013), Bridges et al. (2014) and Košak et al. (2015). The important thing to answer in such a context is whether banks increase their capital ratios by reducing global lending or by attempting regulatory arbitrage or even by injecting capital. To what extent do bank capital ratio changes originate from a change in banks'

loan portfolio? In fact, many researchers attempted to answer this question without a consensus on the sign and the significance of the relationship between capital ratios and lending.

Could there be other factors which could explain discrepancies in the results of existing studies? In fact, ever since the seminal papers by La Porta et al. (1997, 1998, 2002) which pointed out that institutions might serve to explain cross country financial development discrepancies, researchers have been more focusing on the role of the legal and institutional environment when studying bank behavior. Demirgüç-Kunt & Maksimovic (1999) document that a significant part of long-term debt variation can be explained by country level legal and institutional foundations. In the light of that several researchers argued on whether regulations should be more targeted to account for country and bank level characteristics. In a following paper, Demirgüç-Kunt et al., (2004) emphasized on the importance of accounting for institutional quality when studying costs of borrowing. Bae and Goyal (2009) show that contract enforceability significantly influences loan size and spread. As for Qi et al.(2010), they find the existence of a significant negative relationship between political rights and bond spreads.

In this research paper, I build on these two strands of the literature by studying whether the institutional environment and bank capital ratios affect bank credit growth. In fact, one primary determinant of the linkage between the financial sector and the real sectors lies in the relationship between capital ratio decisions and bank lending. Thus, it seems of high importance to study whether legal and institutional development hinder or promotes bank lending and whether a credit crunch is documented in a global context. Up to my knowledge, this study is the first attempt to examine this relationship.

The aim of this paper is thus to study the relationship existing between bank capital ratios, institutional variables and lending in a global context. Specifically, I aim to determine whether capital ratios and institutional country-level foundations are significant determinants of bank lending. To what extent does corruption, the rule of law, creditors' rights, political rights and other aspects of legal and institutional efficiency influence credit growth of commercial banks in a given economy? I aim to answer this question exhaustively, by further analyzing whether different bank characteristics affect this relationship. According to Weil (2011), institutional development may impact differently bank lending in different stages of economic development. Moreover, since bank lending is one of the major drivers of growth and economic prosperity especially in

underdeveloped and developing countries (which are usually more bank-based), studying the determinants and drivers of lending growth in the context of institutional development seems essential.

For this purpose, I use bank-level and macro-level panel data for the period extending from 2004 to 2015 for commercial banks operating in 51 countries. A Two Stage Least Square model is employed where total regulatory capital ratio serves as a dependent variable in the first equation while the growth of total bank loans is the main dependent variable in the second equation. Consistent with existing literature, findings provide evidence of a positive effect of capital ratios on lending growth. Institutional development also significantly promotes lending growth. In other words, countries exhibiting higher legal and institutional development seem to have higher loan growth rates. The influence of the institutional environment on bank lending also holds in times of crisis. According to the results obtained, concerns of a credit crunch following rising regulatory stringency should remain of minor importance, the focus should be more on developing countries' institutional and judicial efficiencies especially in underdeveloped economies.

The following sections of this paper are organized as follows: Section II gives an overview of the related literature. Section III describes the sample employed as well as the model and the methodology used. Section IV details all the variables used in the model. Section V presents the results as well as some robustness checks. Section VI concludes and provides some policy implications.

II- Related Literature

Many researchers attempted to study how banks adjust their lending following a change in their capital ratios. However, existing literature on the effect of bank capital ratios on lending has been conflicting. Some papers document minor or even no effect at all of capital ratios on lending (Berrospide and Edge (2010)). Other papers provide evidence of a significant negative effect of capital ratios on lending (Bernanke and Lown (1991) , Berger and Udell (1994), Peek and Rosengren(2000), Gambacorta and Marques Ibanez (2011)) while others find a positive effect (Furlong (1992),Holmström and Tirole (1997), Brei et al. (2013), Bridges et al. (2014) and Košak et al. (2015). The reason behind such conflicting results might perhaps be explained by differences in sample selection (different country selection or type of bank), methodology, or even time horizons (crisis versus non-crisis periods for example). From one side, an increase in capital ratio increases a bank's solvency and renders it more able absorb shocks which might allow the bank to supply more credit. On the contrary, since raising capital is expensive, many banks might increase their capital ratios by cutting down on their lending or transferring their loans from high credit risk (eg: commercial loans) to low or quasi risk-free treasuries. More specifically, two opposing theories regarding this issue and its conjunction with banks' liquidity creation are provided in the literature. The risk-absorption hypothesis stipulates that a bank holding a higher capital ratio has a higher risk absorption capacity and can thus afford to increase its liquidity creation, thus the positive relationship between capital ratios and lending (Von Thadeden 2004). On the contrary, according to the financial fragility crowding out hypothesis, higher capital ratios negatively influence banks' liquidity. Diamond (2001) shows that relatively less capitalized banks create more liquidity. Banks with more fragile capital structure monitor their loans more closely and stricter monitoring of borrowers implies a higher confidence in creating more loans. Bridges et al. (2014) study UK banks and provide a time bound explanation of bank behavior following a rise in capital regulations. At first, banks respond to an increase in capital requirements by gradually increasing their capital ratios to maintain the capital buffers they had. The year following a rise in capital requirements, lending is reduced. Gradually, as banks rebuild the capital they need to maintain their buffers, lending recovers within a three-year time span on average.

Some researchers argue that the effect of bank capital ratios on lending is conditional to the existing macroeconomic conditions. According to Jackson et al. (1999), banks in distress react in the most cost-effective manner by reducing their loan supply following an increase in capital

requirements. In their study of UK banks, Osborne et al. (2016) find that higher capital ratios increase lending rates only if the bank is not in a distress period. Likewise, Kwan (2010) shows that in an economic downturn, capital ratios have a positive influence on lending rates. In their paper, Brei et al. (2013) confirm the existence of a positive effect of bank capital ratios on lending growth which is amplified in times of crisis. Carlson et al. (2013) document that the positive effect exerted by capital ratios on lending only occurred during and directly after the global financial crisis. They also find evidence of a non-linear relationship between capital ratios and lending whereby the positive relationship between capital ratios and loan growth becomes weaker for higher levels of capital ratios. On the contrary when banks are operating close to the regulatory minima, the effect on lending growth is much higher. Many other researchers argue that the effect of capital ratios on lending depends on the regulatory pressure and the bank's capital position. Kim and Sohn (2017) find that higher capital ratios lead to higher lending only for large banks detaining a sufficient portion of liquid assets. The authors even find a negative effect of capital ratios on lending when banks are low on liquidity. Kosak et al. (2015) emphasize the fact that well capitalized banks perform better during crisis which allows them to cut less on lending compared to banks with lower capital ratios. High bank capital ratios can thus prevent banks from decreasing their lending activities during a recession. Capital requirements, in this scope are deemed essential not only for maintaining bank resiliency and solvency during crisis but also in ensuring that the supply of credit by banks is maintained to further prevent an amplification of a crisis.

In their paper, Berrospide and Edge (2010) study bank holding firms in the United states and find minor impact of bank capital ratios on lending growth. They postulate that some other factors might explain loan growth to higher extent such as macroeconomic factors. Another strand of literature pioneered by La Porta et. al (1997, 1998) emphasized on the role that legal and institutional foundations might be playing in shaping financial and economic development around the world. Many researchers following seminal papers of La Porta et al. have been arguing on the importance of accounting for the legal and institutional environment when studying financial intermediation discrepancies around the world. From one side, higher legal and institutional development on a country level implies a higher value of collateral tied to bank loans which might be associated with lower borrowing costs. At the same time, higher institutional development means that loans might also be extended to borrowers with lower profiling, thus leading to higher interest rates on loans. According to Demirguc-Kunt et al. (2004), institutional

quality is an important factor to consider when studying differences in costs of borrowing between countries. In their paper, they provide evidence that net interest margins are lower in countries with higher levels of property rights and economic freedom. They attribute this finding to higher values of collateral (thus lower costs of intermediation) in countries with higher judicial efficiency. Likewise, Bae and Goyal (2009) find that in countries endowed with a stronger rule of law and higher regulatory efficiency, the cost of debt seems to be lower. The authors specifically provide evidence of a significant negative relationship between creditors' rights and loan spreads. Bae and Goyal (2009) also point out the importance of the enforceability of contracts which seems to lower loans spreads by strengthening creditors' rights. Haselmann et al. (2010) find evidence that collateral law improvement increases bank credit supply more than enforced bankruptcy rules. As for Qi et al.(2010), they find the existence of a significant negative relationship between political rights and bond spreads.

In fact, higher creditors' rights coupled by a stronger rule of law makes banks more comfortable in increasing their credit as their perception of expected losses due to bad loans diminish. Qian and Strahan (2007) study how the existing contracting environment affects loans terms of large borrowers around the world. They find that the higher the creditor rights protection schemes, the longer the loans maturities, the lower the interest rates are and the more concentrated the loan ownership is. In his study, Weil (2011) shows that bank lending is negatively influenced by corruption, however this negative effect of corruption on lending is less pronounced for banks with higher risk aversion. Detragiache et al. (2008) also find that a negative effect of corruption on bank credit allocated to the private sector. Haselmann and Wachtel (2010) study the effect of country legal foundations on bank behavior. They find that banks in countries with under developed legal foundations lend more to large enterprises and the government as opposed to countries with more developed legal systems where lending is more oriented to SMEs. Gaibulloev and Younas (2016) examine the effect of political stability on credit supply to the private sector in developing countries. The authors find that internal conflict is associated with lower bank lending to the private sector with a prominent effect originating from the degree of ethnic fractionalization in a country. In the paper by Marcelin and Mathur (2004), higher institutional development is associated with lower cost of credit and a more developed financial sector. Hail and Leuz (2003) find that capital is less costly in countries with more developed legal and institutional systems.

Hence, the institutional environment might be impacting lending rates and growth through the cost of capital. Lending rates tend to be lower in countries with lower costs of capital.

From all of the above literature, I posit that institutional and legal development is associated with higher lending growth. I also hypothesize that the effect of capital ratios and the institutional variables on lending is conditional to the prevailing macroeconomic conditions, that is, whether the country is experiencing a downturn or a boom.

III- Sample & Methodology

In this section, I start by defining the final sample employed. I then present the model and methodology used to estimate it.

1. Sample description

I start by extracting bank-level data on a sample 4913 commercial banks around the world from Bankscope Bureau Van Dijk database. In order to minimize measurement errors, I exclude all observations lower than the 1st percentile and beyond the 99thpercentile. I also eliminate banks with less than three consecutive years of observations. Institutional variables and regulatory capital ratios[1] availability also further restrict the sample. I end up with panel of 966 commercial banks from 51 countries for the period 2004-2015. In this study, consolidated bank statements are used when available[2]. Institutional quality is obtained from: The World Bank Governance Indicators, The Doing Business database, and The Heritage Foundation database. Macro variables are sourced from the World Bank databases.

2. Model and Methodology

2.1 Model

The following two-stage least square (2SLS) model is employed to study the influence of institutional variables, bank-specific variables, and other macroeconomic variables on commercial bank loan growth (GGL):

[1] Regulatory capital ratios are less reported by banks compared to leverage ratios.
[2] If no consolidated data is available, unconsolidated statements are used.

$$[1] \quad TCR_{it} = \gamma_0 + \sum_{f=1}^{F} \gamma_f S_{fi,t} + \sum_{j=1}^{J} \gamma_j W_{ji,t-1} + \sum_{k=1}^{K} \gamma_k X_{ki,t-1} + \sum_{l=1}^{L} \gamma_l Y_{li,t-1} + \sum_{m=1}^{M} \gamma_m Z_{mi,t} + u_{it}$$

$$[2] \quad GGL_{it} = \beta_0 + \beta_1 \widehat{TCR} + \sum_{j=1}^{J} \beta_j W_{ji,t-1} + \sum_{k=1}^{K} \beta_k X_{ki,t-1} + \sum_{l=1}^{L} \beta_l Y_{li,t-1} + \sum_{m=1}^{M} \beta_m Z_{mi,t} + C_t + v_{it}$$

where the dependent variable in the first equation [1] is TCR, the total capital adequacy ratio for bank k at time t. $S_{fi,t}$ denotes the vector of instruments used for TCR. The latter includes a measure of bank size proxied by the lag of total assets (log_TA) , the return on equity ratio (ROE), and a measure of the regulatory capital stringency per country. Size and ROE are use in their first lag to mitigate possible endogeneity issues. $W_{ji,t-1}, X_{ki,t-1}, Y_{li,t-1}$are vectors containing institutional variables, bank-level variables, and macroeconomic indicators respectively. $Z_{mi,t}$ includes dummy variables accounting for crisis periods and bank characteristics.

In the second equation [2], GGL, the dependent variable, denotes the growth of gross loans for bank i at time t expressed in percentage. The growth rate is calculated as follows: [(Gross Loans_{t} - Gross $\text{Loans}_{t-1)}$)/ (Gross $\text{Loans}_{t-1)}$)]*100. $\widehat{TCR}_{it}$ is the estimated total capital adequacy ratio results obtained from the first equation of the model. $W_{ji,t-1}, X_{ki,t-1}, Y_{li,t-1}$are vectors containing institutional variables, bank-level variables, and macroeconomic indicators respectively. Bank-specific variables are included at their one year lagged values. $Z_{mi,t}$ includes dummy variables accounting for crisis periods and bank characteristics. Finally, (C_t) controls for time fixed effects and global trends in lending. Each institutional variable is included at a time in a regression since institutional variables are highly correlated. Nevertheless, I also use Principal component analysis to build composite indices and allow the inclusion of several institutional measures simultaneously in the regression analysis.

2.2 Capital ratio endogeneity and Instrumental Variable Approach

I use an instrumental variable (IV) regression to model bank capital ratios and lending in a two-stage least squares (2SLS) regression framework. The reason behind using a 2SLS model with capital adequacy ratio as a dependent variable in the first equation is because I suspect that capital ratios are endogenous to lending. A plausible explanation of this endogeneity is the fact that banks may increase their capital ratios whenever they anticipate increasing their loan supply.

Another explanation of a causality from lending to capital ratios is that capital ratios might increase following a higher GDP growth which might in turn increase the growth of lending (Berrospide and Edge 2010). Moreover, banks do not choose their capital ratios first and then decide on their amount of credit supply. Such a decision might co-exist and an inverse causality could exist (Van den Heuvel 2007). Using year lags might have dealt with simultaneity issues. However, according to (Reed, 2015), the problem of simultaneity is not always dealt with by using lagged variables, especially when serial correlation is expected. Nevertheless, the challenge in 2SLS models relies in finding instruments adequality correlated with capital ratios without being correlated with the error term u_{it}. Instruments tests (over-identification tests, endogeneity tests, and first stage tests) confirm the validity of the instruments suggesting their effective use in the instrumental variable regression. Detailed description of the variables and instruments employed is provided in the following section.

IV- Variable Description and Hypothesis Setting

1. First Equation – Capital Ratios

In the first equation the dependent variable is the total capital adequacy ratio. This ratio as per Basel rules is the ratio of the sum of Tier 1 and Tier 2 capital (hybrid capital, subordinated debt, reserves for loan losses, and valuation reserves) to total risk weighted assets and off-balance sheet items. The reason behind using regulatory capital ratios and not simple leverage non-weighted ratios since risk-weighted ratios reflect a bank's solvency better (Gambacorta and Marquez-Ibanez 2004). As mentioned previously, the challenge in 2SLS methodology lies in finding adequate instruments correlated with TCR without being correlated with the error term. In this model, three variables are used to instrument TCR which are validated by various instrument tests. First, I consider a measure of capital regulations' stringency (cap_string) and regulatory capital minima (min_CAR). Second, I use a measure of bank profitability. Profitability is proxied using return on equity ratio (ROE) which is the ratio of net income to total equity. Profitability is expected to boost capital ratios as more profitable banks tend to have higher capital to assets ratio by injecting their retained earnings into capital, consistent with the pecking order theory (Gropp and Heider 2010; Brewer et al 2008).

2. Second Main Equation – Lending Growth

2.1.Dependent Variables

The main dependent variable employed is the annual growth rate of total gross loans (*GGL*) following Gambacorta and Mistrulli (2004), Berrospide and Edge (2010), and Foos et al. (2010). Total loans include mortgage loans (residential and other mortgage loans), consumer and retail loans, corporate and commercial loans and other loans to the non-financial sector. Loan variables as well as other bank-specific variables are extracted form Bureau Van Dijk Bankscope database.

2.2 Independent variables

2.2.1. Institutional variables

First, I consider two indicators from the World Development Indicators of the World Bank. These indicators are scaled from 0 to 5 with higher values indicating higher institutional development. The first variable is a measure of regulatory quality (RQ). This variable accounts

for the state's ability to articulate and implement thorough regulations and policies which contributes to a better development of the nation's private sector. Bankers are expected to be more comfortable in increasing their credit supply to the private sector when levels of regulatory quality are higher. According to Bae and Goyal (2009), by enhancing the loan repayment probability which itself is induced by better lending terms, institutional variables positively affect lending. Also, by empowering judicial efficiency that is essential for loan repayment enforcement, institutional quality seems to boost lending growth (Schiantarelli et al., 2016). All in all, a positive sign is expected on RQ.

Another variable from the World Governance Indicator is a measure of Voice and accountability (VA). This variable measures the freedom of expression, freedom of the media and the degree of participation of citizens in electing their government. Qi et al. (2010) study bond markets and find that political rights are as important as creditor's rights in determining costs of debt. The authors provide evidence that political freedom leads to higher transparency. The latter makes information much more available the fact that decreases bond riskiness and reduces the cost of debt. I thus predict a positive sign on VA whereby banks in countries with higher levels of voice and accountability exhibit higher loan growth.

Two indicators are extracted form the Doing Business database; resolving insolvency and protecting investors. The Resolving Insolvency (RI) variable includes the time, costs, outcome of insolvency, liquidation, and reorganization proceedings. The protecting investors indicator is a proxy of shareholders' rights. It is calculated based on 2 indexes: the extent of conflict of interest regulation and the extent of shareholders' rights index (simple average of both indices). These two indicators are scaled from 0 to 100 with higher scores indicating stronger rights. Results concerning the effect of creditors' rights on lending have been mixed in the literature. Higher creditor rights might lead managers to limit debt usage to avoid losing control should financial distress prevail (Rajan & Zingales 1995; Acharya et al 2011, Cho et. al 2014). According to this literature, bank managers tend to protect their own benefits by choosing to limit their loan supply and reduce asset volatility. Higher creditors' rights under this view will result in lower loan growth. At the same time, higher creditor rights results in less information asymmetry and easier access to external funding. Thus, credit would be available at more favourable conditions. Hence, firms in this case might be relying more on credit (La Porta et al. 1997; González & González 2008). From another perspective, according to Bae and Goyal

(2009), stronger legal rights helps increase contracting efficiency, which lowers the cost of debt. They show that higher creditors' rights is negatively associated with loan spreads. Lower loan spreads results in higher loan growth. Hart and Moore (1994, 1998) elaborate on the power theory of credit which states that lending is higher when forcing repayment by borrowers is easier. According to this theory, banks will be willing to lend more in countries with higher creditors' rights. Hence, I posit that higher creditors' rights is associated with higher loan growth.

I also use an indicator of economic freedom from the World Heritage Foundation. The aggregate index, the Economics Freedom (EF) index, measures the extent to which individuals can control freely their property and labour. The Economic Freedom Index is computed as the simple average of the following ten sub-indicators: Property rights, Freedom from corruption, Fiscal Freedom, Government Spending, Business Freedom, Labor Freedom, Monetary Freedom, Trade Freedom, Investment Freedom, and Financial Freedom. This indicator assesses to what extent capital, labour, and goods can move freely in a given economy. The EF Index is scaled from 0 to 100 with increasing levels indicating higher economic freedom. Higher economic freedom levels indicate lower barriers on doing business and investment which usually boosts competition in a given economy. Higher competition induces higher investment growth (Alesina et al. 2005) the fact which leads to higher credit growth. Also, higher levels of economic freedom might make it easier for banks to assess the lender's creditworthiness which makes banks able and willing to supply a larger amount of credit. Managing collateral is also expected be easier in higher economic freedom environments. Hence, a positive sign is expected on the Economic freedom variable.

2.2.2. Supply side - Bank specific variables

First, the fitted values of the total capital adequacy ratio (TCR) are included, which are obtained from estimating the first equation of the model. As mentioned previously, studies exploring the effect of regulatory bank capital ratio on lending haven't reached a consensus in existing literature. While some papers document a significant negative effect of capital ratios on lending (Bernanke and Lown (1991) , Berger and Udell (1994), Peek and Rosengren(2000), Gambacorta and Marques Ibanez (2011)), others find a positive effect (Furlong (1992), Holmström and Tirole (1997) Berrospide and Edge (2010), Brei et al. (2013), Bridges et al. (2014) and Košak et al. (2015). These two opposing views provide opposing solid arguments to justify each causality.

On one hand, an increase in capital ratio increases a bank's solvency which makes it more able to absorb shocks the fact that might allow it to supply more credit. On the contrary, since raising capital is expensive, many banks might increase their capital ratios by cutting down on their lending or transferring part of their loans from high credit risk (e.g.: commercial loans) to risk-free treasuries, thus a decrease in lending is observed when studying total commercial loan growth. Hence, from existing literature, I am unable to predict whether a credit crunch is expected or not following a rise in capital ratios.

To account for supply side factors that might affect bank lending, I include in the model bank-level variables commonly used in the literature. Time-varying bank-specific variables are lagged one year in order to deal with possible endogeneity issues. First, I control for banks' risk appetite using the ratio of non-performing loans to total loans (NPLGL) as in Fiordelisi et al. 2011 and Distinguin et al. 2013. I expect risk to negatively influence loan growth. Banks's lending desire is expected to decrease when facing a higher credit risk due to a worsened loan quality ((Berrospide and Edge, 2010; Panetta, 2013; and Cucinelli, 2015). I control for liquidity ratio using loans to total assets (NLTA) as in Valverde and Fernandez (2007). This ratio indicates what percentage of the bank's assets are tied up in loans. The higher the ratio, the less liquid the bank will be. I expect then a negative sign on this variable. Finally, I control for bank size by using the logarithm of total assets held by banks (log_TA).

2.2.3. Demand side - Macroeconomic variables

Controlling for country-level macroeconomic factors are essential when studying bank loan growth. Many studies have shown that macroeconomic variables explain to a large extent growth of credit (Berrospide and Herrerias 2015, Brei et al 2013, Gambacorta 2005). Macroeconomic data is sourced from the World Bank databases.

To control for the macroeconomic environment, two measures accounting for the GDP growth and the prevailing interest rate are included in the model. The GDP growth (GDP_Gr) is the annual growth rate of domestic product in a given economy. During an economic boom, investment rises and demand for credit is expected to increase as well (Talavera et al., 2012,

Chen et al., 2010). Banks in upturns are encouraged to lend more as the demand for credit also increases. GDP is expected to positively influence loan growth.

To control for the interest rate and inflation in a given country and consequently the effect of the central bank's monetary policy on lending, I use the real interest rate (RIR) which is deflated. The reason behind this choice is that including both inflation and the nominal interest rate is not adequate due to high correlation between those two variables. The RIR (real interest rate) is thus the lending rate adjusted for annual inflation levels. A negative impact of the real interest rate is anticipated on lending.

Since bank lending growth might be dependent on the relative development of capital markets, I use the ratio of market capitalization to GDP to construct a dummy variable which equals to one for a market capitalization to GDP ratio higher than the median of the sample and zero otherwise. This dummy variable will thus control for whether banks in countries with highly developed stock markets behave differently compared to countries where stock markets are less developed. The reason behind not using the market capitalization to GDP ratio instead of a dummy variable is the fact that this former is highly correlated with institutional variables. This is explained by the fact that financial systems in developing countries (with underdeveloped institutions) tend to be much more bank based than developed countries which are relatively more market based (Demirguc-Kunt and Huizinga 2010). I expect lending growth to be higher in relatively less developed stock markets as banks would be playing a more prominent role in the economy.

2.2.4 Other variables

I also account for bank concentration using the Herfindahl Index of concentration by asset size (hhi_TA). Lower concentration implies higher competitiveness which might push banks to decrease their lending costs which in its turn may lead to higher demand for bank credit (Beck et al 2004). Thus, bank concentration is expected to have a negative effect on lending.

To account for financial markets' development, I add to to regression a variable accounting for stock market development. MK_GDP is the ratio of stock market development to GDP. Due to high correlation between this variable and institutional variables, I only include a dummy : MK_GDPdum which equals one if stock market development is higher than the median of the

sample and zero otherwise. This way I would control if countries with highly developed stock markets behave differently compared to countries where stock markets are less developed.

The regression analysis also includes dummy variables to account for the global financial crisis period. Crisis810 is a dummy variable that takes the value of 1 for years 2008-2010 and zero otherwise. A dummy variable accounting for mergers and acquisitions that might be associated with an external peak in credit growth is also added to the model. In other words, I aim to control for any spurious loan growth that me be simply reflecting a larger loan portfolio originating from an acquisition. As in Lepetit et al, I use a dummy variable to account for M&As (dum_GTA) and deal with the important noise that such effects might bring to the regression. This variable takes the value of 1 for an asset growth higher than 35% and zero otherwise.

V- RESULTS

1. Descriptive Statistics

Table (1) presents the descriptive statistics of the sample used in this study. Mean GGL and TCR are respectively at 19.95% and 17.49%. I notice that the TCR average for the global sample is much higher than international standards and Basel requirements. The highest lending growth rate over the sample period is observed in Venezuela at 61.8% while the lowest is in Japan at 3.4%. Around the world, banking sectors seem on average highly concentrated with a sample mean value of 64.8%. Most concentrated banking sector is in South Africa with an asset concentration ratio reaching 99.12%.

[[insert table 1 here]]

Table (2) displays the correlation matrix between all variables employed. No major correlation issues exist between the variables except for institutional variables which exhibit high correlation coefficients among each other. Hence, to avoid multicollinearity complications, I include one institutional variable at a time when running the regressions. Institutional variables also exhibit slightly high correlation coefficients with GDP growth rates. I run the VIF (Variance Inflation Factor) test following Besley et. al (1980) to make sure that including these variables simultaneously in the regression is not associated with multicollinearity issues. Values lower than 5 are obtained which suggests that including institutional variables and GDP growth rates at the same time in the regression is viable and not associated with multicollinearity issues that might lead to misleading results.

[[insert table 2 here]]

2. Main Regression Results

Table 3 reports the main regression results of the second equation of the 2SLS model. Lending growth is the dependent variable in all equation[3]. As mentioned previously, I include institutional variables separately in every regression to avoid correlation issues. As can be seen, all institutional variables have positive signs and are highly significant. TCR which is estimated in the first equation has a marginal positive sign. Also, all test results justify the instruments used for TCR (Kleibergen-Paap rk LM statistic, Endogeneity test, and First-stage Sanderson-Windmeijer F test). Among control variables, I find that risk, liquidity, and concentration are highly negatively significant in explaining lending growth. Among macroeconomic variables, as one would expect GDPgr has a positive and highly significant sign. Size and stock market development are on the contrary not significant.

According to the findings, countries with higher levels of regulatory quality and voice and accountability exhibit higher loan growth. The results also support the transparency hypothesis whereby higher creditor's rights promote transparency and thus favor lending. For Economic freedom, results validate the set hypothesis whereby higher economic freedom boosts economic growth by facilitating collateral management and boosting competition.

Hence, findings obtained confirm the set hypotheses which stipulated that higher lending growth is observed when institutions are more developed. Consistent with Bae and Goyal (2009), by enhancing the loan repayment probability which itself is induced by better lending terms, institutional variables positively affect lending. Also, by empowering judicial efficiency that is essential for loan repayment enforcement, institutional quality seems to boost lending growth (Schiantarelli et al., 2016).

[[insert table 3 here]]

[3] To render the paper more focused, we do not report the regression results of the first equation. Results available upon request.

3. Further Investigations

To account for the simultaneous effect of institutional variables on lending, I use a principal component analysis and employ the first principal component (INST1) of RQ, VA, PI and EF. Using INST1 thus allows the inclusion of a measure of the different institutional measures in the regression analysis. Column (1) of Table 4 shows the regression results for the principal component analysis. INST1 has a significant positive sign at the 1% confidence level which confirms the main findings and alleviates concerns of including institutional variables in separate regressions. Institutional development seems to be manifested by stricter regulatory efficiency which affects bank behavior. Bank managers seem less hesitant in increasing the quantity of loans in countries where high quality laws and institutions dominate.

Additionally, test whether the effect of the institutional environment on lending is different during economic downturns. For this purpose, I introduce into the model in the second main equation an interaction term (INST*Crisis) between the global financial crisis period (2008-2010) and the first factor of institutional variables. Results are presented in column (2) of Table (4). The positive and significant sign on INST1 shows that institutional quality strongly boosts loan growth in normal times (significant at the 1% level). The positive coefficient on INST*crisis and the significant Wald tests I obtain shows that the effect of the institutional quality on lending is also positive and significant in times of crisis. Institutional development seems to positively influence loan growth even in times of crisis. The sign on the Crisis variable is econometrically insignificant but is in fact negative. In the literature, it has been well documented that a decrease in bank lending during times of crisis further amplifies the effect of the crisis since bank lending is considered one of the main channels affecting investment and the real sector. Institutional development might thus be effective in alleviating pressure on bank lending in times of crisis. Thus, in countries endowed with higher levels of institutional development, better resiliency and less amplification of the repercussions of a financial crisis might be observed.

[[insert table 4 here]]

VI- Conclusion

This paper explored the relationship existing between bank capital ratios, institutional variables and lending using bank level panel data from 2004 to 2015 for commercial banks operating in 131 countries. A Two Stage Least Square model is employed by instrumenting total regulatory capital ratio before running the lending equation. Consistent with existing literature, findings provide evidence of a positive effect of capital ratios on lending growth. This finding reinforces the role of capital regulations that do not seem to lead to a credit crunch according to the results. Institutional development also significantly promotes lending growth. More specifically, countries exhibiting higher legal and institutional development seem to have higher loan growth rates. The positive influence of the institutional quality on lending also hold during times of crisis. Institutional development might thus be effective in alleviating pressure on bank lending in times of crisis. It thus seems that promoting institutional and regulatory development is essential in generating better financial outcomes and resiliency, and henceforth higher economic growth and prosperity.

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Table 1. Descriptive Statistics

	Mean	S.D.	Min	Max
GGL	14.978	23.432	-43.71	223.02
TCR	15.675	7.123	8.320	62.36
log_TA	15.552	1.752	9.597	18.593
NPLGL	4.387	4.797	0	32.9
NLTA	58.909	17.181	0.658	98.787
GDPgr	3.428	4.068	-14.150	15.24
MK_GDPdum	0.082	0.275	0	1
RIR	3.672	3.705	-9.355	28.44
BANK_CONC	67.171	15.192	39.37	99.9
dum_GTA	0.101	0.301	0	1
crisis810	0.323	0.468	0	1
RQ5	3.060	0.727	1.535	4.763
VA5	2.860	0.962	0.813	4.178
PI	58.156	12.258	30.0	96.67
EF	63.969	9.033	44.1	89.4

This table reports the descriptive statistics of all variables employed for the period 2004-2015. GGL is the loan growth rate. TCR is the total capital adequacy ratio. log_TA is calculated by the log of the total assets held by a bank. NPLGL is a measure of risk and is equal to the ratio of non-performing loans to total loans. NLTA is a measure of liquidity and is the portion of net loans in total assets. GDPgr measures the annual GDP Growth rate. MK_GDP is a dummy variable accounting for stock market development. RIR is the real interest rate. BANK_CONC is a measure of bank concentration calculated as the ratio of the assets of the 5 largest banks in a given country to total banking assets. dum_GTA a dummy variable to account for M&As, it takes the value of 1 for an asset growth higher than 35% and zero otherwise. Crisis810 is a dummy variable that takes the value of 1 for years 2008-2010 and zero otherwise. RQ5 measures regulatory quality. VA5 is a measure of voice and accountability. PI accounts for the degree of protection of investors. EF is the economic freedom index. All the ratios are expressed in percentages. Size is the natural logarithm of total assets which is in thousand U.S Dollars.

Table 2. Correlation Matrix

	GGL	TCR	log_TA	NPLGL	NLTA	GDPgr	MK_GDPdum	RIR	BANK_CONC	dum_GTA	crisis810	RQ5	VA5	PI	EF
log_TA	-0.19	-0.43	1												
NPLGL	0.19	0.03	-0.18	1											
NLTA	-0.08	-0.23	0.02	-0.02	1										
GDPgr	0.29	0.05	-0.07	-0.24	-0.22	1									
MK_GDPdum	0	0.05	-0.08	-0.1	0.05	0.09	1								
RIR	0.02	0.07	-0.13	0.13	0.06	-0.09	-0.09	1							
BANK_CONC	-0.07	0.1	-0.15	0.1	0.11	-0.24	0.33	0.07	1						
dum_GTA	0.53	0.1	-0.17	-0.09	-0.12	0.17	0.01	0	-0.01	1					
crisis810	0.03	0	-0.04	0.02	0.02	-0.12	-0.05	-0.03	0.02	0.06	1				
RQ5	-0.24	-0.13	0.19	-0.01	0.3	-0.59	0.18	-0.01	0.46	-0.14	-0.02	1			
VA5	-0.21	-0.1	0.1	0.08	0.36	-0.63	0.1	0.05	0.2	-0.17	-0.03	0.78	1		
PI	-0.13	-0.13	0.21	-0.12	0.28	-0.26	0.01	-0.03	-0.04	-0.1	-0.04	0.44	0.48	1	
EF	-0.23	-0.07	0.17	-0.06	0.26	-0.52	0.23	0	0.44	-0.16	-0.04	0.91	0.7	0.44	1

Table 3. Main Regression

	(1)	(2)	(3)	(4)
TCR	3.039*	3.432*	3.911*	3.463
	(1.72)	(1.84)	(1.80)	(1.63)
RQ	14.63***			
	(2.82)			
VA		23.39***		
		(3.11)		
PI			0.521**	
			(2.10)	
EF				0.643**
				(2.00)
L.log_TA	-7.619	-7.003	-6.031	-6.914
	(-1.31)	(-1.18)	(-0.83)	(-1.04)
L.NPLGL	-1.003***	-0.999***	-0.991***	-0.926***
	(-4.86)	(-4.68)	(-4.46)	(-3.76)
L.NLTA	-0.852***	-0.834***	-0.818***	-0.808***
	(-6.55)	(-6.36)	(-5.31)	(-5.49)
GDPgr	1.022***	1.080***	1.230***	1.228***
	(3.09)	(3.22)	(3.27)	(2.84)
MK_GDPdum	-3.318	-2.704	-2.649	-3.536
	(-1.57)	(-1.23)	(-1.08)	(-1.64)
RIR	-0.00220	0.0111	0.0638	0.0561
	(-0.02)	(0.08)	(0.45)	(0.39)
BANK_CONC	-0.291***	-0.246**	-0.419***	-0.379**
	(-2.69)	(-2.25)	(-3.15)	(-2.51)
dum_GTA	28.82***	28.95***	28.79***	29.84***
	(12.45)	(12.19)	(10.91)	(12.16)
crisis810	-3.122	-2.815	-2.754	-3.300
	(-1.56)	(-1.36)	(-1.17)	(-1.62)
Nbr. of obs.	4376	4376	4138	3791
Nbr. of groups	966	966	951	832
Hansen J				
Chi-square	0.702	0.178	0.289	0.651
P-value	0.4021	0.6734	0.5908	0.4197
Kleibergen-Paap rk LM statistic				
Chi-square	9.252	9.190	9.346	7.184
p-value	0.0098	0.0101	0.0093	0.0275
Endogeneity test				
Chi-square	7.504	8.956	8.004	6.141
p-value	0.0062	0.0028	0.0047	0.0132
First-stage Sanderson-Windmeijer F test:				
Chi-square	4.69	4.67	5.04	3.64
p-value	0.0094	0.0096	0.0066	0.0268

*This tables displays the main regression results of the second equation [2] of the 2SLS model. GGL, the loan growth rate is the dependent variable in all regressions. TCR is the total capital adequacy ratio. RQ measures regulatory quality. VA is a measure of voice and accountability. PI accounts for the degree of protection of investors. EF is the economic freedom index. L.Log_TA is calculated by the log of the total assets held by a bank (lagged one period). L.NPLGL is a measure of risk and is equal to the ratio of non-performing loans to total loans (lagged one period). L.NLTA is a measure of liquidity and is the portion of net loans in total assets (lagged one period). GDPgr measures the annual GDP Growth rate. MK_GDP is a dummy variable accounting for stock market development. RIR is the real interest rate. BANK_CONC is a measure of bank concentration calculated as the ratio of the assets of the 5 largest banks in a given country to total banking assets. RIR is the real interest rate. BANK_CONC is a measure of bank concentration calculated as the ratio of the assets of the 5 largest banks in a given country to total banking assets. Dum_GTA a dummy variable to account for M&As, it takes the value of 1 for an asset growth higher than 35% and zero otherwise. Crisis810 is a dummy variable that takes the value of 1 for years 2008-2010 and zero otherwise. All the ratios are expressed in percentages.Size is the natural logarithm of total assets which is in thousand U.S Dollars. Reported beneath each coefficient estimate is the t-statistic adjusted for clustering at the bank level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

Table 4. Principal Component Analysis and Interacting Institutional Quality with Crisis Periods

	(1)	(2)
TCR^	4.053	4.089
	(1.55)	(1.56)
INST1	7.940***	8.217***
	(2.66)	(2.73)
INST1*crisis		1.185*
		(1.67)
L.log_TA	-6.903	-7.589
	(-0.84)	(-0.93)
L.NPLGL	-0.697***	-0.685**
	(-2.63)	(-2.57)
L.NLTA	-0.849***	-0.846***
	(-4.89)	(-4.83)
GDPgr	1.210**	1.288**
	(2.44)	(2.51)
MK_GDPdum	-4.505*	-5.040**
	(-1.91)	(-2.16)
RIR	0.111	0.0744
	(0.72)	(0.49)
BANK_CONC	-0.344*	-0.329*
	(-1.78)	(-1.73)
dum_GTA	29.78***	29.71***
	(10.86)	(10.93)
crisis810	-1.254	-0.450
	(-0.49)	(-0.17)
Observations	3589	3589
Groups	820	820
Hansen J		
Chi-square	0.14	0.036
p-value	0.7079	0.8502
Kleibergen-Paap rk LM statistic		
Chi-square	6.905	6.839
p-value	0.0317	0.0327
Endogeneity test		
Chi-square	5.561	5.702
p-value	0.0184	0.0169
First-stage Sanderson-Windmeijer F test:		
Chi-square	3.72	3.68
p-value	0.0246	0.0255
Wald Test P-Value		0.003

*This tables displays the main regression results of the second equation [2] of the 2SLS model. GGL , the loan growth rate is the dependent variable in all regressions. TCR is the total capital adequacy ratio. . INST1 is the first principal component of RQ, VA, PI, and EF. INST1*crisis is an interaction term between INST and the crisis period. L.Log_TA is calculated by the log of the total assets held by a bank (lagged one period). L.NPLGL is a measure of risk and is equal to the ratio of non-performing loans to total loans (lagged one period). L.NLTA is a measure of liquidity and is the portion of net loans in total assets (lagged one period). GDPgr measures the annual GDP Growth rate. MK_GDP is a dummy variable accounting for stock market development. RIR is the real interest rate. BANK_CONC is a measure of bank concentration calculated as the ratio of the assets of the 5 largest banks in a given country to total banking assets. RIR is the real interest rate. BANK_CONC is a measure of bank concentration calculated as the ratio of the assets of the 5 largest banks in a given country to total banking assets. Dum_GTA a dummy variable to account for M&As, it takes the value of 1 for an asset growth higher than 35% and zero otherwise. Crisis810 is a dummy variable that takes the value of 1 for years 2008-2010 and zero otherwise. All the ratios are expressed in percentages.Size is the natural logarithm of total assets which is in thousand U.S Dollars. Reported beneath each coefficient estimate is the t-statistic adjusted for clustering at the bank level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*