
The effect of economic liberalization and business cycles on banking activities in the Euro area

Faten Ben Bouheni¹, Jean Joseph Minviel²

Abstract

We investigate the effect of economic liberalization and business cycles on banking activities (lending and capital). To do so, we develop a GMM-SUR procedure to estimate a system of two simultaneous equations for a sample of 722 commercial banks from 16 Euro-area countries. Interestingly, the results regarding the cyclical behavior of lending and capital show that lending is pro-cyclical and capital is counter-cyclical. The findings indicate that European banks tend to decrease (increase) lending during economic downturns (upturns), and their capital cannot sufficiently absorb losses, which may explain why these banks could not withstand the recent financial crisis. Moreover, economic liberalization positively impacts bank capital and lending. This finding indicates that higher degrees of control and restriction on the economy may hamper banking activities. However, we find that too much fiscal freedom may lead to the issue of non-performing loans by encouraging inefficient use of available resources and thus discourage banks to supply credit. We note also that banks held more capital and granted less credit during the 2008/2009 financial crisis in the Euro area, which could be explained by insolvency risk and the intensity of the crisis.

JEL classification: F62, G21, E44.

Keywords: Economic liberalization, business cycle, European banks, capital, lending

1. Introduction

In light of the recent global economic and financial crisis, the linkages between the real economy and the financial sphere are being increasingly scrutinized. Such analyses are relevant for better understanding the mechanisms of shocks' transmission between real activity and the financial sphere and may help circumvent economic and financial crises. The current paper fits into this perspective by focusing on the effect of business cycles and economic freedom on bank capital and bank lending in the Eurozone.

The banking sector has long been the subject of regulation because of its importance to the economy. Indeed, given stochastic returns due to default and market risk, banks do not have full control over their capital (see Stolz and Wedow, 2005). Hence, the most prominent regulatory measure requires banks to hold minimum capital as a way to absorb unexpected losses and negative capital shocks and, ultimately, reduce insolvency risk. However, this regulatory measure could limit banks' ability to lend in a recession (Heid, 2007). In fact, in a recession, banks may be forced to reduce their loan

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portfolio to meet capital requirements. However, if banks are well capitalized during economic upturns, they may be resilient in the case of a recession (see Guidara et al., 2013) and thus avoid a contraction in available credit. Against this background, an analysis of the behavior of bank capital over the business cycle may be very informative for policy makers regarding banks' lending behavior.

However, the occurrence of banking crises, notwithstanding the existence of specific regulatory measures (Basel accords), reveals that particular attention must be paid to key aspects of the economic environment within which banks operate. This can be done by considering the concept of "economic freedom" (see Miller and Kim, 2016). Broadly speaking, economic freedom reflects the liberty or guaranty for individuals to pursue their economic goals. It encompasses, among others, the freedom to enter and compete in markets and the freedom of movement for capital (Miller and Kim, 2016). Economic freedom can improve banking activity (Justesen, 2008) and increase the opportunity for banks to participate in economic activity by increasing the amount of funds available to the banking system (Giannetti, 2007; Shehzad and De Haan, 2008). However, it is worth noting that large capital inflows may cause overlending or encourage the financing of unprofitable projects and thus may lead to banking crises (Dewatripont and Maskin, 1995; Kaminsky and Reinhart, 1999; Caprio et al., 2001; Giannetti, 2007). In addition, investigating the behavior of bank capital and bank lending decisions over indexes of economic freedom may provide relevant policy control tools to policy makers.

This paper makes three major contributions to the existing literature. First, to our best knowledge, it is the first paper that addresses the impact of different indexes of economic freedom on both bank capital and bank lending activities in the European context. Moreover, the paper initiates a new reflection framework to investigate the linkages between real activity and the financial sphere. We examine in particular whether the lending activities and banking capital of Eurozone commercial banks move procyclically or countercyclically over the business cycle. A positive link implies procyclicality³ of lending (or capital), and a negative relationship denotes countercyclicality⁴. Second, the paper studies the effect of business cycles and economic freedom on bank capital and bank lending decisions simultaneously by developing a GMM-SUR estimation procedure. This procedure uses (i) GMM techniques (Blundell and Bond, 1998) to construct instruments and instrumental variables for the endogenous regressors and (ii) a panel data estimation method for a system of equations (Biørn, 2004; Nguyen and Nguyen, 2010) to estimate the model after replacing the endogenous regressors by their instrumental variables. Third, the paper uses an extensive dataset (1999-2013), which covers the last two regulatory environments (Basel II and Basel III) and the recent financial crisis of 2008/2009.

Our estimations show that lending is procyclical, and banking capital is countercyclical, meaning that European banks tend to decrease (increase) lending during economic downturns (upturns) and they are not well capitalized. Moreover, the overall index of economic liberalization positively impacts bank capital and lending, which reveals that higher degrees of control and restrictions in the economy may hamper

³ Lending (or capital) being procyclical means during economic upturns (downturns), the lending (or capital) of banks increases (decreases).

⁴ Countercyclicality indicates that during economic upturns (downturns), lending (or capital) decreases (increases).

banking activities. The same evidence is found for the specific indexes of economic freedom except for the effect of fiscal freedom on lending. We find that greater fiscal freedom may lead to the issue of non-performing loans and thus discourage banks to supply credit. The estimates also indicate that bank capital positively influences bank lending and that bank lending negatively impacts bank capital. This highlights that banks' decisions on how much capital to hold and how many loans to make are not sequential but simultaneous (see Karmakar and Mok, 2015). This may be another explanation for the fact that European banks hold little capital in economic upturns. In addition, we observe that banks held more capital and granted less credit during the 2008/2009 financial crisis, which may be explained by insolvency risk being perceived by bank managers and the severity of the crisis in the Eurozone.

The paper is organized as follows: section 2 presents the literature review, section 3 presents the data and methodology, section 4 focuses on the empirical findings, and section 5 concludes the paper.

2. Literature Review

The effect of business cycles and economic freedom on bank capital and lending is a fundamental issue in finance. However, the precise mechanism through which financial regulation and economic growth affect the cyclical behavior of bank capital and lending remains poorly understood. Existing research has established that bank lending is responsive to the external economic environment (Dell'Ariccia and Marquez, 2006; Keys et al., 2010; Meeks et al., 2014). In addition, experiences from bank crises have made regulators, shareholders and bank themselves more aware of the importance of sufficient capital buffers. Banks retain capital buffers above the regulatory minimum as a cushion to absorb adverse financial consequences (Shim, 2013; Guidara et al., 2013). Excess capital acts as an insurance against costs that may occur due to unexpected capital shocks and difficulties in raising new capital. As the Basel III agreements on banking supervision have recently endorsed, the management of capital buffers over the business cycle is increasingly important for reinforcing the financial stability of the banking systems.⁵ Under a new regime, banks are required to build up extra capital above the regulatory minimum requirement that can be used in stress (Shim, 2013). To overcome these challenges, this paper uses a system of two simultaneous equations for 722 commercial banks of 16 Euro area countries to investigate the question of whether bank lending and capital behave procyclically or countercyclically over the business cycle. We examine in particular whether the business cycle and economic liberalization (financial freedom, fiscal freedom, monetary freedom and freedom from corruption) have a positive (or negative) impact on the lending and bank capital of commercial banks. Cyclicity of bank capital (lending) is defined as the relationship between the business cycle and bank capital (lending). A positive sign implies procyclicality of bank capital (lending) and a negative sign denotes countercyclicality.

Recently, Ben Bouhenni and Hasnaoui (2017) investigated the cyclical behavior of the financial stability of commercial banks of the Eurozone using an unbalanced dynamic panel and the generalized method of moments system (GMM). They find a negative relationship between business cycle and bank risk-taking, indicating that risk-

⁵ The agreement on the Basel III reforms for international banking was reached in September 12, 2010 by the Group of Governors and Heads of Supervision.

taking by banks is countercyclical. In addition, their study shows that lending activity increases risk-taking whereas rising capital requirements boost financial stability. Moreover, their findings suggest positive co-movements between the business cycle and lending, compared to banks' capital, whereby the procyclicality of lending and bank capital have negative effects on the financial stability of commercial banks in the Eurozone. They conclude that the cyclical behavior of commercial banks, in terms of capital requirements and lending activities, depends on their size. Therefore, the lending and capital of smaller banks are procyclical whereas the lending and capital of larger banks are countercyclical.

Noss and Toffano (2016) mention that *“The recent financial crisis and economic contraction that followed highlighted the crucial role that banks play in facilitating the extension of credit and enabling economic growth. This underlies the economic rationale for imposing regulations on the banking industry, including minimum capital requirements designed to mitigate risks banks would not otherwise account for in their behavior. A growing international consensus is emerging on the need to re-orientate the regulatory framework to place stronger emphasis on the mitigation of risks in the financial system as a whole. One aim of the Basel III Accord is to raise permanently the level and quality of capital held by banks, in order to improve their ability to absorb loss.”*

We focus on the banking industry given the high level of regulatory oversight. The industry has witnessed many significant legislative actions, with major changes occurring especially after the recent international crisis (see for instance, Barth et al., 2012; Gropper et al., 2015; Ben Bouheni et al., 2016). There have been many studies in economics linking economic freedom and growth. Economic freedom has been shown to be positively related to economic growth. First, Gwartney et al. (1996) developed the Fraser Institute's measure of economic freedom of the world for the period of 1975-1995. Their major finding was that during the last two decades, there was a strong relationship between economic freedom and economic growth. In fact, countries with either a high level or a substantial increase in economic freedom achieved positive economic growth. Correspondingly, the overwhelming majority of countries with low and/or contracting levels of economic freedom experienced declines in per capita GDP. In countries with a high level of economic freedom, the average per capita GDP growth rate was 2.4% during the period of 1980-1994. In contrast, in countries with a low level of economic freedom, the average per capita GDP growth rate was -1.3%.

One study by Lawson and Roychoudhury (2008) examines state-level economic freedom and equity returns. They consider the time period from 1981 to 2000 and utilize a large sample of firms with over 7000 firm returns in 2000. Their overall conclusion is that firms operating in states deemed to be more economically free do display higher equity returns. Pasiouras and Gaganis (2013) note that the effect of economic freedom on the soundness of insurance firms through the channels of business, international trade, fiscal, labor, and property rights freedom is positive and statistically significant. Recently, Gropper et al. (2015), using historical information on state economic freedom from the Fraser Institute, investigated how the degree of economic freedom affects bank performance and how it interacts with the importance of political connections. They find that bank performance is positively related to state economic freedom. Lin et al. (2016) use economic freedom from the Heritage Foundation (2015) to investigate whether financial freedom strengthened or weakened the relationship between the changes in bank ownership and efficiency before and after 2008 Global Financial Crisis, by using data for banks in 12 Asian developing countries over the period of 2003–2012. They conclude that foreign presence improves bank

efficiency in countries with high financial freedom. In addition, they find that increased government (domestic) ownership of a bank appears to improve (impede) bank efficiency in countries with more financial freedom after a financial crisis.

The rapid expansion of the banking sector calls for a more sophisticated regulation system. As the banking sector grows, regulation issues become more complicated. Poor management of lending activities and non-adequate banking capital may cause serious banking system instability and contribute to an economic crisis. The recent 2007/2009 US sub-prime crisis is a good example.

3. Data and methodology

This empirical study is based on a Euro area sample of 722 commercial banks from 16 European countries⁶ for the period since the adoption of the Euro as currency in 1999 until 2013 (See Table A1 in Appendix for further information about the distribution of banks among countries). We note that the most commercial banks are located in Germany, with 137 banks, which represents 19% of the sample, followed by France, with 123 banks or 17% of the sample, and Italy, with 97 banks or approximately 13% of the sample. To ensure the reliability of our results, we eliminated countries that had recently entered the Euro area and have not provided data for at least five years. Thus, referring to the European Commission (2015)⁷, we exclude Lithuania, which joined the Euro area in 2015; Latvia, which joined in 2014; and Estonia, which joined in 2011. Today, the Euro area has 19 EU member states.

We highlight commercial banks operating in the Eurozone because the recent global financial crisis and the large losses incurred in several European countries have eroded bank bailout costs. These costs have a large impact on the real economy and thus, there is a need to better understand the cyclical behavior of the Eurozone's bank stability (Ben Bouhenni and Hasnaoui, 2017). As mentioned by Baselga-Pascual et al. (2015), the Eurozone countries must coordinate their economic and fiscal policies closely, much more so than the other European Union (EU) member states. In addition, Poghosyan and Čihák (2011) state that an important motivation in favor of more centralized banking regulation in the EU is the notion that risks in the banking sectors of EU members have become increasingly homogeneous. An improved understanding of bank activities fluctuations over the business cycle in the Eurozone is fundamental for regulators and supervisors interested in validation issues related to the new EU banking rules.

The main data source of bank-level information is BankScope of Bureau van Dijk (BankScope, 2015), which is a widely used database in banking studies. For country-level variables, we collect GDP and inflation data from the World Bank (2015), World Development Indicators (WDI). The database contains both listed and not listed commercial banks⁸. Unlisted banks represent the majority of banks in the EU⁹. These

⁶ Our sample is composed of the following Euro-area member States: Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain

⁷ For Euro-area member states, see http://ec.europa.eu/economy_finance/euro/adoption/euro_area/index_en.htm

⁸ We focus on commercial banks that engage in loan operations. We have included all banks that have commercial banking lending activity in our data set. The average ratio of loans to total assets is 0.485,

data set is among the most representative in the banking literature in terms of the number of years (15 years) and commercial banks in the Euro area.

The global financial crisis of 2007/2009 led international regulators to adopt a system-wide macroprudential approach to bank regulation, as mentioned by Borio (2011). The macroprudential perspective of regulation focuses on the soundness of the banking system as a whole and the inter-linkages between financial stability and the real economy (see, e.g., Adrian and Boyarchenko, 2012; He and Krishnamurthy, 2012).

Essentially, this paper investigates the relationship between lending activity, bank capital, and the real economy of the Euro area from 1999 to 2013 and how economic freedom indexes affect banking activities (lending and capital). As in Karmakar and Mok (2015), we believe that decisions on how much capital to hold and how many loans to make are not sequential but simultaneous. Against this background, we estimate a system of two simultaneous equations. To do so, we develop a GMM-SUR estimation procedure. This procedure uses (i) the GMM techniques suggested by Blundell and Bond (1998) to construct instrumental variables for the endogenous regressors and (ii) the panel data estimation method for system of equations (Biørn, 2004; Nguyen and Nguyen, 2010) to estimate the model after replacing the endogenous regressors with their instrumental variables. Our estimation procedure presents two main appealing features. First, it has the advantage of generating efficient instruments from the explanatory variables. Second, the SUR estimation for panel data uses random effects to correct for any potential correlation of residuals across equations (Biørn, 2004). As such, this procedure may improve the efficiency of the parameter estimates.

The system of simultaneous equations to be estimated is given by the following:

$$\begin{aligned} LENDING(LA)_{i,j,t} = & \mu_i + \theta_t + \beta_1(LA)_{i,j,t-1} + \beta_2(CAPITAL)_{i,j,t} + \beta_3(BUSINESS_CYCLE)_{i,j,t} + \beta_4(FINF)_{i,j,t} \\ & + \beta_5(CORRUP)_{i,j,t} + \beta_6(MONF)_{i,j,t} + \beta_7(FISCF)_{i,j,t} + \beta_8(CONTROLS)_{i,j,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

$$\begin{aligned} CAPITAL_{i,j,t} = & \mu_i + \theta_t + \beta_1(CAPITAL)_{i,j,t-1} + \beta_2(LENDING)_{i,j,t} + \beta_3(BUSINESS_CYCLE)_{i,j,t} + \beta_4(FINF)_{i,j,t} \\ & + \beta_5(CORRUP)_{i,j,t} + \beta_6(MONF)_{i,j,t} + \beta_7(FISCF)_{i,j,t} + \beta_8(CONTROLS)_{i,j,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

Dependent variables: To represents the relative importance of LENDING in a bank's activities, we use lending activities (*LA*): It is calculated as net loans over total assets and is used to control for the impact of business cycle on lending activities. This ratio suggests a risky profile (Jokipii and Milne, 2008). We expect a positive association between lending and the business cycle, since the former role of traditional bank is financing the economy through granting credit. The second dependent variable, *CAPITAL*, builds on the recent literature attempting to measure bank capital using

with a standard deviation is 0.289 and maximum and minimum values of 0 and 1, respectively. Therefore, there are a large number of banks for which lending activity is marginal.

⁹ Köhler (2014), using both listed and not listed European banks, finds that among the banks included in his sample more than 95% are not listed.

available information. We use the leveraged capital ratio (ETA), which is the ratio of shareholders' book equity over total assets, as in Flannery and Rangan (2008) and Guidara et al. (2013). $ETA = \text{Equity} / \text{Total assets}$. The ETA suggested by Berger et al. (2009) represents the capitalization ratio, and a higher ETA indicates a lower bank risk.

Explanatory variables: Following the existent literature (e.g., Shim, 2013, Bertay et al., 2015, Carvallo et al., 2015) to represent BUSINESS_CYCLE, we use the natural logarithm of annual GDP growth ($GDPG$). This macroeconomic variable is the most natural indicator of the aggregate business cycle for an economy. We predict that lending and capital are positively associated with the business cycle during economic upturns. Alternatively, a negative relationship is expected if banks decrease their risk-taking during economic downturns.

Economic liberalization is composed of the following variables. The first is financial freedom, which reflects financial liberalization (FINF): "*Financial freedom is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector...*" (Heritage Foundation, 2015). Several notable financial or banking crises have prompted many studies to explore financial liberalization, essentially blaming financial liberalization for having a strong link with crises (e.g., Demirgüç.-Kunt and Detragiache, 2001; Lee et al., 2016), even as some studies do not concur (e.g., Shehzad and De Hann, 2008). Thus far, the financial liberalization–crisis nexus in the literature offers no concrete conclusion. The second is freedom from corruption (CORRUP): "*Corruption erodes economic freedom by introducing insecurity and uncertainty into economic relationships*" (Heritage Foundation, 2015). Third is monetary freedom (MONF). According to the Heritage Foundation (2015), "*Monetary freedom combines a measure of price stability with an assessment of price controls. Both inflation and price controls distort market activity.*" Fourth is fiscal freedom (FISCF): "*Fiscal freedom is a measure of the tax burden imposed by government. It includes direct taxes, in terms of the top marginal tax rates on individual and corporate incomes, and overall taxes, including all forms of direct and indirect taxation at all levels of government, as a percentage of GDP*" (Heritage Foundation, 2015). Last is the overall score of economic freedom (ECF). The Heritage Foundation (2015) measures economic freedom based on 10 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom: (1) Rule of Law (property rights, freedom from corruption), (2) Limited Government (fiscal freedom, government spending), (3) Regulatory Efficiency (business freedom, labor freedom, monetary freedom), and (4) Open Markets (trade freedom, investment freedom, financial freedom). Each of the ten economic freedoms within these categories is graded on a scale of 0 to 100. Averaging these ten economic freedoms, with equal weight being given to each, yields a country's overall score.

The model includes bank-specific and country macro-controls¹⁰. Specifically, we control for various bank-specific characteristics, including Bank size ($SIZE$), which is included to capture size effects on lending and capital. Large banks are likely to have relatively higher risk-taking behavior since larger banks tend to be more diversified and have easier access to the capital markets than smaller banks (Shim, 2013). According to the "too big to fail" hypothesis, there is a high probability that larger banks will be bailed out by government assistance in the event of financial distress. As mentioned by Bertay et al. (2015), bank size captures the impact of a bank's too-big-to-fail status.

¹⁰ Bertay et al. (2015) consider that control variables are taken to be exogenous to limit the number of instruments and prevent overfitting.

Larger banks may be involved in riskier lending activities, since the moral hazard issue is likely to occur for them due to a government's safety net through implicit "too big to fail" policies. In contrast, the charter value acts as a restraint against moral hazard (Keeley, 1990). Larger banks may avoid excessive risk-taking behavior to protect their charter or franchise value (Shim, 2013). Bank size is measured by the natural logarithm of total assets (SIZE). *AGR*, or the asset growth rate, is calculated as $((\text{Asset } t - \text{Asset } t-1) / \text{Asset } t-1)$. We expect a negative correlation between the asset growth rate (*AGR*) and lending activities and bank capital because banks with a higher asset growth rate tend to have more volatile return of assets (Ben Bouheni et al., 2016; Shim, 2013). The largest banks are more oriented towards market activities than traditional activities of commercial banks. *LIQ* is the ratio of liquid assets to total assets. It can be a measure of a bank's soundness and its ability to sustain its lending, as well as an indicator of inefficiency since too much liquidity comes at the cost of less bank intermediation (Bertay et al., 2015). If banks have a higher level of liquid assets that can readily be turned into cash when needed indicate, then they have a greater ability to meet short-term financial obligations without having to resort to the untimely sale of investments or fixed assets. Banks that are required to maintain a certain level of liquid assets may have less incentive to engage in riskier lending activities (Shim, 2013). This variable is expected to be positively (negatively) associated with lending (capital).

Descriptive statistics for the dependent and explanatory variables are shown in table 1, whereas the correlation matrix and variance inflation factors (VIFs) for the explanatory variables are presented in table 2.

Table 1: Summary statistics of dependent and explanatory variables

Variable	Mean	Std. Dev.	Min	Max
Dependent Variables				
Lending (LA)	0.50	0.27	0	1
Capital (ETA)	10.01	11.36	-45.82	98.77
Explanatory Variables				
Business-Cycle (GDPG)	1.09	2.67	-8.5412	10.49
Overall index (ECF)	68.13	5.68	55.4	82.6
Financial freedom (FINF)	65.40	11.88	40	90
Freedom from corruption (CORRF)	72.22	12.55	30	97
Monetary freedom (MONF)	82.35	3.41	68.8	90.8
Fiscal freedom (FISCF)	55.36	9.37	33.2	89.5
Size (SIZE)	7.65	2.04	2.08	14.55
Asset growth rate (AGR)	-0.01	1.82	-122.17	0.99
Liquidity ratio (LIQ)	0.30	0.25	0	1
Number of observations	4706			

Table 2 indicates that there are no strong correlations (i.e., approximately 0.8 or 0.9 in absolute value; see Kennedy, 2008) between the explanatory variables. In addition, Table 2 shows that the variance inflation factors (VIFs) are lower than 10 and that the mean of all the VIFs is not considerably larger than 1 (see Chatterjee and Hadi, 2006; Kennedy, 2008). Hence, the VIF analysis and the correlation matrix suggest that multicollinearity issues can be safely ignored in our regressions.

Table 2 Correlation matrix and variance inflation factors (VIF) for the explanatory variables

	GDPG	ECF	FINF	CORRF	MONF	FISCF	SIZE	AGR	LIQ	VIF
GDPG	1.00									1.11
ECF	0.17	1.00								5.08
FINF	0.11	0.59	1.00							1.86
CORRF	0.17	0.69	0.33	1.00						2.86
MONF	0.23	0.19	-0.14	0.25	1.00					1.44
FISCF	0.08	0.46	0.27	-0.05	-0.18	1.00				2.09
SIZE	-0.11	0.02	0.13	-0.08	-0.17	0.09	1.00			1.06
AGR	0.01	-0.02	0.003	-0.01	-0.01	-0.01	0.03	1.00		1.00
LIQ	0.12	0.27	0.18	0.25	0.09	0.07	-0.17	-0.04	1.00	1.10
Mean VIF										1.96

Notes: GDPG: GDP GROWTH; ECF: Overall index; FINF: Financial freedom; CORRF: Freedom from corruption; MONF: Monetary freedom; FISCF: Fiscal freedom; SIZE: natural logarithm of total assets; AGR: Asset growth rate; LIQ: Liquidity ratio.

4. Empirical Findings

4.1. First results

Table 3 reports the estimation results for the system of equations (1). Columns 1 and 2 show the estimates for the equations of bank capital and bank lending for a basic model with an overall index of economic freedom, whereas columns 3 and 4 present the estimates for the same equations for an extended model with specific economic freedom indexes. Overall, 94% of the parameters (17 of 18) of the basic model are significant at the 1% level, whereas 92% of the parameters (22 of 24) of the extended model are significant at the 1% level. This suggests that there is little uncertainty about the estimated parameters. Globally, the estimates from the two models tell a consistent story, but the extended model signals that the use of an overall index of economic freedom can mask certain specific effects of individual indexes.

Table 3 Estimation results for the simultaneous equations of bank capital and lending

	Basic Model		Extended Model	
	Lending	Capital	Lending	Capital
Lagged variables				
Lag lending	0.88*** (0.46E-02)	/	0.871*** (0.46E-02)	/
Lag Capital	/	0.97*** (0.66E-02)	/	0.97*** (0.67E-02)
Simultaneity variables				
Capital	0.18E-02*** (0.12E-03)	/	0.16E-02*** (0.13E-03)	/
Lending	/	-3.85 *** (0.34)	/	-4.48*** (0.37)
Economic conditions				
GDP growth	0.24E-02*** (0.25E-03)	-0.05** (0.02)	0.23E-02*** (0.26E-03)	-0.06*** (0.02)
Economic Freedom				
Overall index	0.13E-02*** (0.87E-04)	0.18*** (0.59E-02)	/	/
Financial freedom	/	/	0.49E-03*** (0.89E-04)	0.03*** (0.54E-02)
Freedom from corruption	/	/	0.43E-03*** (0.11E-03)	0.04*** (0.63E-02)
Monetary freedom	/	/	0.73E-03*** (0.94E-04)	0.07*** (0.59E-02)
Fiscal freedom	/	/	-0.30E-03** (0.12E-03)	0.03*** (0.71E-02)
Control variables				
Size	0.27E-02*** 0.41E-03	-1.06*** 0.02	0.15E-02*** (0.42E-03)	-1.02*** (0.02)
Asset growth rate (AGR)	-0.25E-03*** (0.13E-02)	-1.01*** 0.08	-0.36E-03 (0.13E-02)	-1.01*** (0.08)
Liquidity ratio	-0.22*** (0.47E-02)	-6.83*** (0.36)	-0.22*** (0.48E-04)	-7.19*** (0.38)
Number of observations	4706		4706	

The stand errors are in brackets. The asterisks ***, ** and * indicate significance at the 1, 5 and 10% levels, respectively

From the basic and the extended model, we observe, as expected, a significantly positive relationship between bank lending (LA) and the annual GDP growth (GDPG). This suggests procyclical behavior of lending by banks, i.e., the credit supply is abundant during economic upturns and scarce during economic downturns. This finding supports earlier results obtained by Van Roy (2008). The intuition behind our result is that banks tend to decrease (increase) lending during economic downturns (upturns) as their concern about loan repayment risk increases (decreases). Nonetheless, it must be noted that the quantity of credit supplied by the banks depends also on the demand and on the interest rate. In contrast, we observe that capital (ETA) is negatively associated with the business cycle indicator (GDPG). At first glance, this result is not intuitive since it suggests that banks accumulate more capital in downturns than in upturns following

Basle III requirements. However, our result indicates that European banks are not well capitalized during economic upturns, which may explain why they have not withstood the recent financial crisis (see Guidara et al., 2013). In addition, Carvallo et al. (2015) find mixed results. They examine capital buffer fluctuations over the business cycle for banks from Latin American and Caribbean countries for the period of 2001–2012. They note that there is a negative and significant relationship between bank capital and GDP growth for five countries and a positive and significant relationship for six others. Thus, they conclude that a capital buffer is more likely to fluctuate procyclically (countercyclically) for banks with a higher (lower) speed of capital adjustment.

As regards the effect of economic freedom, from the basic model (columns 1 and 2), we observe that overall index of economic freedom positively and significantly impacts bank capital and lending. This finding suggests that higher degrees of control and restrictions in the economy may hamper banking activities. In other words, our results indicate that greater controls may preclude banks from exercising their role of mobilizing financial resources and financing economic system activity. The intuition is that the fewer constraints faced by banks in their managing practices, the more they may improve their activity and the more they can boost the real economy. This result is of crucial importance for regulators since it concerns policy variables, which are under policy makers' control. Within the extended model (columns 3 and 4), the same evidence is found for the specific indexes of economic freedom, except for the effect of fiscal freedom on lending. In fact, we find that fiscal freedom negatively impacts bank lending.

The negative association between fiscal freedom and bank lending seems to be counter-intuitive. However, one could interpret it in the sense that too much fiscal freedom may lead to the issue of non-performing loans and thus discourage banks to supply credit. Indeed, if potential borrowers are free from taxes, they may engage in inefficient use of resources. This could increase the risk of repayment (probability of default) perceived by banks and thus they could cut lending. In other words, one could argue that small taxes (but not much) can encourage decision-makers to make better use of available resources. That is, in order to pay the (small) tax, decision-maker should try to use available resources more efficiently.

However, to our best knowledge, there is no clear-cut explanation for this negative effect of fiscal freedom on bank lending. Indeed, recall that fiscal freedom reflects freedom from highly burdensome taxes. The lower the fiscal burden, the higher the value of the fiscal freedom index. Higher taxation can reduce the ability of individuals and businesses to pursue their goals in the marketplace and reduce the incentive to save, invest, or take risk. Therefore, one should expect a positive effect of fiscal freedom on lending. As such, our result seems to be counter-intuitive. It must be noted that Fuentelsaz et al. (2015) found a negative association between fiscal freedom and entrepreneurship opportunity. They provided an explanation similar to ours, but they state that it is not quite appropriate and that the striking result concerning fiscal freedom deserves further analysis.

The estimates also indicate that bank capital positively impacts bank lending and that bank lending negatively impacts bank capital. This suggests that banks' decision on how much capital to hold and how many loans to make are not sequential but simultaneous (see Karmakar and Mok, 2015). This may be another explanation for the fact that European banks hold little capital in economic upturns. Concerning the effect of bank lending on capital, similar results have been found by Van Roy (2008) for U.S.

banks. In addition, the parameter estimates on lagged capital and lagged lending variables are positive and significant, with values close to one. This reveals that banks, in our sample, adjust capital and lending to their targeted levels rather slowly.

The most interesting results on the control variables are the following. We find that bank size negatively impacts bank capital and positively impacts bank lending. This result is in line with the literature (e.g., Jacques and Nigro 1997; Aggarwal and Jacques 2001; van Roy, 2008; Chernykh and Theodossiou, 2015) and can be explained by the fact that large banks have easier access to capital markets and can thus operate with lower amounts of capital. The impact of asset growth rate (AGR) on bank capital and lending is found to be negative. This result corroborates previous findings (Ben Bouhenei et al., 2016; Shim, 2013) and can be explained by the fact that banks with a higher asset growth rate tend to have more volatile returns of assets. As a result, they may have less incentive to hold a large capital ratio and have less incentive to engage in riskier lending activities (Shim, 2013). The ratio of liquid assets to total assets (LIQ) can be thought of as an indicator of banks' ability to sustain their lending. As such, this variable should have a positive (negative) effect on lending (capital). As expected, our results show that liquid assets are negatively associated with capital, but as regards lending, the results contrast with our expectations. A possible explanation for the negative association between bank lending and the liquidity ratio is that a high liquidity ratio held by banks results in a decrease in the lending granted.

4.2. Controlling for specific effects of the 2008/2009 financial crisis

Given its severity, the 2008/2009 financial crisis may involve specific effects on banks' behavior. In this line, a potential criticism to the previous estimations is that they do not explicitly account for such effects. Hence, to check if the 2008/2009 financial crisis had specific effects on banking activity and if the previous estimations fail to capture such effects, we re-estimate the system of equations (1) by introducing a dummy variable that equals 1 for the period of 2008/2009 and 0 otherwise. The new results are reported in table 4. As in table 3, columns 1 and 2 of table 4 show the estimates for the equations of bank capital and bank lending for a basic model with an overall index of economic freedom, whereas columns 3 and 4 present the estimates for the same equations for an extended model with specific economic freedom indexes. Overall, the results reported in table 4 are similar to those in table 3, which suggests that the results reported in table 3 are fairly robust to the specific effects of the 2008/2009 financial crisis. However, from table 4, we observe that banks held more capital and granted less credit during the 2008/2009 financial crisis. This may be explained by insolvency risk perceived by bank managers during this period. An appealing feature of these new results is that they may also explain why the crisis was so severe.

Table 4 Estimation results for the simultaneous equations of bank capital and lending controlling for specific effects of the 2008/2009 financial crisis

	Basic Model		Extended Model	
	Lending	Capital	Lending	Capital
Lagged variables				
Lag lending	0.88*** (0.43E-02)	/	0.87*** (0.46E-02)	/
Lag Capital	/	0.97*** (0.66E-02)	/	0.97*** (0.67E-02)
Simultaneity variables				
Capital	0.18E-02*** (0.12E-03)	/	0.16E-02*** (0.13E-03)	/
Lending	/	-3.86 *** (0.34)	/	-4.56*** (0.37)
Economic conditions				
GDP growth	0.23E-02*** (0.26E-03)	-0.84E02*** (0.16E02)	0.23E-02*** (0.27E-03)	-0.07*** (0.02)
Economic Freedom				
Overall index	0.13E-02*** (0.87E-04)	0.18*** (0.59E-02)	/	/
Financial freedom	/	/	0.53E-03*** (0.89E-04)	0.02*** (0.54E-02)
Freedom from corruption	/	/	0.44E-03*** (0.11E-03)	0.04*** (0.65E-02)
Monetary freedom	/	/	0.68E-03*** (0.10E-03)	0.08*** (0.64E-02)
Fiscal freedom	/	/	-0.30E-03** (0.12E-03)	0.03*** (0.71E-02)
Control variables				
Size	0.27E-02*** (0.41E-03)	-1.06*** (0.06E02)	0.15E-02*** (0.42E-03)	-1.03*** (0.02)
Asset growth rate (AGR)	-0.25E-03 (0.13E-02)	-1.01*** 0.08	-0.36E-03 (0.13E-02)	-1.01*** (0.08)
Liquidity ratio	-0.22*** (0.47E-02)	-6.86*** (0.36)	-0.22*** (0.48E-02)	-7.29*** (0.39)
2008/2009 crisis (dummy)	-0.35E-02** (0.16E-02)	0.20** (0.10)	-0.20E-02** (0.10E-02)	0.42*** (0.11)
Number of observations	4706		4706	

The stand errors are in brackets. The asterisks ***, ** and * indicate significance at the 1, 5 and 10% levels, respectively

5. Conclusion

This empirical study uses a system of two simultaneous equations and a GMM-SUR estimation procedure using data for 722 commercial banks from 16 Euro area countries to investigate the impact of economic circumstances (economic liberalization and business cycle) on bank lending and capital. Interestingly, the results from the basic and extended models highlight the cyclical behavior of lending and capital. Indeed, lending activities behave in a procyclical manner. That is, European banks tend to

decrease (increase) lending during economic downturns (upturns) as their concern about loan repayment risk and the transformation of performing loans to non-performing ones increases (decreases).

However, banking capital is countercyclical. Although the goal of the Basel III Accord is to permanently raise the level and quality of capital held by banks, to improve their ability to absorb loss during recession, commercial banks in the Euro area raise (reduce) their capital during economic downturns (upturns). Thus, European commercial banks are not well capitalized. This finding may explain why European banks have not withstood the recent financial crisis. Moreover, the overall index of economic liberalization positively impacts bank capital and lending. This finding reveals that higher degrees of control and restrictions in the economy may hamper banking activities, which is of crucial importance for regulators since it concerns policy variables that are under policy makers' control. In addition, we find the same evidence for the specific indexes of economic freedom, except for the effect of fiscal freedom on lending. In fact, greater fiscal freedom may lead to the transformation of performing loans to non-performing ones and thus discourage banks to supply credit. Moreover, we note that banks held more capital and granted less credit during the 2008/2009 financial crisis, which could be explained by insolvency risk perceived by bank managers and the intensity of the crisis in the Eurozone. Understanding bank capital and lending fluctuations over the business cycle in the Eurozone is important for regulators and supervisors interested in validation issues related to the new EU banking policies.

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Appendix:**Table A1: Distribution of banks per country**

Country name	Number of banks	% distribution of commercial banks per country
Austria	69	0.0955
Belgium	30	0.0415
Cyprus	17	0.0235
Finland	19	0.0263
France	123	0.1703
Germany	137	0.1900
Greece	9	0.0124
Ireland	14	0.0193
Italy	92	0.1274
Luxembourg	67	0.0927
Malta	9	0.0166
The Netherlands	31	0.0429
Portugal	25	0.0346
Slovakia	12	0.0166
Slovenia	17	0.0235
Spain	51	0.0706
Total	722	1