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Bank liquidity creation: does ownership structure matter?

Nacera YEDDOU[†] and Marc POURROY[‡]

Abstract:

This paper uses a new, hand-collected database on ownership structure for a sample of commercial banks from 17 western European countries to explore the relationship between bank ownership structure and bank liquidity creation over the period 2004-2018. We focus on bank ownership concentration and on the identity of the major owner. Our findings are twofold: first, we find that ownership concentration has a significant and positive impact on liquidity creation. Specifically, we find that banks with over 65% controlling ownership create more liquidity than other banks. Secondly, we analyze the impact of the nature of the owner on liquidity creation. We find that banks tend to create more liquidity when the owner is another bank or a state, holding a stake above 50%, 65% for a non-financial company, 75% for a family and 85% for a financial institution.

Keywords: Liquidity Creation; Bank Ownership Structure; Liquidity Risk; Bank Regulation.

JEL Codes: G21; G28; G30.

Highlights:

- We examine the relationship between bank ownership structure and bank liquidity creation.
- We use a sample of commercial banks from 17 western European countries over the period 2004-2018.
- Banks with over 65% controlling ownership create more liquidity than other banks.
- This threshold depends on the nature of the owner.
- Banks tend to create more liquidity when the owner is another bank holding a stake above 50%.

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"Effective corporate governance is critical to the proper functioning of the banking sector and the economy as a whole". BCBS, 2015.

1 Introduction

Liquidity creation is a crucial function that banks perform in the economy.¹ The recent financial crisis has illustrated how financial institutions, even with adequate levels of capital, may fail when they face liquidity management problems (Diaz and Huang, 2017). Banks create on balance sheets liquidity by financing long-term illiquid assets with short-term liquid liabilities (e.g., Bryant, 1980; Diamond and Dybvig, 1983) and off-balance sheet liquidity primarily through loan commitments and similar claims (e.g., Holmstrom and Tirole, 1998, Kashyap *et al.*, 2002).

Recently, in a seminal paper, Berger and Bouwman (2009) introduced a comprehensive framework to measure liquidity creation.² Based on these metrics, several studies have examined the factors shaping liquidity creation, with a focus on regulatory capital (Horvath *et al.*, 2014), monetary policy (Berger and Bouwman, 2017), economic output (Berger and Sedunov, 2016), government intervention (Berger *et al.*, 2016) and bank governance (Diaz and Huang, 2017). So far, the literature on how banks' ownership structure influences their liquidity creation is scarce.³

This paper examines the impact of ownership structure on bank liquidity creation. We discuss the issue of whether ownership concentration and the nature of the major owner may impact bank liquidity creation. Berger and Bouwman (2009) examine the impact of liquidity creation on bank performance in the US. They argue that the creation of additional liquidity increases the amount of net surpluses shared amongst stakeholders and non-bank public. They show that liquidity creation increases bank value. To put it simply, when banks create liquidity, they transform more liquid liabilities (e.g. demand deposits), which are associated with lower rates, into less liquid assets (e.g. commercial loans) which generate higher revenues.

¹ Transforming risk is another important role of banks in the economy by issuing riskless deposits to finance risky loans (e.g., Diamonds, 1984, Ramakrishnan and Thakor, 1984, Boyd and Prescott, 1986).

² Note that Rauch *et al.* (2010) has introduced an alternative liquidity creation measure.

³ To our knowledge, there is no research considering ownership impact on liquidity creation using the same ownership types breakdown as in this paper. Davydov *et al.* (2018) show that bank liquidity creation is pro-cyclical using data on Russia. They don't find evidence of a distinct behavior of domestic private banks as opposed to state-controlled banks or foreign-owned banks. Using a similar database, Fungáčová (2017) find a positive relationship between bank regulatory capital and liquidity creation only for private domestic banks but not for state-controlled and foreign-owned banks.

Consequently, liquidity creation increases the surplus distributed to shareholders. Therefore, banks' shareholders have an incentive to ask banks' managers to create more liquidity. Taking stock on this demonstration, this paper further develops the link between liquidity creation and ownership structure. A large strand of literature has shown that shareholders' ability to influence the management increases with ownership concentration (see Shleifer and Vishny (1986) and Caprio and Levine (2002) among others). Small and dispersed shareholders do not pose a threat to the management, unless they are able to organize themselves. Large or concentrated shareholders do not have this free rider problem (Shleifer and Vishny, 1997). Assuming that liquidity creation is in the interest of shareholder because it generates value, we consequently question the fact that if concentration strengthens shareholders' power, it should finally push management toward more liquidity creation.

Another concern about liquidity creation for both banks' shareholders and managers, is that liquidity creation is closely related to risk taking. Let's take an example. If a bank's shareholders and management are absolutely risk adverse, the bank will use liquid liabilities (e.g. current deposit) to finance liquid assets (e.g., treasuries). In such a situation, there is no liquidity creation because the bank holds items for approximately the same liquidity as they give to the nonbank public (see Berger and Bouwman, 2009). Let's now consider a second situation, where both the bank's shareholders and management are less-risk adverse: looking for higher yields, managers would grant loans to relatively more illiquid borrowers. Consequently, in the less risk adverse example, liquidity creation is higher. This close link between liquidity creation and risk taking may be found, for example, in Andreou *et al.* (2015), who argue that bank's managers balance profit and wealth maximization objectives against risk by choosing optimal sources of funding and the corresponding allocations of those funds, according to the risk-performance characteristics of the available assets and liabilities. In this paper we further explore the determinant of liquidity creation, by taking into account other results of the literature: according to papers such that Beltratti and Stulz (2012) or Barry *et al.* (2011) bank risk taking behavior vary according to the nature of the controlling shareholders. This is typically the case of a bank own by a family who wishes to transmit the bank to the next generation and therefore is strictly risk adverse. As the nature of the shareholder may influence the risk preference, and the latter is closely related to liquidity creation, we also question if the nature of a bank's shareholders is a determinant of its liquidity creation.

To analyze these issues, we consider a sample of 396 Western European commercial banks for which we have constructed a hand-collected database on ownership structure for the period 2004-2018. We consider five major owner types: individual or family investors, non-financial companies, banks, institutional investors including insurance companies, financial

companies and mutual pension funds, public authorities including states or governments. We use Berger and Bouwman's procedure (Berger and Bouwman, 2009) to measure bank liquidity creation. We then test three alternative models to assess the impact of ownership structure on liquidity creation, using the GMM technique to deal with endogeneity issues. To the best of our knowledge, this is the first cross-country study which discusses whether different ownership profiles imply different levels of liquidity creation.

Our findings are as follows: firstly, we find that ownership concentration has a significant and positive impact on liquidity creation. It means that any increase in the percentage of total equity held by the major owner leads to an increase in the level of liquidity produced. We estimate the elasticity of liquidity creation to ownership concentration change to be 0.16. Specifically, banks with controlling shareholding above 65% seem to create more liquidity than banks with a dispersed ownership structure. Secondly, for any major owner type, we estimate its influence on liquidity creation. Our results seem to indicate that different owner types do not imply different liquidity creation profiles, when looking at banks with similar ownership concentration. Lastly, we estimate the minimum concentration thresholds above which banks create more liquidity while controlling for the major owner type. We find that banks tend to create more liquidity when the owner is another bank holding a stake above 50%. This threshold is also 50% for a bank controlled by a government, 65% for a bank controlled by a non-financial company, 75% for a bank controlled by a family and 85% for a bank controlled by a financial institution. Therefore, we conclude that ownership concentration impact on liquidity creation is not independent from owner type.

This paper is a significant contribution to the existing literature on both liquidity creation and corporate governance. Indeed, ownership structure has not yet been considered in the existing empirical literature on liquidity creation. Our findings provide evidence to support the view that ownership structure is a determinant of the level of liquidity created by banks. These findings are particularly relevant for policy makers, as excessive liquidity creation can sow the seeds of a future crisis (Berger and Bouwman, 2016).

The remainder of the paper is structured as follows. Section 2 reviews the previous studies and further develops on the link between ownership structure and liquidity creation. Section 3 describes the data and variables. In Section 4 the method and the hypotheses tested are presented. We discuss our results in section 5 and robustness checks are reported in section 6. Lastly, we conclude in section 7.

2 Literature review and testable hypothesis

2.1 Determinants of liquidity creation

Our study aims to investigate the relationship between ownership structure and liquidity creation. The literature on liquidity creation is already rich of a large number of publications, whose key results are briefly presented in this section.

Berger and Bouwman (2009) proposed a comprehensive method to measure bank liquidity production.⁴ They applied the constructed measure to US bank data from 1993 to 2003, to analyze the relationship between regulatory capital and liquidity creation. They find that both bank size and the inclusion of off-balance sheet items in liquidity creation measures influence the relationship between capital and liquidity creation. Building on from this pioneer work, several other studies have set out to identify the determinants of liquidity creation. A first set of papers has focused on regulatory capital, pointing to the existence of a trade-off between financial stability (high regulatory capital) and the benefits from higher liquidity creation. Distinguin *et al.* (2013) analyze the relationship between regulatory capital and liquidity creation for a sample of US and European banks from 2000 to 2006. They find that banks decrease regulatory capital when they create more liquidity. Furthermore, they find that small US banks increase their regulatory capital when they are exposed to higher illiquidity. Horvath *et al.* (2014) examine the causality link between regulatory capital and liquidity creation for Czech banks from 2000 to 2010. They show that capital negatively granger-causes liquidity creation while liquidity creation also negatively impacts capital.

Another set of papers has highlighted several other determinants of liquidity creation. Using a sample of German banks, Rauch *et al.* (2010) find that monetary policy has a strong impact on liquidity creation. Their findings have been confirmed by Berger and Bouwman (2017) but only for small banks during “normal times” (as opposed to financial crises). Berger *et al.* (2016) find that, as opposed to capital support, regulatory interventions impact (negatively) liquidity creation. Diaz and Huang (2017) study the impact of internal bank governance quality, captured by variables such as CEO education, compensation structure or progressive practices on liquidity creation. They find a positive and significant effect but mainly during times of crisis. Hasan and Soula (2017) examine to what extent bank business models could explain efficiency in producing liquidity. They find that medium banks are the most efficient in producing overall liquidity. While the majority of the papers in this strand of literature have focused on the

⁴ A novelty of Berger and Bouwman (2009) is to include both on- and off-balance sheet items in one measure.

determinants of liquidity, it is worth noticing that a handful of them have analyzed the impact of liquidity creation on other macroeconomic variables. Berger and Bouwman (2017) show that relatively high liquidity creation may help predict future crises. Fungacova *et al.* (2015) study the impact of liquidity creation on bank failure. Berger and Sedunov (2016) provide the first empirical study confirming that liquidity creation impacts economic growth.

2.2 Ownership concentration

In this paper, we enlarge the list of liquidity creation determinants by looking at ownership structures. The literature on corporate governance has for long underlined that ownership structures have major implications for corporate governance and performance (an early discussion can be found in Berle and Means, 1932). A large strand of papers has found a positive correlation between ownership concentration and profitability (see Cubbin and Leech, 1983, Short, 1994, Leach and Leahy, 1991 and Zeckhouser and Pound, 1990, among others). While this idea has been challenged theoretically (Demsetz, 1983) and empirically (Demsetz and Villalonga, 2001) it remains validated in most papers (see Hill, C. and S. Snell, 1988; Agrawal and Mandelker, 1990). Two issues have devoted a particular attention: the possibility of non-linearity of the relationship between concentration and performance (Morck *et al.*, 1988, McConnell and Servaes, 1990) and the institutional background. The latter is mostly dominated by LaPorta *et al.* (2002) who have explored the institutional environment that potentially explained why concentration is in average larger in some countries (civil law countries) than others (common law countries). They show that in countries where ownership structure is much more concentrated, the identity of the largest owners is correspondingly more important

The case of banks' governance is generally assumed to be specific due to banks particularities (see Fernandes *et al.*, 2019, for a comprehensive literature review on this topic). One of the key reasons is that, following Becht *et al.* (2011, page 438) "*banks have the ability to take on risk very quickly, in a way that is not immediately visible to directors or outside investors.*" Typically, it is complex to assess the quality of a bank's assets, and therefore to estimate the risks they bear (see Mülbart, 2009, Levine, 2004 and Morgan, 2002). Also, banks are highly leveraged firms, therefore some conflicts of interest between shareholders and debtholders could arise and impact the equity governance (De Masi and Paci, 2016). Finally, banks are heavily regulated and supervised. Adams and Mehran (2012) show that there may be a conflict of interest between the safety and soundness goals of regulators and the value maximization objectives of shareholders. Due to these specificities, the free rider problem that arises when shareholders are small and

dispersed may be even more accurate in banks than in other companies. According to Shleifer and Vishny (1997, page 741) "*The free rider problem faced by individual investors makes it uninteresting for them to learn about the firms they have financed, or even to participate in the governance, just as it may not pay citizens to get informed about political candidates and vote*". As a result, the effective control rights of the managers are large. In the opposite case, a substantial minority shareholder has the incentive to collect information, to monitor the bank's management and finally to put pressure on the management through his voting control.

Banks have another specificity: their performance is related to the liquidity they provide to the economy. Berger and Bouwman (2009) find that bank liquidity creation is positively related with bank value proxied by market-to-book and price earnings ratios. They argue that the creation of additional liquidity would increase the net surpluses shared among stakeholders and non-bank public, and therefore liquidity creation has a positive impact on bank value. Indeed, when banks create liquidity, they transform liquid assets like demand deposits, which are usually associated with low rates, to fund illiquid assets such as commercial loans, which tend to generate higher returns. Therefore, higher liquidity creation is associated with higher profitability.

To conclude, two results emerged from the literature. First, large owners with substantial cash flow rights have greater incentives and power to increase bank risk-taking than small shareholders (Jensen and Meckling, 1976; John *et al.*, 2008 and Laeven and Levine, 2009). Second liquidity creation might be a mechanism through which managers increase bank's surpluses (Berger and Bouwman, 2009). If liquidity creation is in the interest of shareholder because it generates value, and if concentration strengthens shareholders' power, then we should expect that

Ownership concentration increases liquidity creation. (Hypothesis 1)

2.3 Owner type

Ownership structures vary not only due to ownership concentration, but also due to the nature of the shareholder. A major result of the literature on both financial and non-financial companies is the impact of owner type on companies risk-taking.

Previous studies have investigated the impact of different ownership structures on bank performance and risk. Berger *et al.* (2005) test the effect of governance on bank performance using data from Argentina in the 1990s. They find that state-owned banks have poor long-term performance compared with privately-owned banks. Furthermore, using a sample of European

banks, Iannotta *et al.* (2007) find that state-owned banks are less profitable than private banks. In addition, they find that state-owned banks have poorer loan quality and higher insolvency risk than the other banks. Laeven (1999) examines the issue of efficiency on a panel of Asian banks and finds that family-owned banks and company-controlled banks are among the riskiest in the East Asian region. Lastly, regarding institutional investors category, Barry *et al.* (2011) find that institutional investors seem to influence managers' decisions and exert riskiest strategies. Pound (1988) posits that institutional investors have greater expertise and thus can monitor managers at a lower cost than can small shareholders.

A particular aspect of bank risk taking, is its close relation to the bank's liquidity creation activity. According to Berger and Bouwman (2009), banks create liquidity by financing illiquid assets with liquid liabilities. Recall that a fully risk adverse strategy would consist in using liquid liabilities to finance liquid assets (e.g. using current deposit to finance treasuries). Such a strategy not only provides low return but also creates no additional liquidity to the economy: banks hold items for approximately the same liquidity as they give to the nonbank public. However, banks generally invest in riskier or longer-term assets, in order to increase returns. Typically, equity owners may induce managers to shift the assets of the bank to risky activities since return would increase. Therefore, if managers act in the interest of shareholders, they would seek maximization of shareholders' wealth by choosing risky assets. For instance, they would grant loans to risky borrowers which would increase the level of liquidity generated. Therefore, we assume that liquidity creation increases with bank risk taking. In addition, Andreou *et al.* (2015) argue that bank's managers balance profit and wealth maximization objectives against risk by choosing optimal sources of funding and the corresponding allocations of those funds, according to the risk-performance characteristics of the available assets and liabilities. This process ultimately determines the quantity of liquidity created.

All in all, two main results emerged from the above-mentioned literature: first, owner type impacts bank risk profile; second, risk appetite is closely related to the levels of liquidity created. Consequently, we should expect that

Different categories of major owner imply different levels of liquidity creation
(Hypothesis 2)

Let's us be more specific for five categories of owners, generally identified in the literature (Barry *et al.*, 2011) : a government or state, a family, a non-financial company, a bank and an institutional investor.

Iannotta *et al.* (2007) find that **state-owned banks** have poor loan quality and higher insolvency risk than the other banks due to government protection. Demirgüç-Kunt and

Detragiache (2002) argue that state-owned banks would not fully bear the consequences of negative outcomes, as the cost of excessive risk taking would be borne by government. Therefore, state-owned banks are expected to take more risk and create more liquidity than the other categories

Family-controlled banks are supposed to be more averse to risk-taking due to their goal of transferring the firm to the next generation (Anderson *et al.*, 2003). In addition, family-controlled banks maintain undiversified portfolios. Thus, family-controlled banks may take less risk and therefore create less liquidity than banks controlled by other categories of owners.

Banks held by a non-financial company tend to increase the riskiness of loans granted to owners. For instance, if a bank is behind an industrial group, the group management will have incentives to grant risky loans at favorable terms to the industrial group itself. In addition, the industrial group has less incentive than other borrowers to repay a loan on time (or simply not to repay) (see Laeven, 2001). Also non-financial companies might hold diversified asset portfolios. Consequently, banks with a large portion of stocks held by non-financial companies may have incentives to take risk and create more liquidity than the other banks.

When **a bank is the owner of another bank**, the key risk-return strategies are presumably controlled by the parent firm and not at subsidiary level. As shareholders, banks might prefer conservative risk-taking strategies for reputation and safety concerns (Barry *et al.* 2011) because in case of financial distress or failure, the parent bank is likely to support its subsidiary. However, large banks may prefer to take more risk as they maintain diversified portfolios. Thus, predictions on risk preferences of banks as shareholders are not clear in the literature and the supposed impact of this category of shareholders on bank's liquidity decisions remains ambiguous.

Institutional investors seem to influence managers' decisions and exert riskiest strategies (Barry *et al.*, 2011). Previous studies have documented that institutional owners can influence the decisions of managers in terms of risk-taking through their voting rights. In addition, Pound (1988) posits that institutional investors have greater expertise and thus can monitor managers at a lower cost than can small shareholders. As shareholders, institutional investors are supposed to be almost indifferent to the riskiness of banks' investments and only concerned by expected returns. Thus, banks owned by institutional investors may take more risk and create more liquidity than other banks.

Finally, both ownership concentration and owner type have an impact on liquidity creation, one may expect that the concentration impact on liquidity may change according to owner type, and *vice versa*, the impact of the owner's nature on liquidity may change according

to concentration level. This leads us to consider two more hypotheses: **Ownership concentration impact on liquidity creation may change according to owner type** (Hypothesis 3) and conversely: **Owner impact on liquidity creation may change according to the concentration level** (Hypothesis 4).

The next section describes our data and variable construction. We rely on the above literature for variable construction, typically to identify the different categories of owner types that may have an incentive to influence bank risk-taking.

3 Data

In this section, we describe our data, explain the procedure followed to construct the ownership- and concentration-related variables and we define all other variables used in the estimations.

3.1 Sample definition

Our sample covers the period 2004-2018 for 396 commercial banks established in 17 Western European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Sweden, Switzerland, Spain and the United Kingdom. These countries share some institutional backgrounds, most of them are involved together in discussions on financial regulation and, as argued by La Porta *et al.* (1998), ownership in the banking sector is relatively more concentrated in these developed economies than in less developed economies. Also, this sample is common in the literature, allowing for comparison (see Barry *et al.*, 2011).

We collected banks' balance sheet data from Bankscope BvD and macroeconomic data from the World Bank, the OECD and from central banks' websites. We used consolidated data when available, and unconsolidated data when the consolidated data are not available. Moreover, in addition to Bankscope's information, we collected annual reports on banks' websites to build a new, hand-collected database on direct ownership and the identity of shareholders. Our baseline database is made up of the 488 banks for which total regulatory capital ratio⁵ is available in Bankscope. Also, we couldn't find information on direct ownership for 35 banks. After cleaning the sample from outliers by eliminating extreme bank-year observations, we eventually ended up with 396 banks. Table 1 displays the distribution of banks by country. The sample covers on average more than 80%⁶ of total banking sector assets in each country of our study.

[Insert Table 1 - Distribution of banks by country]

3.2 Ownership concentration

⁵ Total regulatory capital ratio is defined as the sum of Tier 1 and Tier 2 over risk weighted assets.

⁶ The median is 85%.

Our goal is to examine the relationship between ownership structure and the level of liquidity produced by banks. In a first step we focus on the impact of ownership concentration on bank liquidity creation and then in a second step we consider the impact of controlling shareholder type on bank liquidity production. We follow the methodology proposed by Laeven and Levine (2009) and Barry *et al.* (2011) to classify a bank in our sample as “concentrated” or “widely held” and to identify the category of the controlling shareholder(s).

We consider a bank as having a concentrated ownership structure if and only if there is at least one shareholder holding more than 25% of the bank’s total equity⁷ (higher thresholds will be considered next). Therefore, we created a variable *Own* that corresponds to the percentage of total equity held by the major owner. Concentration variable *Own* equals 0 if a bank is widely held and takes values from 25% to 100% otherwise.

We also created dummy variables to carry out further investigations on the impact of ownership concentration on liquidity creation. Specifically, it allows us to determine the minimum threshold of control at which ownership concentration has an impact on liquidity creation. Thus, in line with the previous studies (Laeven and Levine, 2009, Shehzad *et al.*, 2010 and Barry *et al.*, 2011), we consider different thresholds of control ($X = 25\%, 35\%, 45\%, 50\%, 55\%, 65\%, 75\%$ or 85%) to define the category of the controlling shareholder and we create a set of dummy variables *Concentrated*(X) that equal 1 if *Own* is higher than a given cut-off point ($X\%$). For example: when a shareholder holds 30% of total equity, $Own = 30$, therefore $Concentrated(25) = 0$ and $Concentrated(35) = 1$. Similarly:

$$Concentrated(X) = \begin{cases} 1 & \text{if } Own > X\% \\ 0 & \text{otherwise} \end{cases}$$

With X denoting the cut-off point of control, and $X = 25\%, 35\%, 45\%, 50\%, 55\%, 65\%, 75\%$ or 85% .

3.3 Ownership nature

It has been widely documented in the theoretical and empirical literature that risk-taking behavior is different according to the nature of shareholder (Barry *et al.* 2011). Thus, controlling shareholders could take different liquidity creation decisions depending on their nature and their risk incentives in order to adjust bank risk, and the level of liquidity produced might depend on the type of the major owner. Consequently, we created a set of variables that reflects the nature of the major shareholder. We only considered the categories of owners for which we could

⁷ If no shareholder holds more than 25% of total bank’s equity, we consider the bank as widely held.

identify their nature, behavior and incentives to take more risk (Laeven and Levine, 2009 and Barry *et al.*, 2011). We ended up with five categories of owners that may influence banks' decisions on liquidity: individual or family investors (*Family*), non-financial companies (*Company*), banks (*Bank*), institutional investors including insurance companies, financial companies and mutual pension funds (*Institute*), public authorities including states or governments (*State*). While *Own* is a continuous variable reflecting ownership concentration, *Company*, *Family*, *Bank*, *Institute* and *State* are dummy variables reflecting the identity of the main shareholder.

Table 2 presents the distribution of the 396 banks in our sample according to their ownership structure. This table shows that 12% of European commercial banks in our sample are widely held whereas 88% have major owners holding at least 25% of total equity. A closer look at the controlled banks shows that *Bank* is the main category of shareholders with 56% of the whole sample of 396 commercial banks. Institutional investors and non-financial companies are the major owners of respectively 15% and 12% of the banks in our sample. Lastly, families and states hold very low proportions of equity in the sample with respectively 3% and 2%.

[Insert Table 2 - Distribution of banks by ownership]

3.4 Bank liquidity creation measure

We used the "CATNONFAT" liquidity creation measure introduced by Berger and Bouwman (2009) in our estimations to proxy bank liquidity creation. We use the terminology from Horvath *et al.* (2014) and name this variable narrow liquidity creation measure (*NLC*). It is defined as the ratio of liquidity creation to total assets.

To compute the narrow liquidity creation measure, we follow Berger and Bouwman (2009) and Distinguin *et al.* (2013) three-step procedure. First, we classify the on-balance sheet items as liquid, semiliquid or illiquid according to their category. Second, we assign weights to all items. Third, we compute the narrow liquidity creation measure as the weighted sum of the categorized items.

$$NLC = \frac{0.5*illiquid\ assets + 0*semiliquid\ assets - 0.5*liquid\ assets + 0.5*liquid\ liabilities + 0*semiliquid\ liabilities - 0.5*illiquid\ liabilities}{Total\ assets}$$

Table 3 summarizes our procedure to compute the narrow liquidity creation measure following the method of Distinguin *et al.* (2013).⁸

[Insert Table 3 - Weights and definitions used in Narrow Liquidity Creation calculation]

3.5 Control variables

We consider different control variables in our regressions. First, we use the total regulatory capital ratio (*tier1&2*) provided by Bankscope. According to Berger and Bouwman (2009), there are two main hypotheses on the relationship between liquidity creation and capital. The “financial fragility-crowding out hypothesis” posits that when a bank’s capital structure is fragile, it results in the bank receiving more deposits and financing more loans. Thus, financial fragility enhances liquidity creation. An increase in capital should reduce liquidity creation as it reduces financial fragility.⁹ The “risk absorption hypothesis” suggests that banks with greater capital create more liquidity. On the one hand, liquidity creation increases banks’ exposure to risk as banks that create more liquidity face greater losses when they are forced to sell illiquid assets to satisfy the liquidity demands of customers (see, e.g. Allen and Santomero, 1998). On the other hand, greater capital allows banks to absorb greater risk (see, e.g. Bhattacharya and Thakor, 1993 and Repullo, 2004). In view of these two hypotheses, the expected impact of capital on our bank liquidity creation proxy is ambiguous.

Following the existing literature (Distinguin *et al.*, 2013 and Berger and Bouwman, 2009), we consider the ratio of total assets of bank (*i*) located in country (*j*) to the total assets of the banking system in country (*j*) as a proxy of *market power*. Market power might allow banks to grant more loans and attract more funds (e.g., deposits and market funds) and enhance their transformation activities. Thus, we expect that market power positively impacts liquidity creation.

Besides, our study uses the central bank policy rate of each country in our sample as a proxy for monetary policy (referred as *policy rate*). Previous studies (Rauch *et al.*, 2009) shed light

⁸ Berger and Bouwman (2009) offer four different liquidity creations metrics. Following Distinguin *et al.* (2013), we measure the liquidity created by banks only from on-balance sheet positions as detailed breakdown of off-balance sheets is not available for European banks on Bankscope. Therefore we only use the *NLC* ratio.

⁹ Increased capital favors the bargaining power of the bank, which hampers the credibility of its commitment to its depositors. Consequently, an increase in capital reduces liquidity creation.

on the importance of monetary policy for bank liquidity. Indeed, when central bank policy rate is relatively low, credit supply increases, thus liquidity creation should increase. We thus expect a negative impact of monetary policy on liquidity creation. Data are collected on central bank's websites.

Following Distinguin *et al.* (2013), we consider the spread between one-month interbank rate and central bank policy rate as a proxy of *liquidity pressures*. Higher values of the spread represent higher pressures on the interbank market and thus bigger difficulties for banks to access and produce liquidity. Consequently, we expect a negative correlation between *liquidity pressures* and *NLC*. The short interest rates are obtained from the OECD database.

Pana *et al.* (2010) show that bank activities can be affected by the macroeconomic environment. Thus, we include the annual rate of real GDP *growth* as a proxy of macroeconomic environment. Banks might increase their maturity transformation activities during economic booms. Thus, we expect a positive relationship between bank liquidity creation and the rate of real GDP growth. GDP data are provided by the World Bank.

Table 4 in appendix presents the descriptive statistics for our sample of 396 European commercial banks.

4 Empirical strategies

4.1 Ownership concentration

Our first objective is to analyze the impact of ownership concentration on liquidity creation. Therefore, we use our continuous measure of ownership concentration (*Own*), which reflects the percentage of equity held by the major owner. The creation of additional liquidity increases the amount of net surpluses. Large owners with substantial cash flow rights have greater incentives and power to control bank's actions. From this point of view, liquidity creation might result from owners' incentives to increase bank liquidity transformation activity. Thus, we test Hypothesis (1) "Ownership concentration impacts positively liquidity creation", using the econometric specification (1.1).

$$NLC_{it} = \alpha_0 + \alpha_1 Own_{it} + \sum_j \beta_j Z_{jit} + \varepsilon_{it} \quad (1.1)$$

Where: NLC_{it} is the measure of bank liquidity creation for bank i at time t ; α_0 is a constant; Own_{it} is an indicator of ownership concentration (the percentage of stock held by the controlling shareholders); Z_j is the j^{th} control variable (*Tier1&2*, *Market Power*, *Policy Rate*, *Liquidity Pressure* and *Growth*) and ε_{it} is a random disturbance that is assumed to be normally distributed with mean 0 and variance σ^2 .

Second, we extend the analysis on the relationship between ownership concentration and liquidity creation by examining the minimum threshold of control at which ownership concentration does matter. Therefore, we consider various thresholds of control and estimate the following equation:

$$NLC_{it} = \alpha_0 + \alpha_1 Concentrated(X)_{it} + \sum_j \beta_j Z_{jit} + \varepsilon_{it} \quad (1.2)$$

where $Concentrated(X)$ is a dummy variable that equals one in case there is at least one owner with shareholdings greater than X percent of total equity and zero otherwise.¹⁰ We run Equation (1.2) for each of the concentration thresholds: $X = 25\%, 35\%, \dots, 85\%$.

¹⁰ X corresponds to one of the following concentration thresholds: 25%, 35%, 45%, 50%, 55%, 65%, 75%, 85%.

4.2 Type of major owner

It has been shown in both the theoretical and empirical literature that banks' risk-taking behavior is dependent on shareholder type (see Barry *et al.* 2011). Therefore, considering that liquidity creation might be an effective channel through which shareholders might adjust banks' risk profile, we decided to analyze the impact of the type of the major shareholder on liquidity creation. We test Hypothesis (2) "Different categories of major owner imply different levels of liquidity creation", using Equation (2).

$$NLC_{it} = \alpha_0 + \alpha_1 Bank_{it} + \alpha_2 Family_{it} + \alpha_3 Company_{it} + \alpha_4 State_{it} + \alpha_5 Institut_{it} + \sum_j \beta_j Z_{jit} + \varepsilon_{it} \quad (2)$$

Where: NLC_{it} denotes the measure of liquidity creation; α_0 is a constant; Z_{jit} is a bank specific or macroeconomic control variable; ε_{it} is a random disturbance; $Bank$, $Family$, $Institut$, $Company$ and $State$ represent dummy variables which equal 1 if the controlling shareholder is respectively a bank, an individual/family, institutional investors, a non-financial company, or a government with shareholdings control above $X\%$ and 0 otherwise.¹¹ To ensure the robustness of our results, we need to control for concentration level: our purpose is to capture the impact of owner type on liquidity creation *ceteris paribus*, i.e. for a given concentration value. Therefore, we estimate Equation (2) over a restricted sample, with only those banks which have a concentrated ownership structure above $X\%$.

As we exclude from the estimation all banks with concentration levels below $X\%$, we have an identification issue. Indeed, if the number of observations in this restricted sample is equal to n , then the sum of all dummy variables is also equal to n . That is: $\sum_{i=1}^n (Bank_i + Family_i + Institut_i + Company_i + State_i) = n$. Given the presence of a constant (α_0), using these five dummy variables leads to pure multicollinearity. Therefore, we drop one dummy variable (namely $Institute$) to avoid singular matrix.¹² Also, it is worth noticing that the estimated coefficients (α_1 , α_2 , α_3 and α_4) are to be interpreted relatively to the missing variable: $Institute$. For example, if α_2 (associated to $Family$) is not statistically different from 0, it means that the level of

¹¹We used the same cut-off point as for model (1.2) that is $X = 25\%$, 35% , 45% , 50% , 55% , 65% , 75% or 85% .

¹²The choice of excluding $Institut$ is based on the fact that the risk-taking behavior of institutional investors is the most settled in the literature. See Barry *et al.* (2011). We also estimate Equation (2) for robustness check by excluding the other dummy variables (one by one) and the results remain the same.

liquidity created by banks owned by a family is not different from the level of liquidity created by banks owned by an institutional investor.¹³

4.3 Interaction between concentration and owner type

If both ownership concentration and owner type have an impact on liquidity creation, one may expect that the concentration impact on liquidity may change according to owner type, and *vice versa*, the impact of the owner's nature on liquidity may change according to concentration level. This leads us to consider two more hypotheses. We first test Hypothesis (3), "Ownership concentration impact on liquidity creation may change according to owner type", to consider the elasticities of liquidity with respect to concentration when controlling for the owner's type using specification (3) :

$$NLC_{it} = \alpha_0 + \alpha_1 Own_{it} + \beta_1 Own_{it} * Bank_i + \beta_2 Own_{it} * Family_i + \beta_3 Own_{it} * Company_i + \beta_4 Own_{it} * State_i + \beta_5 Own_{it} * Institute_i + \sum_j \gamma_j Z_{jit} + \varepsilon_{it} \quad (3)$$

Where NLC_{it} denotes the measure of liquidity creation; α_0 is a constant; Own_{it} is the percentage of stock held by the controlling shareholders; $Bank$, $Family$, $Institute$, $Company$ and $State$ are dummy variables which equal 1 if the controlling shareholder is respectively a bank, an individual/family, institutional investors, a non-financial company or a government and 0 otherwise; Z_{jit} is a bank specific or macroeconomic control variable and ε_{it} is a random disturbance.

Due to the presence of a constant (α_0), using the five dummy variables leads to pure multicollinearity, as explained above. Therefore, we drop $Institute$ variable to avoid singular matrix.

Under the specification described in Equation (3), parameter α_1 captures the average effect of ownership concentration on the endogenous variable, while the interaction term (for example $Own_{it} * Bank_i$) should be read as a complementary effect. Therefore, we test the significance of the sum of the concentration variable coefficient (α_1) and the coefficient of each interaction term (β_1 , β_2 , etc.). For example, for a bank owned by another bank, the impact of ownership concentration on liquidity creation is equal to $(\alpha_1 + \beta_1)$. Therefore, we test $H0: \alpha_1 + \beta_1 =$

¹³ Similarly, if α_2 is significantly higher (lower) than 0, it means that the liquidity creation of banks owned by a family is greater (smaller) than the liquidity creation of banks owned by institutional investors.

0.¹⁴ If H_0 is rejected and $\alpha_1 + \beta_1 > 0$, then when a bank's major owner is another bank an increase in the percentage of equity held by the major owner is associated to a greater liquidity creation.

Then to precisely test Hypothesis (3), we need to test whether all elasticities are the same. To test whether the elasticity of liquidity creation with respect to concentration when the owner is a financial institute is different from the elasticity of liquidity creation with respect to concentration when the owner is (for example) a bank, we need to test: $\alpha_1 = \alpha_1 + \beta_1$. Hence, this can be simplified as the standard and basic significance test: $H_0: \beta_1 = 0$.¹⁵ If we reject H_0 , we accept Hypothesis (3). Therefore, we test Hypothesis (4), "Owner impact on liquidity creation may change according to the concentration level", using specification (4):

$$\begin{aligned}
 NLC_{it} = & \alpha_0 + \alpha_1 \text{Concentrated}_{it}(X) * \text{Bank}_{it} + \alpha_2 \text{Concentrated}_{it}(X) * \text{Family}_{it} \\
 & + \alpha_3 \text{Concentrated}_{it}(X) * \text{Company}_{it} + \alpha_4 \text{Concentrated}_{it}(X) * \text{State}_{it} \\
 & + \alpha_5 \text{Concentrated}_{it}(X) * \text{Institute}_{it} + \sum_j \beta_j Z_{jit} + \varepsilon_{it} \quad (4)
 \end{aligned}$$

We test this last hypothesis by estimating Equation (4), where $\text{Concentrated}(X)$ is a dummy variable that equals one in case there is at least one owner with shareholdings greater than $X\%$ and zero otherwise; Bank , Family , Institute , Company and State are dummy variables which equal 1 if the controlling shareholder is respectively a bank, an individual/family, institutional investors, a non-financial company or a government and 0 otherwise; Z_{jit} is a bank-specific or macroeconomic control variable; ε_{it} is a random disturbance. Equation (4) is estimated over a large sample of banks, which includes banks with both concentrated and dispersed ownership structures. The interaction term formed by $[\text{Concentrated}(X) * \text{Bank}]$ should be seen as a dummy variable that takes the value 1 if the major owner is a bank ($\text{Bank}=1$) that holds at least $X\%$ of total equity ($\text{Concentrated}(X)=1$), and 0 otherwise.

Running Equation (4) using both banks with dispersed and concentrated ownership solves the multicollinearity issue met earlier: for any dispersed bank i in the sample, the dummy variables are such that $\text{Bank}_i = \text{Family}_i = \text{Institute}_i = \text{Company}_i = \text{State}_i = 0$. This allows us

¹⁴ The significance test is the test of the null hypothesis that the sum of the coefficients of concentration and interaction term does not have a joint impact on liquidity creation or bank illiquidity. The alternative hypothesis is $H_1: \alpha_1 + \beta_1 \neq 0$.

¹⁵ The alternative hypothesis is $H_1: \beta_1 \neq 0$.

to simultaneously estimate the constant (α_0) and the set of dummy variables ($\alpha_1, \alpha_2, \alpha_3, \alpha_4$ and α_5) without multicollinearity.¹⁶

One may notice that if Equation (4) was estimated over a restricted sample of concentrated banks only, then it would be exactly the same as Equation (2) when testing Hypothesis (2). To illustrate the differences between Hypotheses (2) and (4), let's consider the case of parameter α_2 . When estimating Equation (2) over a restricted sample (Hypothesis 2), if $\alpha_2 > 0$, then a bank at least X% owned by a family creates more liquidity than other banks concentrated at X% (the benchmark being a bank owned by an institute). When estimating Equation (4) over a large sample (Hypothesis 4), if $\alpha_2 > 0$, then a bank at least X% owned by a family creates more liquidity than a bank with dispersed ownership. Hence in Hypothesis (2) we compare different owner types at a given concentration level while in Hypothesis (4) we compare each owner type with unconcentrated banks.

4.4 Estimation technique

Regarding the estimation technique, the Hausman test indicates that the random effect method is indeed suitable for our panel. However, our regression models are potentially subject to endogeneity issues. Consequently, we estimate equations (1.1, 1.2, 2, and 3) using the generalized method of moments (GMM). Introducing this estimation method has two advantages: it is robust to the distribution of errors and it is considered more efficient than two-stage least squares (2SLS) regression because it accounts for the heteroskedasticity of errors (Hall, 2005). According to the literature on bank liquidity creation, bank-specific variables are suspected to be endogenous. Thus, we carry out an endogeneity test. The results show that bank-specific variables are indeed endogenous.¹⁷ Therefore, we instrument them with their one-year lagged values. We test the validity of our instruments using the Sargan-Hansen statistic for over-identification test, the Cargg-Donald Wald F statistic for weak identification test, and the LM statistic for under-identification test. Finally, to ensure that the error term (ε_{it}) is actually iid we have to address two potential sources of heteroscedasticity: country and bank specificities. The first one is addressed by introducing country fixed effects. The latter is addressed by clustering standard errors at the bank level. This is justified by testing that the covariance

¹⁶ If the total number of banks (concentrated and dispersed) is equal to N, then the sum of all dummy variables is lower than N, that is $\sum_{i=1}^N (Bank_i + Family_i + Institut_i + Company_i + State_i) = N - K$; with K the number of dispersed banks. And, therefore, there is no identification problem.

¹⁷ We reject the null hypothesis of an endogeneity test for the following bank-specific variables: regulatory capital (tier1&2), market power, policy rate and liquidity pressures.

structure is dependent on the bank individual characteristics but is homoscedastic within a bank's group of observations.¹⁸

¹⁸ Estimates without FE and standard error clustering are presented in the Robustness section, Table 10.

5 Results

This paper examines the effect of ownership structure on bank liquidity for a sample of 396 banks from 17 Western European countries. Table 5 to Table 9 show the results for models (1.1), (1.2), (2) and (3) using the GMM estimator.

5.1 Impact of ownership concentration on bank liquidity

Firstly, we estimate Equation (1.1) to examine the impact of ownership concentration on the level of liquidity produced by banks.

Notice that among the control variables, the negative sign of the total regulatory capital ratio variable (*Tier1&2*) confirms the financial fragility / crowding-out hypothesis, while the central bank interest rate, the interbank market spread, and the real GDP growth rate variables aren't statistically significant. Also notice that the validity of our instruments is confirmed by a low LM and endogeneity statistics, and high Sargan-Hansen statistic.

Using our *Own* variable, which measures the percentage of equity held by the major shareholder (from 0% to 100%), we find robust evidence that ownership concentration has a significant and positive connection with liquidity creation. The results in Table 5 indicate that a 1-percentage point increase of the equity held by the major shareholder is associated to a 0.07 percentage point increase of the narrow liquidity creation measure. While significantly different from zero, this number may appear relatively small. However, when estimated over a sample of concentrated banks only (the major owner holds at least 25% of total equity, Table 5 second column), this coefficient increases to 0.16. This result seems to indicate that ownership concentration has a positive impact on liquidity creation in particular for highly concentrated structures.

Secondly, we carry out a deeper investigation on the influence of ownership concentration on bank liquidity creation in order to determine the minimum concentration level at which ownership concentration does matter. Using a concentration proxy *Concentrated(X)*, which is a dummy variable that takes value 1 if ownership concentration is greater than $X\%$, we estimate Equation (1.2) considering several thresholds ($X = 25\%, 35\%, \dots, 85\%$). Results are presented in Table 6. We find that ownership concentration has a positive and significant impact on liquidity creation only if the owner holds at least 65% of total bank equity. Below that threshold, concentrated and widely held banks behave similarly.

These results are consistent with Hypothesis (1): large owners have greater incentives and power to increase bank risk-taking than small shareholders (Shleifer and Vishny, 1997), and our

results seem to indicate that liquidity creation might be a mechanism through which owners increase bank risk by producing more liquidity.

5.2 Impact of the type of the controlling shareholder

Estimation of Equation (1.2) led us to the conclusion that banks with ownership concentration above 65% have on average a greater NLC ratio than banks with a dispersed ownership. However, differences may appear between concentrated banks themselves, due to owner type. Hence, after assessing the impact of concentration change on bank liquidity, we turn to the owner's identity. We create dummy variables (*Bank, Institute, Family, Company* and *State*) equal to 1 if the owner is respectively a bank, an institutional investor, an individual or a family, a non-financial company or a government, with shareholdings above thresholds (denoted X) from 25 to 85%. We exclude from the sample banks with a dispersed ownership (when the major owner owns less than X%).

Results are reported in Table 7. Note that the higher the concentration threshold, the smaller the number of observations. Interestingly, we find no significant coefficients associated to owner type. For example, the last column shows that a bank whose major owner is a family that holds more than 85% of equity has on average the same NLC ratio as a bank held by a financial institution (our benchmark) at 85%. The same result holds for a bank owned by a non-financial company, a state or another bank. This seems to invalidate our second hypothesis: various categories of major owner don't seem to imply different levels of liquidity creation while comparing banks with the same concentration level. Also, we will drop the restriction over the concentration level when examining Hypothesis (4), which will help us understand our results as we will show that the type of major owner does matter but only for some concentration levels.

5.3 Concentration impacts on liquidity creation, accounting for owner type.

Thirdly, we ask if the impact of ownership concentration on liquidity creation may vary according to the nature of the controlling shareholder

Therefore, we estimate Equation (3) and we test the significance of the sum of the coefficients of the concentration variable (*Own*) and the interaction terms (*Own* and dummy *bank, own* and dummy *family, etc.*). Results are given in the second column of Table 8. A low P-value indicates that the total effect (sum of coefficients) is different from 0. This is the case for all categories, which means that an increase in the equity held by the major shareholder always leads to an increase in the bank's NLC ratio, whatever the nature of the major shareholder. More

precisely Table 8. should be read as followed: the elasticity of liquidity creation to a change in major owner concentration is equal to $\alpha_1 = 0.187$ when the owner is an institutional investor, to $\alpha_1 + \beta_1 = 0.199$ when the owner is a bank, to $\alpha_1 + \beta_2 = 0.196$ when the owner is a family, to $\alpha_1 + \beta_3 = 0.165$ when the owner is a non-financial company and lastly to $\alpha_1 + \beta_4 = 0.32$ when the owner is a government.

While all positive and different from 0, these elasticities are very close to each other and seem to vary only slightly across owner types.¹⁹ Statistically, none of the estimated β coefficient is different from 0, which means that these elasticities are not statistically different from one another.²⁰

These findings are relatively inconsistent with Hypothesis (3): our results do not indicate that the impact of concentration on liquidity creation changes according to owner type. Also, estimation of Equation (4) will contribute to specify the interactions between concentration and owner types.

5.4 Owner type impact on liquidity creation, accounting for concentration

We estimate Equation (4) to test if the owner's type impact on liquidity creation may change according to the concentration level.

Equation (4) is close to Equation (2), however the sample change. In Equation (2) we exclude dispersed banks from the sample, hence capturing a pure owner type effect (we compare one owner type to another *ceteris paribus*). In Equation (4), we include both concentrated and dispersed banks in the sample, hence capturing the ability of such or such owner type to behave differently from dispersed banks. In other words, we capture the ability of a major owner to use its power over the other shareholders. Results are displayed in Table 9. To our opinion, this is the most exciting and fruitful part of our work. To make them easily understandable, we decompose our analysis into three pieces: concentration threshold below 50%, above 85% and in-between.

For a concentration threshold below 50% none of the owner type variables are significant (Table 9). This is consistent with estimation of Equation (1.2) presented in Table 6. Indeed, it is the same concentration effect which is measured as a total in Table 6 and decomposed into 5

¹⁹ The only parameter slightly larger than the others is *State* but recall that this category contains only a few observations.

²⁰ If β_i coefficient is not different from 0, then the sum $\alpha_1 + \beta_i$ cannot be different from α_1 .

sub-effects according to owner type in Table 9. Below the 50% concentration threshold, we find neither total concentration effects (Table 6) nor owner type-related concentration effects (Table 9) : banks widely held and banks with concentrated ownership have the same NLC characteristics level. We can conclude that a shareholder holding less than 50% of total equity hasn't enough power (if not incentive) to influence bank decisions in term of liquidity creation. This result can easily be explained by the majority rules applied in the board of directors

-For concentration threshold above 85%, Table 9 displays a positive and significant coefficient for all the categories of owners that we have considered. Therefore, we can conclude that when concentration is above 85% or higher, the nature of the bank owner does not matter anymore. Our results are consistent with the idea that the major owner will use its power to increase bank risk-taking via liquidity creation (confirmation of Hypothesis 1), whatever its nature (contra Hypothesis 2).

For concentration thresholds between 50% and 85%, Table 9 displays a positive and significant coefficient for some owner types, but not for all. More precisely, when the major owner is a bank or a government, it starts impacting liquidity creation if it holds at least 50% of the equity. Then when the owner is a non-financial company or a family, the concentration effect appears only for concentrations above 65% and 75%, respectively. Lastly, below concentration at 85%, banks owned by a financial company seem to behave like dispersed banks. This result is clearly in line with Hypothesis (3) and (4): ownership concentration impact on liquidity creation may change according to owner type, and in turn owner type impact on liquidity creation may vary according to the concentration level.

One may argue that a family has a lower incentive to push for higher bank risk-taking (see Anderson *et al.* 2003 among others) and hence liquidity creation. However, our results point to a different story. If families were pushing for less liquidity creation, we would have a negative coefficient in Table 7 and this is not the case. We find that families have the same goal in terms of liquidity creation as other shareholders (that is no specific impact on liquidity creation when controlling for concentration level, Table 6) but that families are not able to use and impose their power over minority shareholders unless they own a very large share of equity (at least 75% according to Table 9).

A striking result from Table 9 is that two owner types, namely banks and governments, seem to have a strong influence over bank liquidity creation even for a relatively low concentration level. Other owner types are able to influence bank liquidity creation but only when they control almost the entire capital while banks and government have the ability to influence bank liquidity creation at soon as they own 50% of the equity. The question here is not

only about the motivation to push bank risk-taking and liquidity creation, but also about the ability of a major shareholder to impose his views on the bank. One might easily argue that a government may benefit from the institutional context and have a stronger power over the minority shareholders than another owner type (examples include Iannotta *et al.* 2007). Possible explanations for banks may include interconnection of the management structures between a mother bank and the branches or banks' shareholding-activism (see for example Gomes and Novaes (1999, 2005) for analysis of corporate governance with multiple controlling shareholders as a bargaining problem).

6 Robustness tests

We carry out several tests in order to evaluate the robustness of our main results.

First, it may be argued that the financial crisis (2007-2008) has impacted bank liquidity and thus may have temporarily changed banks behavior with respect to liquidity creation. To test whether our results are robust to the context of a crisis or not, we introduce an additional dummy variable in our sample: the *Systemic Banking Crises measure*, defined by Laeven and Valencia (2018). This variable takes the value 1 when a systemic banking crisis is going on (in a given country, a given year) and 0 otherwise. We expect a negative correlation with NLC, meaning that liquidity creation falls in crisis time. Results are reported in **Tables 11 and 13**. When the dummy is included in Equation (1.1) or in Equation (4) we obtain a negative sign, as expected, significant only for Equation (1.1). Other parameters remain unchanged. To farther test the robustness of our results, we estimate Equation (1.1) with a limited sample, restricted to observations in “normal” time (as opposed to crises).²¹ The exclusion of the crisis time lead to a slightly larger *Own* parameter than with all observations. This confirms that NLC is negatively impacted by the crisis. Also, including or excluding crisis time from our sample does not impact our main result: the larger the main owner share, the larger liquidity creation.²²

Second, our results may be affected by bank size. Distinguin *et al.* (2013) argued that large banks could create more liquidity than small banks because they have easier access to the lender of last resort, and they would be the first to benefit from the safety net. Consequently, bank size may have a positive effect on liquidity creation. We include the natural logarithm of *total assets* to account for bank size. Although, *total assets* are already present in our regressors, as it is one components of *Market Power* (which is defined as the ratio of a bank total assets over the country total assets). Therefore, when we include *total assets* in the estimate of Equation (1.1), we exclude *Market Power*. Results are presented in **Table 11**. We expect a positive sign, as larger banks may have access to more loans and attract more funds (e.g., deposits and market funds) which should enhance their transformation activities. However, we obtain a negative sign. Most importantly, the inclusion of the total asset variable has no impact on the estimated parameters, when we include *Market Power* or not.

²¹ We can't keep only observations of crisis time; we would have a too short sample.

²² For the sake of completeness, we've also repeated the tests with the crisis variable used by the European Systemic Risk Board (at the ECB), and defined in Lo Duca et al. (2017). We obtained similar results.

Third, our results may be impacted by some country specificities. For example, the significance of our *State* dummy may be influenced by the institutional environment. To a large extent, we assume that country specificities are already treated by the inclusion of country fixed effects. Also, our sample been limited to western Europe, we expect that the intuitional environment does not change dramatically over time (from 2004 to 2018) and across countries. To complete our analysis and to ensure the robustness of our setup, we include two institutional environment measures in our sample. First, we focus on *Rule of law*, a Worldwide Governance Indicators published by the World Bank. This variable “reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.” The variable takes values from -2.5 (weak governance) to +2.5 (strong governance). See Kaufmann et. al. (2010) for further details. Second, we include the “Anti-director Rights” variable, defined by La Porta *et al.* (2002). It is a measure of shareholder protection, defined as the sum of six rights that may be attributed (in the corporate law or in the commercial code) to public shareholders when opposing management. The variable takes value from 0 to 6. A high value means that shareholders are well protected. The expected sign of these two variables is unclear. On the one hand, a better institutional environment could produce a better corporate governance, with shareholders been able to control the management and therefore to ask for high return and hence high liquidity creation. On the other hand, a good institutional environment could mean that shareholders are well protected, even if they own only a small fraction of the company. Therefore, the positive impact of concentration on NLC would be reduced, and all in all NLC could be lower. Results are displayed in Table 10 and 12. When included among the exogenous variables, with and without country fixed effects, we obtain a negative coefficient for the two variables. All other parameters remain unchanged.

Last, we test the robustness of our results to the presence of consolidated statements. We introduce a dummy variable that takes the value of 1 for banks with unconsolidated statements and 0 otherwise. Estimates of Equation (1) are presented in Table 11 and estimates of Equation (4) are shown on Table 13. Banks with unconsolidated statements seem to have a significantly lower NLC than consolidated banks. Most importantly, taking consolidation into account does not modify the parameters associated with the variables related to owner type. Finally, to ensure that our results are robust to the presence of consolidated data in our sample, we estimate Equation (1) on a limited sample of unconsolidated data only. Results are shown in Table 11. We obtain a larger value for *Own*: the impact of main shareowner concentration increases from 0.06 in our baseline analysis to 0.08 with this limited sample. Consequently, these results confirm the robustness of our analysis.

7 Conclusion

According to the literature, banks perform two prominent roles in the economy: creating liquidity and transforming risk. While most of the empirical literature has focused on the latter, this paper aims to contribute to the growing literature on the determinants of bank liquidity creation. Other studies about bank liquidity creation highlight significant relationships between liquidity creation and regulatory capital (Horvath *et al.*, 2014), monetary policy (Berger and Bouwman, 2017), economic output (Berger and Sedunov, 2016), government intervention (Berger *et al.*, 2016) and bank governance (Diaz and Huang, 2017). Yet researchers have not examined whether and how ownership structure influences bank liquidity creation. To our knowledge, this study is the first to examine the relationship between bank liquidity creation and ownership structure using a panel of European banks.

The existing theoretical and empirical studies highlight that banks' risk-taking behavior might be different according to the power and the category of shareholders. However, liquidity creation might be a channel through which shareholders adjust bank risk, and thus the level of liquidity produced might vary according to the ownership structure of each bank. Therefore, our study investigates the relationship between liquidity creation and two characteristics of banks' ownership: concentration and the type of the controlling shareholder.

We construct a database on ownership structure over the period 2004-2018 for commercial banks in 17 European countries. We follow the Berger and Bouwman (2009) method to compute a liquidity creation measure.

Our results are as follows.

First, our results seem to indicate that banks with a concentrated ownership tend to create more liquidity than banks with dispersed ownership. Specifically, we find that banks with a major owner holding more than 65% of total equity create more liquidity than dispersed banks. Among concentrated banks, we estimate an elasticity of liquidity creation to a change in ownership concentration of 0.16.

Second, the type of the controlling shareholder has an impact on liquidity creation, but not for all concentration level. For banks with a major owner holding less than 45% of total equity, the type of major owner does not matter because there is no difference between concentrated and dispersed banks. For concentrations above 85%, all concentrated banks produced more liquidity than dispersed banks, and therefore the type of major owner does not matter either. Lastly, for intermediate concentration levels, between 45 and 75%, the type of major owner has an impact on liquidity creation. For example, at a 65% concentration threshold,

banks controlled by a family or a financial institution have similar bank liquidity creation levels than dispersed banks, while banks controlled by another bank, a government or a non-financial institution produce more liquidity than dispersed banks.

Fine monitoring of bank liquidity is crucial for the global financial stability, as shown by the introduction of two required liquidity ratios in Basel III. Our study expands the empirical literature on bank liquidity creation and bank corporate governance. Our findings suggest that a close look at both ownership concentration and the nature of the major owner could be important to supervisors as liquidity creation affects financial stability and economic fragility.

Our study could be seen as a first attempt at documenting and exploring the linkage between ownership characteristics and bank liquidity creation in a panel approach. A further investigation on this issue using other measures of liquidity creation proposed by Berger and Bouwman (2009) and considering other countries could be an extension of this paper.

8 References

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Table 1 - Distribution of banks by country

Country	Total number of banks	Number of listed banks	Country coverage*
Austria	26	5	45%
Belgium	12	0	83%
Denmark	27	19	99%
Finland	7	3	84%
France	21	3	85%
Germany	64	4	72%
Greece	5	3	92%
Ireland	7	2	81%
Italy	63	12	92%
Luxembourg	23	0	60%
Netherlands	19	0	90%
Norway	11	0	97%
Portugal	14	2	97%
Spain	18	8	97%
Sweden	15	1	85%
Switzerland	19	3	41%
United Kingdom	46	1	76%
Total/Mean	396	66	81%

* Country coverage = total assets in our sample / country's totals asset in Bankscope

Table 2 - Distribution of banks by ownership characteristics

Ownership	Number of banks	Percentage (%)
Widely Controlled*	48	12
Concentrated Ownership	348	88
Bank	220	55
Family	13	3
Company	61	15
Institut	48	12
State	6	2
Total	396	100

* Widely Controlled refers to banks with no shareholder with a proportion of held equity higher than 25%.

Table 3 - Weights and definitions used in Narrow Liquidity Creation calculation

Assets		
<i>Liquid assets</i> <i>(weight -0.5)</i>	<i>Semi-liquid assets</i> <i>(weight 0)</i>	<i>Illiquid assets</i> <i>(weight 0.5)</i>
Cash and near cash items	Interbank assets	Commercial loans
Short-term marketable assets	Consumer loans	Fixed assets
	Other loans	Other assets
	Long-term marketable assets	
	Customer acceptances	

Liabilities		
<i>Liquid liabilities</i> <i>(weight 0.5)</i>	<i>Semi-liquid liabilities</i> <i>(weight 0)</i>	<i>Illiquid liabilities</i> <i>(weight -0.5)</i>
Demand deposits	Time deposits	Subordinated debentures
Saving deposits	Other term deposits	Preferred equity
Short-term borrowings	Long-term borrowings	Minority interests
Other short-term liabilities	Other long-term liabilities	Shareholder common capital
		Retained earnings

Table 4 - Descriptive statistics of the dependent and independent variables

Variable	Description	Mean	Std. Dev	Min	Max	Obs.
Dependent variables						
<i>NLC</i>	Narrow liquidity creation measure	28,92	20,48	-42,16	81,88	2553
Control variables						
<i>Tier1&2</i>	Tier 1 and 2 capital / total risk weighted assets	17,62	25,00	4,83	87,56	2588
<i>Market Power</i>	Bank's total assets to the country's banking system total assets	7,09	16,06	0,01	90,04	2588
<i>Policy Rate</i>	Central bank policy rate	1,16	1,49	-2,00	5,60	2588
<i>Liquidity Pressure</i>	Spread between one-month interbank rate and the policy rate of the central bank	0,30	0,61	-0,61	3,54	2588
<i>Growth</i>	Annual growth rate of real GDP	0,98	2,69	-9,13	25,12	2588
<i>Own</i>	Percentage of equity held by major shareholder	71,40	36,61	0,00	100,00	2588

Note: all control variables are expressed in percentage.

Table 5 - Bank liquidity and ownership concentration

<i>Sample:</i>	All banks	Concentrated only
<i>Dependent variable:</i>	NLC	NLC
Tier1&2	-0.722*** (-6.43)	-0.778*** (-6.70)
Market Power	-0.282*** (-5.43)	-0.307*** (-4.86)
Policy Rate	-0.873 (-0.48)	-0.931 (-0.41)
Liquidity Pressure	-0.0456 (-0.00)	0.582 (0.06)
Growth	0.223 (0.22)	0.322 (0.30)
Own	0.0712** (2.44)	0.161*** (3.48)
Constant	43.64*** (10.87)	34.57*** (7.88)
Observations	1956	1645
F - statistic	17.22	17.01
P - val. Hansen statistic	0.47	0.53
P - val. LM statistic	0.00	0.00
Country Fixed Effects	Yes	Yes

Note: Standard errors are clustered at bank level. T-statistics are in parenthesis below estimates. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. In column 2, the sample includes both concentrated and dispersed ownership structures, while in column 3 the sample includes concentrated banks only, with a major owner holding at least 25% of total equity. *Own* is the percentage of equity held by major shareholder.

Table 6 - NLC and ownership concentration thresholds

Threshold for Dummy Concentrated (X)	X = 25%	X = 35%	X = 45%	X = 55%	X = 65%	X = 75%	X = 85%
<i>Dependent variable</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>
Tier1&2	-0.519*** (-4.46)	-0.521*** (-4.47)	-0.530*** (-4.53)	-0.535*** (-4.60)	-0.541*** (-4.63)	-0.545*** (-4.84)	-0.552*** (-4.89)
Market Power	-0.280*** (-5.22)	-0.282*** (-5.28)	-0.279*** (-5.28)	-0.285*** (-5.43)	-0.288*** (-5.54)	-0.283*** (-5.92)	-0.279*** (-6.01)
Policy Rate	-1.235 (-1.38)	-1.256 (-1.40)	-1.246 (-1.40)	-1.252 (-1.41)	-1.261 (-1.43)	-1.194 (-1.37)	-1.068 (-1.23)
Liquidity Pressure	3.274 (0.75)	3.343 (0.77)	3.250 (0.76)	3.184 (0.74)	3.315 (0.78)	2.909 (0.70)	2.394 (0.58)
Growth	0.497 (0.97)	0.507 (0.99)	0.505 (0.99)	0.510 (1.00)	0.520 (1.03)	0.496 (1.00)	0.437 (0.89)
Dummy Concentrated(X)	2.589 (1.01)	2.562 (1.09)	3.572 (1.55)	3.373 (1.57)	4.280** (2.05)	6.763*** (3.27)	7.423*** (3.65)
Constant	41.87*** (10.09)	42.45*** (11.62)	42.19*** (12.06)	42.72*** (13.00)	42.33*** (12.85)	41.24*** (12.44)	39.67*** (20.63)
Observations	1969	1969	1969	1969	1969	1969	1969
F - statistics	17.17	17.18	17.25	17.22	17.33	17.26	17.29
P - val. Hansen statistic	0.45	0.46	0.48	0.49	0.49	0.49	0.49
P - val. LM statistic	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: *Dummy Concentrated(X)* = 1 if the major owner holds at least X% of total equity, and 0 otherwise. The value taken by X is given on top line. T-statistics are in parenthesis below estimates. Standard errors are clustered at bank level. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. The sample includes both concentrated and dispersed ownership structures.

Table 7 - NLC and the nature of the controlling shareholder, concentrated sample

Thresholds for sample inclusion	X = 25%	X = 35%	X = 45%	X = 50%	X = 55%	X = 65%	X = 75%	X = 85%
<i>Dependent variable</i>	NLC	NLC	NLC	NLC	NLC	NLC	NLC	NLC
Tier1&2	-0.470*** (-3.99)	-0.486*** (-4.14)	-0.473*** (-3.74)	-0.453*** (-3.49)	-0.397*** (-3.25)	-0.363*** (-2.79)	-0.312** (-2.05)	-0.312** (-1.98)
Market Power	-0.301*** (-4.60)	-0.297*** (-4.66)	-0.273*** (-4.25)	-0.277*** (-4.27)	-0.264*** (-4.18)	-0.269*** (-4.16)	-0.251*** (-3.87)	-0.233*** (-3.65)
Policy Rate	0.993 (0.72)	0.660 (0.48)	1.439 (0.65)	1.804 (0.75)	1.262 (0.49)	2.012 (0.66)	3.215 (0.74)	4.148 (0.75)
Liquidity Pressure	-5.475 (-0.82)	-3.690 (-0.56)	-7.249 (-0.67)	-9.064 (-0.78)	-6.033 (-0.50)	-9.119 (-0.65)	-13.46 (-0.70)	-17.51 (-0.73)
Growth	-0.503 (-0.73)	-0.346 (-0.51)	-0.810 (-0.70)	-0.992 (-0.79)	-0.641 (-0.50)	-1.006 (-0.67)	-1.514 (-0.72)	-1.819 (-0.71)
Dummy Bank	1.621 (0.60)	2.319 (0.86)	1.439 (0.46)	1.736 (0.53)	1.677 (0.50)	1.516 (0.43)	2.654 (0.65)	1.019 (0.23)
Dummy Family	0.862 (0.20)	4.768 (1.17)	2.733 (0.56)	2.413 (0.48)	0.360 (0.07)	2.276 (0.34)	7.973 (0.94)	6.229 (0.68)
Dummy Company	1.743 (0.59)	1.831 (0.60)	0.627 (0.18)	0.762 (0.21)	1.760 (0.48)	1.607 (0.42)	1.214 (0.27)	-1.167 (-0.25)
Dummy State	0.412 (0.09)	0.544 (0.11)	1.672 (0.34)	2.399 (0.53)	4.046 (0.92)	3.726 (0.78)	3.092 (0.54)	0.540 (0.09)
Constant	39.58*** (12.19)	38.84*** (12.07)	40.16*** (10.79)	40.21*** (10.31)	38.21*** (9.91)	38.60*** (9.36)	38.34*** (8.62)	40.90*** (9.13)
Observations	1632	1579	1496	1448	1332	1257	1114	1046
F statistic	32.54	32.09	26.34	26.80	22.82	19.39	13.42	13.04
P-val Hansen Stat.	0.44	0.67	0.66	0.59	0.80	0.51	0.43	0.30
P-val LM statistic	0.00	0.00	0.01	0.01	0.02	0.04	0.12	0.18
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: In order to compare banks at a given concentration level, the sample includes only banks whose major owner holds at least X% of total equity. The value taken by X is given on top line. T-statistics are in parenthesis below estimates. Standard errors are clustered at bank level. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. *Bank, Family, Company and State* are dummy variables that respectively take the value 1 if the major owner is a bank, a family, a non-financial institution and a government that held at least 25% total equity, and zero otherwise.

Table 8 - Interaction between concentration level and the type of the major shareholder

<i>Dependent variables</i>	<i>NLC</i>	<i>NLC</i>
Tier1&2	-0.778*** (-6.70)	-0.562*** (-4.40)
Market Power	-0.307*** (-4.86)	-0.322*** (-5.13)
Policy Rate	-0.931 (-0.41)	-0.108 (-0.05)
Liquidity Pressure	0.582 (0.06)	-1.744 (-0.17)
Growth	0.322 (0.30)	-0.0107 (-0.01)
Own (α_1)	0.161*** (3.48)	0.187*** (3.03)
Own * Dummy Bank (β_1)		0.0118 (0.32)
Own * Dummy Family (β_2)		0.00949 (0.13)
Own * Dummy Company (β_3)		-0.0215 (-0.52)
Own * Dummy State (β_4)		0.133 (1.38)
Constant	34.57*** (7.88)	27.62*** (5.40)
Observations	1645	1645
F statistics	17.01	15.82
P-val Hansen Statistic	0.53	0.64
P-val LM Statistic	0.00	0.00
P-val significance test:		
H0 : $\alpha_1 + \beta_1 = 0$		0.00
H0 : $\alpha_1 + \beta_2 = 0$		0.01
H0 : $\alpha_1 + \beta_3 = 0$		0.00
H0 : $\alpha_1 + \beta_4 = 0$		0.00

Note: Significance test is the test of the null hypothesis that the sum of the coefficients of concentration and interaction term do not have a joint impact on liquidity creation. Low P-val. leads to reject H0. T-statistics are in parenthesis below estimates. Standard errors are clustered at bank level. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. Country fixed effects are included. The sample contains only banks with ownership concentration greater than 25%. *Own* is the percentage of equity held by major shareholder. *Bank*, *Family*, *Company* and *State* are dummy variables that respectively take the value 1 if the major owner is a bank, a family, a non-financial institution and a government that held at least 25% total equity, and zero otherwise.

Table 9 - NLC and the nature of the controlling shareholder, whole sample

Thresholds for Ownership Concentration (X)	X = 25%	X = 35%	X = 45%	X = 50%	X = 55%	X = 65%	X = 75%	X = 85%
<i>Dependent variable</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>
Tier1&2	-0.515*** (-4.37)	-0.523*** (-4.47)	-0.516*** (-4.44)	-0.519*** (-4.47)	-0.514*** (-4.36)	-0.528*** (-4.54)	-0.536*** (-4.76)	-0.545*** (-4.86)
Market Power	-0.287*** (-5.48)	-0.286*** (-5.57)	-0.291*** (-5.61)	-0.292*** (-5.71)	-0.294*** (-5.76)	-0.300*** (-5.83)	-0.301*** (-6.29)	-0.292*** (-6.25)
Policy Rate	-0.295 (-0.22)	-0.267 (-0.20)	-0.374 (-0.29)	-0.403 (-0.31)	-0.386 (-0.30)	-0.418 (-0.32)	-0.481 (-0.37)	-0.191 (-0.15)
Liquidity Pressure	-0.775 (-0.12)	-0.937 (-0.15)	-0.427 (-0.07)	-0.323 (-0.05)	-0.366 (-0.06)	-0.212 (-0.03)	0.0730 (0.01)	-1.140 (-0.18)
Growth	0.0248 (0.03)	0.00833 (0.01)	0.0694 (0.10)	0.0904 (0.12)	0.0827 (0.11)	0.100 (0.14)	0.154 (0.22)	0.0222 (0.03)
Dummy Bank (X)	2.847 (1.00)	2.806 (1.08)	3.326 (1.33)	4.198* (1.77)	4.113* (1.72)	4.595** (2.01)	8.322*** (3.69)	8.959*** (3.97)
Dummy Family (X)	1.284 (0.20)	4.644 (0.69)	-0.135 (-0.02)	0.371 (0.06)	-5.704 (-0.99)	-4.215 (-0.45)	29.23*** (6.28)	28.71*** (6.39)
Dummy Company (X)	1.183 (0.37)	1.021 (0.34)	1.250 (0.43)	1.979 (0.70)	3.878 (1.33)	4.918* (1.74)	6.767** (2.45)	6.588** (2.43)
Dummy State (X)	4.232 (0.43)	4.301 (0.43)	8.712 (1.13)	12.43* (1.90)	16.85*** (3.64)	17.30*** (3.71)	19.08*** (3.85)	18.93*** (3.90)
Dummy Institute (X)	-0.260 (-0.08)	-0.802 (-0.25)	0.256 (0.07)	1.068 (0.31)	1.131 (0.31)	2.293 (0.62)	5.764 (1.52)	7.900** (2.14)
Constant	43.04*** (9.62)	43.48*** (11.26)	43.39*** (12.09)	42.66*** (11.93)	42.68*** (12.54)	42.54*** (12.47)	41.28*** (11.97)	41.27*** (12.46)
Observations	1969	1969	1969	1969	1969	1969	1969	1969
F statistic	5.72	5.72	5.74	5.67	5.68	5.71	5.80	5.81
P-val Hansen statistic	0.95	0.95	0.96	0.97	0.98	0.97	0.95	0.88
P-val LM statistic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Country fixed effects are included. Standard errors are clustered at bank level. T-statistics are in parenthesis below estimates. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. The sample includes both concentrated and widely held structures. *Bank*, *Family*, *Company*, *State* and *Institute* are dummy variables that respectively take the value 1 if the major owner is a bank, a family, a non-financial institution and a government that held at least X% total equity, and zero otherwise. The value taken by X is given on top line.

Table 10 - Robustness checks

Tests	Baseline		Institutional Environment		Legal Environment	
	Yes	No	Yes	No	Yes	No
Country Fixed Effects	Yes	No	Yes	No	Yes	No
<i>Dependent variable</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>
Tier1&2	-0.722*** (-6.43)	-0.668*** (-6.23)	-0.725*** (-6.55)	-0.675*** (-6.39)	-0.768*** (-6.64)	-0.715*** (-6.45)
Market Power	-0.282*** (-5.43)	-0.323*** (-5.53)	-0.284*** (-5.64)	-0.329*** (-5.66)	-0.272*** (-5.32)	-0.295*** (-5.07)
Policy Rate	-0.873 (-0.48)	-0.327 (-0.41)	-1.600* (-1.91)	-0.328 (-0.42)	-1.678* (-1.91)	-0.981 (-1.24)
Liquidity Pressure	-0.0456 (-0.00)	0.408 (0.10)	5.316 (1.33)	0.332 (0.09)	4.512 (1.08)	3.918 (1.00)
Growth	0.223 (0.22)	0.0780 (0.17)	0.707 (1.51)	0.0574 (0.13)	0.657 (1.32)	0.528 (1.12)
Own	0.0712** (2.44)	0.0272** (2.43)	0.0674** (2.32)	0.0263** (2.34)	0.0709** (2.39)	0.0322*** (2.82)
Rule Of Law			-17.40*** (-2.69)	0.417 (0.22)		
Anti-director Rights					-3.178*** (-2.95)	-1.502** (-2.32)
Constant	43.64*** (10.87)	40.79*** (15.76)	74.68*** (5.91)	40.33*** (11.81)	43.25*** (11.95)	43.83*** (15.61)
Observations	1956	1956	1956	1956	1887	1887
F - statistic	17.22	36.51	16.92	25.25	17.33	29.78
P-val Hansen statistic	0.47	0.39	0.46	0.14	0.72	0.27
P-val LM statistic	0.00	0.00	0.00	0.00	0.00	0.00

Note: Country fixed effects are included. Standard errors are clustered at bank level. T-statistics are in parenthesis below estimates. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. *Own* is the percentage of equity held by major shareholder. *Rule Of Law* reflects the institutional quality. *Anti-director Rights* is a measure of shareholder protection.

Table 11 - Robustness checks: crisis, size and consolidation.

Test	Crisis dummy	No crisis sample	Bank size	Bank size	Unconsolidated dummy	Unconsolidated sample
<i>Dependent variable</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>	<i>NLC</i>
Tier1&2	-0.741*** (-6.67)	-0.716*** (-6.31)	-0.803*** (-6.49)	-0.833*** (-6.32)	-0.777*** (-6.47)	-0.828*** (-4.29)
Market Power	-0.282*** (-5.50)	-0.288*** (-5.56)	-0.190*** (-2.79)	.	-0.241*** (-4.53)	-0.222*** (-4.29)
Policy Rate	-1.302* (-1.83)	-0.544 (-0.38)	0.0280 (0.02)	0.457 (0.23)	-0.331 (-0.18)	-1.497 (-1.05)
Liquidity Pressure	4.443 (1.17)	-1.367 (-0.19)	-5.448 (-0.60)	-8.833 (-0.88)	-2.700 (-0.28)	2.492 (0.34)
Growth	0.160 (0.55)	0.0493 (0.06)	-0.347 (-0.35)	-0.698 (-0.62)	-0.0779 (-0.08)	0.625 (0.82)
Own	0.0725** (2.47)	0.0704** (2.41)	0.0751*** (2.64)	0.0820*** (2.87)	0.0694** (2.46)	0.0839** (2.32)
Dummy Crisis	-5.079** (-2.04)					
Total Assets			-1.075** (-2.06)	-1.847*** (-4.59)		
Dummy Unconsolidated					-5.537*** (-2.78)	
Constant	44.63*** (12.66)	44.02*** (11.74)	62.18*** (7.11)	73.73*** (9.73)	49.05*** (10.84)	42.34*** (9.29)
Observations	1956	1450	1956	1956	1956	1147
F - statistic	23.60	0.91	18.11	15.50	16.89	10.71
P-val Hansen statistic	0.62	0.99	0.18	0.11	0.34	0.41
P-val LM statistic	0.00	0.14	0.00	0.00	0.00	0.00

Note: Country fixed effects are included. Standard errors are clustered at bank level. T-statistics are in parenthesis below estimates. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. *Own* is the percentage of equity held by major shareholder. *Crisis* is a dummy variable that takes the value 1 when a systemic banking crisis is ongoing, and 0 otherwise. *Total Assets* is a proxy for bank size. *Unconsolidated* is a dummy variable that equals 1 for banks with unconsolidated statement and 0 otherwise.

Table 12 - Robustness: legal and institutional environment

<i>Concentration (X)</i>	X = 35%	X = 50%	X = 65%	X = 85%	X = 35%	X = 50%	X = 65%	X = 85%
Tier1&2	-0.507*** (-4.19)	-0.507*** (-4.20)	-0.513*** (-4.28)	-0.521*** (-4.47)	-0.555*** (-6.64)	-0.554*** (-6.57)	-0.559*** (-6.76)	-0.568*** (-7.11)
Market Power	-0.288*** (-5.61)	-0.293*** (-5.77)	-0.301*** (-5.90)	-0.295*** (-6.34)	-0.278*** (-9.62)	-0.283*** (-9.96)	-0.292*** (-10.25)	-0.284*** (-10.34)
Policy Rate	0.216 (0.12)	0.0155 (0.01)	0.0406 (0.02)	0.504 (0.27)	-0.330 (-0.18)	-0.516 (-0.28)	-0.469 (-0.25)	-0.0843 (-0.05)
Liquidity Pressure	-3.389 (-0.35)	-2.297 (-0.24)	-2.469 (-0.26)	-4.965 (-0.50)	-1.546 (-0.17)	-0.580 (-0.06)	-0.894 (-0.10)	-3.029 (-0.33)
Growth	-0.218 (-0.21)	-0.0924 (-0.09)	-0.107 (-0.10)	-0.324 (-0.30)	-0.00947 (-0.01)	0.106 (0.11)	0.0740 (0.07)	-0.103 (-0.10)
Dummy Bank (X)	2.727 (1.05)	4.263* (1.80)	4.633** (2.03)	8.997*** (4.01)	3.314 (1.25)	4.700* (1.95)	4.832** (2.06)	9.055*** (3.92)
Dummy Family (X)	4.924 (0.75)	0.979 (0.16)	-4.321 (-0.46)	28.20*** (6.00)	5.396 (0.83)	1.170 (0.19)	-3.393 (-0.37)	28.62*** (6.36)
Dummy Company (X)	0.892 (0.30)	1.933 (0.69)	4.804* (1.71)	6.474** (2.41)	0.913 (0.30)	1.814 (0.64)	4.411 (1.55)	5.913** (2.17)
Dummy State (X)	4.036 (0.40)	12.32* (1.87)	17.30*** (3.72)	18.80*** (3.89)	4.306 (0.43)	12.48* (1.90)	17.32*** (3.73)	18.75*** (3.90)
Dummy Institut(X)	-0.719 (-0.22)	1.235 (0.36)	2.363 (0.64)	7.929** (2.15)	-0.459 (-0.14)	1.456 (0.43)	2.462 (0.67)	8.066** (2.18)
Rule Of Law	-15.03** (-2.23)	-15.77** (-2.40)	-15.53** (-2.43)	-16.68*** (-2.70)				
Anti-director Rights					-2.588*** (-4.87)	-2.868*** (-5.36)	-2.966*** (-5.61)	-3.014*** (-5.83)
Observations	1956	1956	1956	1956	1887	1887	1887	1887
F - statistic	5.56	5.51	5.51	5.59	5.16	5.11	5.14	5.22
P-val Hansen statistic	0.99	0.98	0.90	0.90	0.91	0.89	0.82	0.99
P-val LM statistic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: The dependent variable is NLC. A constant and country fixed effects are included. Standard errors are clustered at bank level. T-statistics are in parenthesis below estimates. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. *Bank*, *Family*, *Company*, *State* and *Institute* are dummy variables that respectively take the value 1 if the major owner is a bank, a family, a non-financial institution and a government that held at least X% total equity, and zero otherwise. The value taken by X is given on top line. *Rule Of Law* reflects the institutional quality. *Anti-director Rights* is a measure of shareholder protection.

Table 13 - Robustness, Crisis & Unconsolidated

<i>Concentration (X)</i>	X = 35%	X = 50%	X = 65%	X = 85%	X = 35%	X = 50%	X = 65%	X = 85%
<i>Tier1&2</i>	-0.502*** (-4.23)	-0.499*** (-4.23)	-0.508*** (-4.31)	-0.527*** (-4.63)	-0.586*** (-4.65)	-0.584*** (-4.66)	-0.597*** (-4.73)	-0.605*** (-5.03)
<i>Market Power</i>	-0.290*** (-5.59)	-0.295*** (-5.73)	-0.303*** (-5.86)	-0.295*** (-6.28)	-0.245*** (-4.56)	-0.251*** (-4.68)	-0.257*** (-4.76)	-0.252*** (-5.03)
<i>Policy Rate</i>	0.283 (0.18)	0.129 (0.09)	0.124 (0.08)	0.268 (0.18)	-0.279 (-0.21)	-0.417 (-0.32)	-0.430 (-0.33)	-0.199 (-0.15)
<i>Liquidity Pressure</i>	-4.607 (-0.61)	-3.853 (-0.52)	-3.838 (-0.52)	-4.306 (-0.58)	-0.840 (-0.13)	-0.239 (-0.04)	-0.121 (-0.02)	-1.049 (-0.17)
<i>Growth</i>	-0.326 (-0.38)	-0.234 (-0.28)	-0.230 (-0.28)	-0.249 (-0.30)	0.00551 (0.01)	0.0885 (0.12)	0.0979 (0.14)	0.0187 (0.03)
<i>Dummy Bank (X)</i>	2.946 (1.14)	4.449* (1.90)	5.037** (2.31)	7.954*** (3.68)	2.825 (1.12)	4.023* (1.75)	4.599** (2.16)	7.587*** (3.58)
<i>Dummy Family (X)</i>	4.481 (0.67)	0.403 (0.06)	-4.406 (-0.47)	28.42*** (6.36)	4.441 (0.64)	-1.016 (-0.17)	-4.359 (-0.47)	28.30*** (8.21)
<i>Dummy Company (X)</i>	0.967 (0.34)	2.013 (0.75)	4.757* (1.79)	5.370** (2.09)	1.145 (0.41)	1.774 (0.67)	4.699* (1.81)	5.121** (2.06)
<i>Dummy State (X)</i>	6.730 (0.77)	13.64** (2.29)	18.10*** (3.82)	18.75*** (3.87)	5.368 (0.54)	12.96** (1.98)	17.87*** (3.71)	18.50*** (3.78)
<i>Dummy Institut (X)</i>	-1.514 (-0.39)	0.734 (0.16)	2.632 (0.45)	28.78*** (10.89)	0.0856 (0.02)	2.198 (0.51)	4.026 (0.73)	28.65*** (8.86)
<i>Dummy Crisis</i>	-0.342 (-0.25)	-0.431 (-0.32)	-0.365 (-0.27)	0.247 (0.19)				
<i>Dummy Unconsolidated</i>					-4.874** (-2.48)	-4.911** (-2.49)	-4.994** (-2.55)	-4.481** (-2.35)
Observations	1956	1956	1956	1956	1956	1956	1956	1956
F - statistic	10.59	10.53	10.57	10.60	5.67	5.62	5.65	5.75
P-val Hansen statistic	0.39	0.34	0.32	0.45	0.90	0.92	0.99	0.83
P-val LM statistic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: The dependent variable is NLC. A constant and country fixed effects are included. Standard errors are clustered at bank level. T-statistics are in parenthesis below estimates. The ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 level respectively. *Bank*, *Family*, *Company*, *State* and *Institute* are dummy variables that respectively take the value 1 if the major owner is a bank, a family, a non-financial institution and a government that held at least X% total equity, and zero otherwise. The value taken by X is given on top line. *Crisis* is a dummy variable that takes the value 1 when a systemic banking crisis is ongoing, and 0 otherwise. *Unconsolidated* is a dummy variable that equals 1 for banks with unconsolidated statement and 0 otherwise

