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The impact of banks' liability management on large lending volume. Empirical Evidence from US Banks

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Abstract

Banks provide credit to large firms either to finance large firms' investment projects with positive net present values or to lend out SMEs indirectly through the expansion of trade credit by large firms which have Access to bank credit. The aim of the current article is twofold: to provide empirical evidence that time deposits affect the supply of large lending and to study whether the large lending volume differs according to banks' characteristics. We employ a Heckman's sample selection model to take into account the latent (unobserved) mechanism that banks use to decide whether to lend out large firms either to finance their goals or to provide trade credit to SMEs. We create a panel of US banks acquired from Statistics on Depository Institutions (SDI) report made by Federal Deposit Insurance Corporation (FDIC) covering the period from 2012 to 2021. The results of this study offer us empirical evidence of positive relationship between large lending volume

and time deposits, which means that the availability of long time-term liabilities increases large lending as this flexibility of banks' liability management implies that banks can aggressively expand their assets obtaining funds (by issuing time deposits) as they were needed.

Keywords: Banking ; Large Lending; Time Deposits, Sample Selection

JEL classification: C23, C51, G21, G2, E5

1. Introduction

Banking system determines money supply through banks' behavior. Particularly, the behavior of banks (in which money is held) as well as the behavior of households (which hold money) determines money supply apart the conventional opinion that Fed policy controls money supply. Indeed, the reserve deposit ratio reflects banks' business policies that can affect money supply as banks can create more loans from every dollar of reserves with a lower reserve deposit ratio. In other words, we can see increases in money multiplier and money supply when the reserve-deposit ratio decreases. The crucial role of banks to create money, in a system of fractional -reserve banking, can also be noticed when households consider demand deposits as a more desirable form of money than currency and therefore banks keep some deposits for bank reserves and the remaining deposits are lent out by banks increasing the supply of money. Furthermore, the credit creation theory

of banking implies that banks can on an individual basis develop credit and money out of nothing (without banks draw down their deposits). In fact, bank accounting rules permits banks to reclassify their liabilities when they grant loans turning the account payable liability to another liability category called "customer deposits" creating therefore money as banks' deposits are considered to be by central banks part of the official money supply (as measured in such official 'money supply' aggregates as M1,M2,M3 or M4) and finally expanding their balance sheet (Werner, 2014).

Moreover, banks carry on to be critically vital, especially to small and mid-size businesses (Elliehausen and Wolken 1990) although the presence of alternative source of credit to business. In addition, other important sources of credit to SMEs such as trade credit or leasing are provided mainly by large and old firms that have access to external finance (Berlin, 2003; Petersen & Rahan, 1997) while recent lending literature review supports that banks, which offer large lending to those firms that provide trade credit, alleviate the asymmetric information problem that exists during loans procedure and at same time they improve both their efficiency and asset quality (Andriakopoulos and Kounetas, 2023; Tsagkanos and Andriakopoulos, 2024).

The aforementioned discussion reveals that banks' behavior affects not only money supply but also bank loan supply as banks can gather deposits and lend these out (intermediate theory and fractional reserve theory of banking) or they create loans using bank accounting rules that it permits also the creation of "new deposits" without the increase of savings from people (creation of money out of nothing).

Although empirical literature review has offer evidence for both three competing theories of banking, we aim to fill the gap of the bank literature review studying the supply

of large lending considered to be at the same time not only an asset for banks but also a unique bushiness policy of banks that it permits them to be involved indirectly in high-risk activities that may be reluctant to undertake without the presence of large lending.

In fact, large lending can be considered as a mechanism that it can reduce information asymmetries issues that arise when banks lend SMEs. So, when banks lend large firms offering large lending we do not know if banks lend large firms to finance large firms' investment projects or to offer trade credit to SMEs. Therefore, there is a latent procedure that banks decide for which reason they offer credit to large firms. In other words, banks can borrow SMEs directly undertaking the higher credit risk of SMEs lending compared to large lending or they can lend out SMEs indirectly through large lending given that large firms, which have access to external finance, offer trade credit to SMEs that are credit constrained because of small size and opaque nature (Berlin, 2003).

For this reason, we consider that the supply of large lending must be studied using an outcome equation which it reflects the supply of large lending and a selection equation which it captures the latent procedure that banks decide for which reason they offer credit to large firms.

Moreover, the above three theories of money creation reveal the positive effect of deposits both on loan supply and money supply. For this reason, we focus on general principles of bank management to consider business policies of banks as these general principles of bank management can affect banks' balance sheet and therefore the supply of loans. However, the effect of liability management on large lending have not been studied extensively and this paper tries to send light on an important but neglected issue of bank

lending literature review given the unique feature of large lending to be asset and business policy for bank at the same time.

The aim of the current article is twofold: to provide empirical evidence that time deposits affect the supply of large lending and to study whether the large lending volume differs according to banks' characteristics. Thus, we create a panel of US banks stems from Statistics on Depository Institutions (SDI) report made by Federal Deposit Insurance Corporation (FDIC) covering the period from 2012 to 2021.

The results of this study offer us empirical evidence of positive relationship between large lending volume and time deposits, which means that the availability of long time-term liabilities benefit large lending as this flexibility of in liability management implies that banks can aggressively expand their assets obtaining funds (by issuing time deposits) as they were needed.

2. Literature Review

2.1 Large lending - time deposits relationship

The main research hypothesis of this article we aim to investigate is whether time deposits increase large lending. The economic reasoning for this research question relies on the important role that banks can play on the ability of monetary policy to influence real activities. Indeed, the stimulation of real economy by monetary policy requires the influence of banks' loan supply by monetary policy (Fuerst, 1994; Labadie, 1995). Therefore, under this idea, banks are crucial not only because of their role as issuers of deposits but also due to their loan's disbursement (Ghazali and Ramhaman, 2005).

Although bank literature review has highlighted the important role of bank loan supply in modern economy, new empirical evidences notice the positive impact of large lending on banking system as this kind of bank credit can improve bank characteristics via the alleviation of information asymmetries that prevail when banks lend out especially SMEs, considered less credit worthy than large firms, because of their financial opacity (Berger and Udell, 1998).

In fact, the business of banking relies on to the production of information, but when banks consider to lend out SMEs frequently they have less information about the investment opportunities and activities of their potential borrowers and therefore banks tries to control credit risk rationing the credit of SMEs (Stiglitz and Weiss, 1981) which limits the crucial role of SMEs in investment, innovation, employment and social stability, which are important constituents of economic growth and social cohesion (Edmiston, 2007; Liang et al, 2017).

However, this adverse situation for banks can be mitigated through large firms that extend trade credit to SMEs (financial constrained firms) as trade credit is created by large lending offered by banks to large firms to finance SMEs having limited access to bank loans because of their small size and opaque nature (Berlin, 2003; Petersen and Rahan, 1997)

Intuitively, when banks lend out large firms use “hard information”, offered by large firms, including audited financial statements and quantifiable data to assess more accurately credit risk (Elyasiani & Golberg, 2004).

Thus, the information asymmetries problems that prevail when banks borrow SMEs can be reduced via large lending, when large firms extend trade credit to smaller firms and therefore large lending provided to smaller firms indirectly reducing at the same time the bank inefficiency and bank credit risk (Andriakopoulos and Kounetas, 2023).

Indeed, trade credit has the advantage to reveal the financial situation of a potential borrower, as payments beyond the discount period can be thought of by selling firms as a sign of financial distress (Ng et al, 1999), and therefore large lending can mitigate the adverse selection problem that exists during a loan procedure provided that large firms (credit unconstrained firms) offer trade credit to SMEs (credit constrained firms).

Furthermore, large firms, which offer trade credit, deal with moral hazard problems reducing the incentives of firms for non – payment, or diverting the loan for unprofitable purposes through the ability of selling firms to cut off shipments for non - payment to inconsistent buyers (Burkart and Ellingsen, 2004). Based on the above, we test the following hypothesis:

H_1The large lending is positively related with the investment of time deposits

2.2 Large lending and general principles of bank management

The three competing theories of banking have implicitly highlighted the crucial role of deposits in banking system the financial intermedation, the fractional reserve, and the credit creation theories of banking notice that banks create credit because their unique and important role to maintain costumer deposits (Werner, 2014). In this section, we review the implications of time deposits on large lending.

According to financial intermedation theory, banks collect funds and use labor and capital to transform specific funds into loans and other earning assets (Berger and Humphery, 1997;Altumbas et al, 2000;Chortareas et al, 2012). Especially, Werner, 2014 observe that banks gather deposits and then lend these out while D'Avernas et al, 2023 notice that large banks offer lower interest rates to gather deposits than small banks.

Turning to fractional reserve theory banks keep some deposits as required reserves and the remaining deposits are usually lent out firms. Intuitively, the lower the required reserves the higher the loan amount that is available for lending. In addition, banks with excess bank reserves are less likely to experience changes in other parts of their balance sheet in case of deposit outflow. However, when banks hold insufficient excess reserves a deposits outflow may hurts their ability to provide loans in firms. In fact, when banks deal with deposit outflow and they do not have ample excess reserves that have four basic options a) banks borrow from other banks in the federal funds market, or by borrowing from corporations, b)banks sell of their securities to deal with deposit outflow, c)banks can borrow from the Fed to meet a deposit outflow and d)banks can reduce their loans by the required amount to meet a deposit outflow that hurts their reserves . However, the reduction of loan amount is the banks' costliest way acquiring reserves when a deposit outflow happens and at the same time banks do not have ample excess reserves to deal with this reduction in their deposits (Werner, 2014; Mishkin, 2016).

Consequently, according to three competing theories of banking, we create the following hypothesis:

H_2 The volume of large lending is higher for more liquid banks

Instead, the credit creation theory of banking does not require new deposits to lend out firms as the two aforementioned implies but it supports that banks can create credit and money at the same time exploiting the unique advantage of banks to maintain costumer deposits which can be used by banks to invent make-belief costumer deposits that help these to lend out firms even if these deposits did not in fact come from any new deposits (Bank of England, 2014a, 2014b, Werner, 2014).

Given the return on assets, the lower the bank capital, the higher the return for the owners of the bank. Thus, an bank capital surplus reduces return on equity and it implies that banks should reduce the amount of bank capital to improve banks' profitability. So, bank have three option to lower the amount of capital relative to assets: (1) banks can buy back some of the banks' stock, (2) banks can increase the amount of dividends that they pay out to their stockholders diminishing the banks' retained earnings and therefore reduce banks' capital and finally (3) banks can keep bank capital constant but increase the banks' assets by acquire new deposits and then increasing business loans or buy new securities with these new deposits (Mishkin, 2016).

Similarly, banks with insufficient capital relative to assets can raise the amount of capital relative to assets following three choices: (1) banks can raise capital by issuing equity, (2) banks can raise capital by diminishing the banks' dividends to shareholders thus increasing retained earnings that it can put into their capital account and (3) banks can keep capital at the same level but reduce the banks' assets by creating fewer loans or by selling off securities and using the proceeds to reduce the banks' liabilities (Mishkin, 2016)

Intuitively, banks with insufficient capital relative to assets are more likely to experience a bank failure as they do not have enough capital to deal with this situation.

Therefore, banks with sufficient (insufficient) capital relative to assets have to reduce (raise) the amount of capital relative to assets to avoid a bank failure. Since banks can adjust their relative capital to assets keeping constant their capital but modify their assets through the maintenance of deposits, we test the next hypothesis:

H_3 The volume of large lending is higher for banks with variable bank capital than for banks with stable capital

3. Data

Our analysis employs a unique dataset containing US banks tracked yearly for the period 2012-2021, creating an unbalanced panel of 28.161 bank year observations. The financial and accounting data used in this study were obtained from Statistics on Depository Institutions (SDI) report made by Federal Deposit Insurance Corporation (FDIC) [1] containing state and private banks.

The dependent variable to be analyzed is large lending (LL). This variable is calculated from the difference between commercial and industrial loans minus commercial and industrial lending to small business divided by total assets. The key independent variable is the time deposits (TIMEDEP) calculated as the ratio of time deposits to total deposits.

[1] Data are from the Statistics on Depository Institutions (https://www5.fdic.gov/sdi/download), which provides branch-level information

Additionally, all regressions include control variables found by previous literature to explain supply of bank loans: bank size (SIZE), bank capital (CAP) and its liquidity level (LIQ). SIZE is the logarithm of total assets. There is a view that large lending and bank size have a positive relationship as large banks lend out large firms relying on hard information that the latter offer to large banks (Mkhaiber and Werner, 2021). Bank capital (CAP) are measured by total equity capital to total assets. In this sense, Gambacorta and Marques-Ibanez, 2011 assume that banks with high capital are more likely to expand supply of loans and well-capitalised banks can deal with a drop in deposits via an strength balance sheet (Gambacorta and Mistrulli, 2004). Thus, we expect a positive relation between large lending and bank capital. Finally, (LIQ) is the ratio of total deposits to total assets. Previous literature notices that highly - liquid banks are more likely to expand supply of loans (Gambacorta and Marques-Ibanez, 2011; Chortareas et al., 2012; Badunenko and Kumbhakar, 2017) and banks that have high liquidity level can avoid the reduction of their loans, which is the banks' costliest way of acquiring reserves, when a deposit outflow exists (Mishkin, 2016). Therefore, we expect a positive association between large lending and banks' liquidity level. Furthermore, since good economic conditions make both banks and firms to enjoy a higher profitability increasing banks' ability and willingness to extend large lending reflecting both the pro-cyclical nature of loan demand as well as the various aspects of bank lending supply in respect with business cycle for loans is pro-cyclical (Gambacorta and Mistrulli, 2004; Martinez - Sola et al, 2014). Thus, we expect a positive relationship between large lending and the variable GDP, which measures annual GDP growth[2]

[2] GDP growth was extracted from Federal Reserve Bank of St.Luis

4. Methodology

Banks provide credit to large firms either to finance large firms' investment project with positive net present value or to lend out SMEs indirectly through expansion of trade credit by large firms which have access to bank credit. Therefore, the extension of large lending from a bank is realized in two steps. We start from the first step of a bank's decision to lend out large firms. The first step is the participation decision itself, and the second is the decision concerning the volume of large lending extended. Volume data are noticed only over a non-random sub-sample of banks that actually did transact large lending. Thus, when the presence of common unobservables affect both the participation and the volume equation the standard techniques such as ordinary least squares fail to estimate the volume equation effectively due to sample selection bias (Heckman, 1979; Sartori, 2003). Thus, we deal with this trouble situation employing a Heckman's sample selection model with which we can take consistent and asymptotically efficient estimates of the coefficients both for participation equation and the volume equation via the inclusion of the parameter that controls for the non-zerocovariance or correlation disturbance terms of the aforementioned equations.

Participation equation $part_{i,t}^{*}=c'z_{it}+u_{it}$ (1)

Bank i provides large lending in year t if $part_{i,t}^{*} > 0$

Bank i does not provide large lending in year t if $part_{i,t}^{*} \leq 0$

Volume equation: $ll_{i,t}=\beta' x_{it} + \varepsilon_{i,t}$ (2)

The equation (1) permits us to model the idea that we do not finally know the reason that banks provide large lending. For this reason, $part_{i,t}^{*}$ in (1) is a latent (unobserved)

variable while its value shows the likelihood of providing large lending. The vector of covariates z_{it} (one of which allows for an intercept) presume to have a linear relation with $part^*_{i,t}$. c is a vector of coefficients while the random element in the participation decision is captured by the disturbance term u_{it}.Turning to volume equation, in (2), the volume of large lending is represented by the variable $ll_{i,t}$while the variable x_{it} captures the vector of covariates (one of which allows for an intercept). b presents the vector of coefficients. (1) is observed over all banks but (2) is observed only over participant banks.

We denote ρ the (unknown) coefficient of correlation between the disturbance terms u_{it} and ε_{it} , which are supposed to be jointly normally distributed (bivariate normal), in (1) and (2) respectively and implying at the same time the presence of common unobservables in u_{it} and ε_{it}.The estimation of the volume equation implies that each observation should be obtained conditional on participation having taken place or conditional on $part^*_{i,t} + u_{it} > 0$. Moreover, the expectations of $ll_{i,t}$ conditional on x_{it} and on $part^*_{i,t} + u_{it}$ are the fitted values of the volume equation:

$$\mathrm{E}\left(ll_{i,t}|x_{it}, part^*_{i,t} + u_{it} > 0\right)=b'x_{it} + \mathrm{E}\left(\varepsilon_{i,t}|part^*_{i,t} + u_{it} > 0\right)=b'x_{it}+\rho\lambda_{it}$$

Where $\lambda_{it} = \varphi\left(-part^*_{i,t}\right)/(1 - \Phi\left(-\left(part^*_{i,t}\right)\right) = \varphi\left(-part^*_{i,t}\right)/\Phi\left(\left(part^*_{i,t}\right)\right)$, where φ and Φ denote the standard normal density and distributions functions respectively. Therefore, (2) could also be written as follows:

$$ll_{i,t}=b'x_{it} + \rho\,\lambda_{i,t} + \tilde{\varepsilon}_{it} \quad (3)$$

Where $\tilde{\varepsilon}_{it}$ is a random (uncorrelated) disturbance term. The equation (3) implies that an additional term, which is created since are supposed to be jointly normally

distributed (bivariate normal), determines the expected value of $ll_{i,t}$, Particularly, the term $\lambda_{i,t}$ in equation (3) capture the inverse Mills ratio which we should take into account when we aim to deal with sample selection bias. In addition, we require that z_{it} be a strict subset of x_{it} so that we avoid collinearity between x_{it} and $\lambda_{i,t}$ in other words for identification z_{it} should contain at least one covariate that is not contained in x_{it}.

5. Results

5.1 Large lending - banks' liability management relationship

Table 2 contains the full sets of two-step coefficient estimates for the volume and participation equations in the sample selection model. In the participation equation, the dependent variable is binary, coded 1 if bank i provide large lending in year *t*, and 0 otherwise. In the volume equation, the dependent variable is the ratio of the difference between commercial and industrial loans minus commercial and industrial lending to small business divided by loans and lease financing receivables of the institution, including unearned income coded 1 if bank i provide large lending in year *t*, and 0 otherwise.

As anticipated, the coefficient on TIMEDEP in the volume equation is positive and significant at the 1% level. This finding reflects both the fundamental role of deposits for the supply of loans as banks needs new deposits to make new loans according to intermedation and fractional reserve theories of banking while the credit creation theory of banking supports that the controlling power of banks over costumers' deposits gives them the comparative advantage to create new loans without new deposits (Mkhaiber and Werner, 2021) and more importantly that the flexibility in liability management increases

the volume of large loans as banks compete with one other for time deposits (Mishkin, 2016).

In line with the economic theory the coefficient on SIZE is positive and significant in both the volume and participation equations, implying that large banks exploits the comparative advantage that they have in 'hard information' lending (or 'transactions lending') proving a smaller proportion of their lending portfolios to small businesses than smaller banks (Berger and Udell, 1995; Keeton, 1995; Berger et al., 1998, 2005; Strahan and Weston, 1998; Haynes et al., 1999; Berger and Udell, 2002; Gilje, 2019;Mkhaiber and Werner, 2021) which implies that large banks prefer to lend out more transparent and large firms (Berger and Udell, 2002; Mkhaiber and Werner, 2021).

Confirming the banking literature the CAP coefficient is positive and significant in volume equation, which suggests that high numbers of large lending can be produced by a relatively well capitalized bank as thinly capitalized banks reduce their credit especially when their initial capital is sufficiently low implying a weak balance sheet that is insufficient to deal with a drop in deposits (Gambacorta and Mistrulli, 2004; Brunnermeier and Pedersen, 2005). As far as the variable that capture the liquidity level - LlQ - we notice a positive relationship between large lending and liquidity level which confirms the view that highly - liquid banks are more likely to expand the supply of loans (Gambacorta and Marques-Ibanez, 2011).

Unexpectedly, economic conditions seem to affect negatively large lending as GDP variable enters negatively and significantly contrary to economic theory that suggests that good economic conditions make both banks and firms to enjoy a higher profitability increasing banks' ability and willingness to expand large lending reflecting both the pro-

cyclical nature of loan demand and loan supply. (Gambacorta and Mistrulli, 2004; Martinez - Sola et al, 2014)

5.2 Large lending and general principles of bank management

We include interaction between the time deposits and dummy variables measuring liquidity and banks' capital volatility developing the following model so that we investigate the aforementioned hypothesis that the relation between banks' liability management differs according to banks' characteristics

Participation equation:

$$PART_{i,t} = c_0 + (c_1 + c_2\, DUMMY_{it}) \times TIMEDEP_{it} + c_3 DUMMY_{it} + c_4 SIZE_{it} + c_5 CAP_{it} + c_6 LIQ_{it} + c_7 GDP_{it} + c_8 BHC_{it} + u_{it} \quad (3)$$

Volume equation:

$$LL_{i,t} = \beta_0 + (\beta_1 + \beta_2\, DUMMY_{it}) \times TIMEDEP_{it} + \beta_3 DUMMY_{it} + \beta_4 SIZE_{it} + \beta_5 CAP_{it} + \beta_6 LIQ_{it} + \beta_7 GDP_{it} + \varepsilon_{it} \quad (4)$$

In equation 4 (volume equation) we incorporate dummy variables to investigate the effect of liquidity level and banks' capital variability on large lending volume. How does large lending is affected by time deposits? If we focus on the brackets of equation 4, we take $\beta_1 * TIMEDEP_{it} + \beta_2 * TIMEDEP_{it} * DUMMY_{it}$.Thus, the effect on large lending can be captured by the sum of coefficient β_1 and coefficient β_2 , which is $(\beta_1 + \beta_2)$ when $DUMMY_{it}$ takes value 1. Otherwise, the interaction variable becomes 0 when $DUMMY_{it}$ takes value 0 and therefore the effect on large lending is captured by β_1. In addition,

following (Dittmar and Mahrt-Smith, 2007), we deal with endogenous relations that is more likely to stem from the dummy variable than from the interaction term including both in volume equation and participation equation the $DUMMY_{it}$ variable on its own. Both the volume and participation equation include the aforementioned control variables while ε_{it} and u_{it} are the error terms of volume and participation equation respectively. Finally, the variable BHC is only entered in participation equation so as to identify the selection equation for this reason , we take into account banks' autonomy in lending policies, measured as BHC - a dummy variable that takes value one if the bank owned by a Multi-Bank Holding Company, and zero otherwise. since many holding companies may impose their policies on their smaller subsidiaries. Keeton (1995) argues that small banks affiliated with bank holding companies may act more like large banks, suggesting a lower propensity to lend to micro and small businesses.

In order to test the banks' liability management for banks liquidity level we take into account banks' liquidity level, measured as DLIQ - a dummy variable that takes value one if bank liquidity of that year is less than or equal to the median bank liquidity in the sample, and zero otherwise. For large lending, the banks' liquidity implies various benefits that can affect credit risk and banks profitability (Mishkin 2016, Regehr and Sengupta 2016). As stated in hypothesis 2 we expect more liquid banks to have higher volume of large lending from time deposits (flexible liability management) than less liquid banks.

Table 3 contains the results for the effect of bank size on the volume of large lending, using two-step estimation. The TIMEDEP ×DLIQ negative coefficient indicates that time deposits is more productive for more liquid firms than for less liquid. For instance, the volume of large lending for the subsample of less liquid banks is 0.0116 +

(-0.0131)=-0.0015, while the subsample of more liquid banks $(DLIQ = 0)$this value is 0.0116. This result is consistent with the view that more liquid banks (larger banks) have sufficient reserves to deal with a drop in deposits leaving unaffected the level of banks loans.

In order to test the effect of capital adequacy management on large lending, we now split the sample according to DCAP- the variable reflecting capital adequacy variability. Following Long et al. (1993), this is the standard deviation of capital adequacy (3 years) divided by mean capital adequacy over a 3 - year period. DCAP takes value one if CAPVOL is smaller than or equal to the median capital adequacy volatility in the sample. According to capital adequacy management a capital surplus, which is following by an increase on return on equity, can be reduced by keeping constant bank capital and at the same time increase the bank's assets by acquiring new funds such as time deposits - and then offering new loans. On the other hand, a capital deficit, which increase the likelihood of bank failure, can be eliminated by raising the amount of capital relative to assets. Therefore, capital adequacy management suggests that keeping capital at the same level but reduce the banks' assets by making fewer loans it increases capital relative to assets. Therefore, we anticipate a greater effect of time deposits on large lending for the subsample of uncertain or variable bank capital. Table 4, presents the results for equation 3 including dummy variable DCAP and the interaction TIMEDEP × DCAP shows support for this hypothesis (H_3). Since the interaction coefficient β_2 is positive and statistically significant, the volume of large lending for banks with stable capital is higher than for banks with a uncertain capital. For instance, the volume of large lending for the sub-sample of less certain bank capital banks is $0.0104 + (-0.0122)$=-0.0018, while the sub-sample

of more stable bank capital ($DCAP = 0$)this value is 0.0104. The positive effect of the variable TIMEDEP × DCAP on large lending may be a result of production efficiency for firms with certain capital. Thus, asset- liability management can be used to lessen the consequences of uncertain capital (Cambacorta and Mistrulli, 2004), and the finding supports the asset - liability management for banks.

6. Conclusion

Bank liability management is particularly important in the case of banks that offer large business loans since an important part of their assets can be invested in SMEs via trade credit. Therefore, efficient bank liability management could improve large lending significantly. Although the impact of banks' liability management on large lending is highly important, no studies have been carried out to investigate this association. The aim of this article has two directions to provide empirical evidence that time deposits affect the supply of large lending and to study whether the large lending volume differs according to banks' characteristics. Thus, we create a panel of US banks stems from Statistics on Depository Institutions (SDI) report made by Federal Deposit Insurance Corporation (FDIC) covering the period from 2012 to 2021.

covering the period between 2012 - 2021.

We find a positive relationship between the investment in time deposits and large lending derived from the fact that banks exploit their comparative advantage to maintain deposits creating at the same time credit and money, frequently, without new deposits. Further evidence implies that an efficient liquidity management could benefit large lending, showing that financial unconstrained banks (banks with higher liquidity level)

provide extra-large business loans than do financially constrained banks. The findings also support that efficient capital adequacy management help banks to expand large business loans. Actually, the use of time deposits is more productive for banks with stable capital than for banks with variable capital. In this sense, time deposits can make banks more prudent improving their capital sufficiency and lowering the likelihood of banks' failure.

These results show the important role of time deposits as determinant of large lending and provide valuable insights for academics and bankers since the results support that by increasing their investment in time deposits banks might enhance large lending, especially in the case of unconstrained banks and banks with stable capital. This article highlights the importance of bank liability management in the supply of loans and opens an important field of future research. In addition, this paper is also relevant for other groups of stakeholders such as central banks and policy makers, since central banks use banks to implement their monetary policy and policy makers, in view of the importance of time deposits for large lending, should enforce prudent rules in banking system to combat bank runs.

Tables

Table 1 Descriptive statistics					
Variables	Observations	M	SD	Min	Max
TIMEDEP	28,161	0.3175	0.1653	0	1
SIZE	28,161	12.5507	1.4715	8.3272	21.9193
CAP	28,161	0.1154	0.0446	-0.0190	0.9678
LIQ	28,161	0.8369	0.0721	0.0082	1.0057
GDP	28,161	0.0243	0.0130	-0.010	0.0542

Table 2: Estimation results, USA, 2012-2021		
	Volume	Participation
BHC		0.5054*** (0.0216)
TIMEDEP	0.0055*** (0.0024)	-0.6319*** (0.0592)
SIZE	0.0157*** (0.0004)	0.5811*** (0.0093)
CAP	0.0843*** (0.0128)	-2.7694*** (0.2765)
LIQ	0.0266*** (0.0067)	0.3211* (0.1763)
GDP	-0.1722*** (0.0253)	-2.6609*** (0.7886)
CONSTANT	-0.1911*** (0.0095)	-6.4560*** (0.2305)
Notes: (a) The number of stars (*) denote significance level:*** p-value<0.01, ** p-value<0.05 and * p-value<0.1. Source: Call Reports of FDIC		

Table 3: Estimation results, USA, 2012-2021		
	Volume	Participation
BHC		0.4972*** (0.0217)
TIMEDEP	0.0116*** (0.0033)	-0.0463 (0.0834)
TIMEDEP × DLIQ	-0.0131*** (0.0045)	-1.1747*** (0.1159)
DLIQ	0.0061*** (0.0016)	0.4907*** (0.0462)
SIZE	0.0159*** (0.0004)	0.5882*** (0.0094)
CAP	0.0822*** (0.0128)	-2.7097*** (0.2791)
LIQ	0.0385*** (0.0087)	0.7070*** (0.2191)
GDP	-0.1697*** (0.0253)	-7.0956*** (0.2624)

CONSTANT	-0.2068*** (0.0109)	-7.0956*** (0.2624)
Notes: (a) The number of stars (*) denote significance level:*** p-value<0.01, ** p-value<0.05 and * p-value<0.1. Source: Call Reports of FDIC		

Table 4: Estimation results, USA, 2012-2021		
	Volume	Participation
BHC		0.5005*** (0.021)
TIMEDEP	-0.0027 (0.0048)	0.3801*** (0.1243)
TIMEDEP × DCAP	0.0104* (0.0054)	-1.2847*** (0.1386)
DCAP	-0.0122*** (0.0019)	0.3868*** (0.0526)
SIZE	0.0156*** (0.0004)	0.5859*** (0.0093)
CAP	0.0997*** (0.0128)	-2.5968*** (0.2798)
LIQ	0.0283*** (0.0067)	0.3538** (0.1766)
GDP	-0.1856*** (0.0253)	-2.4190*** (0.7896)
CONSTANT	-0.1826*** (0.0096)	-6.8642*** (0.2360)

Notes: (a) The number of stars (*) denote significance level:*** p-value<0.01, ** p-value<0.05 and * p-value<0.1.
Source: Call Reports of FDIC

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