

# LIQUIDITY DETERMINANTS OF THE SELECTED BANKING SECTORS AND THEIR SIZE GROUPS

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## Abstract

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The article focuses on the factors affecting the liquidity of selected bank sectors, as well as their size groups, using panel regression analysis. For higher complexity of the results, multiple dependent variables are used: liquidity creation, outflow and net change. The values are calculated based on the specific method of liquidity risk measurement – gross liquidity flows. The results indicate both multiple effects of some factors on the given variables, as well as isolated influence of factors on a single liquidity form or size group. Thus, when looking for determinants using just one form of liquidity, such as creation, the results need not necessarily comprehensively show the influence of the given factors, and can lead to erroneous conclusions. The results also point to the differing behaviours of the size groups and their different sensitivity on the factors; smaller banks have shown higher sensitivity on macroeconomic variables. Higher flexibility in regulation could lead to higher optimization.

Keywords: liquidity determinants, measurement liquidity, size of the banks, different liquidity forms

## INTRODUCTION

Studies investigating the determinants of liquidity almost always work with two main concepts of measuring liquidity risk on the side of the dependent variable. One of them is using financial ratios (see Bunda and Desquibet, 2008; Vodová, 2011a, 2011b, 2012; Trenca, Petria, Mutu, *et al.*, 2012), but this method is somewhat static, so some authors use a more dynamic one, which according to them provide a better assessment of liquidity. The solely used method in this case is the method of liquidity creation based on Berger, Bouwman (2009) (e.g. Pana, Park and Query, 2010; Lakštutienė and Krušinskas, 2010; Horvath, Seidler and Weill, 2012).

According to the present author the method of creation of liquidity, besides the fact it is on a dynamic basis, provides just a partial view of the impact of the given factors on liquidity. As the global crisis has shown, the banks or the whole system had problems in the creation of liquidity at that time, but also with a higher outflow of it. This is caused by the lower efficiency of markets, as well as by financial problems of counterparties. Moore (2010) detected that liquidity during crisis was about 8% lower.

Thus the factor may have a crucial effect on other dimensions of liquidity, not only creation. Regarding the studies dealing with the determinants of liquidity outflow, the only known study is by Laštůvková (2015a, 2015b) or let say by Valla, Saes-Escorbiac, and Tieset (2006), who, however, did not construct regression models to seek determinants as such, but dealt with the evaluation of liquidity flows and compared these flows with the economic cycle to assess financial stability.

Moreover, when evaluating the influence of one factor on the creation of liquidity, a false belief may be created that the end result of this factor's effect is the creation of liquidity. This same factor can influence the outflow of liquidity in a greater extent, and can thus lead to liquidity outflow from the system. For these reasons more forms of liquidity are used as a dependent variable – creation, outflow and net changes.

The aim of the paper is to identify the factors influencing liquidity in the selected banking sector using multidimensional panel regression analyses. The regressions operate with a larger number of dependent variables to represent different views

on the liquidity risk. The panel is made from all the chosen sectors, as well as from the size groups of banks of these selected sectors.

### Studies Dealing with Liquidity Determinants

This article works with general possible determinants that may affect bank liquidity. Other studies dealing with possible general determinants are e.g. Hackethal, Rauch, Steffan *et al.* (2010), Lakštutienė and Krušinskas (2010), Vodová (2011a, 2011b, 2012), Trenca, Petria, Mutu *et al.* (2012) and Laštůvková (2015a, 2015b).

The factors are usually divided into three categories – specific banking factors, factors on the level of the banking sector and macroeconomic factors. Specific banking factors often represent bank size, equity and profit together with the value of loans and deposits, as the elements connected to the main activity of the banks.

The size of the banks is mainly expressed by the total value of the assets or the author's work with different size groups of banks to show the effect of size on banking liquidity. It is expected that size groups manage liquidity differently; they have different strategies (see e.g. Laštůvková, 2014). This diverse behaviour can then cause that the liquidity of size groups is sensitive to different factors. Generally it is expected that the bigger the bank is, the less liquidity it holds and more relies on, and obtains it from the financial markets. It is connected with the concept "too big to fail". Laeven, Ratnovski and Tong (2014) argue that the big banks have a better possibility for diversification, which in turn reduces the risk of the portfolio, thereby allowing banks to hold less capital and use less stable funding. On the other hand there is an assumption that smaller banks create and hold more liquid assets, as they have to rely more on themselves.

Regarding the total equity, two opposite concepts are in the game. One, so-called "crowding out of deposits" with negative impact on liquidity (see e.g. Gorton and Winton, 2000), and the second with a positive impact, called "risk absorbing hypothesis" (Allan and Gale, 2004; Repullo, 2004). These two concepts have been subjected to many studies. Distinguin, Roulet and Tarazi (2013) explored the relationship of these variables on US and European banks and demonstrated a negative relationship. A negative relationship is also demonstrated by Lei and Song (2013), who explore the Chinese banking market. However, Lei and Song (2013) pointed out that the negative relationship was weaker for foreign banks than for banks based in China, arguing that most Chinese banks are owned or supported by the state and thus they do not need to increase the amount of capital to cover potential risks, unlike foreign banks. Berger and Bouwman (2009) point out that the relationship can be significantly affected by the size and type of banks.

In the case of profit the general sign is based on an investment triangle, where liquidity is a counterweight to profitability. Bank need to be

profit, as well as, liquid. Some authors, e.g. Owolabi, Obiakor and Okwu (2011) speak about trade-off between these two variables.

For deposits it is an important factor affecting the liquidity their security – the higher the security, the less the concerns of clients and thus lower the liquidity risk. Furthermore, the very structure of depositors and deposits – risk can be e.g. the concentration of types of depositors. For loans, liquidity risk arises from credit risk – the threat to liquidity is already open credit positions, outstanding client repayment and so on. Apart from the basic items of loans and deposits (see e.g. Cucinelli, 2013; Moussa, 2015) various ratios are also used. Moussa (2015) adds the ratio of deposits to loans. The authors also take into account the quality of the bank assets, through NPL ratio or allowances for loan losses (e.g. Vodová, 2011a, 2011b, 2012; Cucinelli, 2013; Horvath, Seidler and Weill, 2013; Roman and Sargu, 2015).

Another group is variables on the level of the banking sector. These are usually interest rate or some legal regulation specific for the sector. The interest rate, according to Moore (2010), acts as a "fine" for lack of liquidity. The higher this rate is, the higher the "fine" would be and that banks hold more liquidity. On the other hand, with a lower interest rate it is cheaper for banks to obtain loans and there are also better conditions for clients to obtain loans from banks.

The last group represents the macroeconomic variables. Typical are GDP, inflation and unemployment. Regarding GDP, Valla, Saes-Escorbiac and Tieset (2006) say that appetite for higher creation of liquidity increases with better economic conditions, where future loan growth is expected, and at that time the conditions are suitable for stocking up liquidity, liquidity creation is easier than at a time of economic downturn. Cucinelli (2013) also speaks about increased liquidity creation during good economic conditions. Conversely, Aspachs, Nier and Tieset (2005), Vodová (2011a) and Moussa (2015) document higher liquidity holdings in a period of economic downturn, when holding is motivated by the principle of precaution from banks, but also by less demand for loans from clients. Berrospide (2013) shows that the rate of hoarding of liquidity decreases with the size of banks.

Bunda and Desguilbet (2008) added the effect of inflation due to other intentions for banks to hold liquid assets – if banks offer a higher proportion of long-term loans, the nominal value of the assets is more sensitive to inflation. Vodová (2012) also documents the larger holding of liquid assets during higher inflation. Higher unemployment, according to Hackethal, Rauch, Steffan, *et al.* (2010), may indicate deterioration in general economic conditions, which is necessarily reflected in the lower availability of liquidity, etc. Higher unemployment may also lead to the loss of revenue of clients who are repaying previously obtained

loans. This puts pressure on banks to cover these shortfalls.

## MATERIALS AND METHODS

To determine the factors influencing the chosen liquidity flows, panel robust regression analyses are performed. The general equation of the model is as follows:

$$\begin{aligned} \text{Liquidity (POS/NEG/NET/TOT)} = \\ = \alpha + \beta_1 \text{Inner\_factors} + \beta_2 \text{Factors\_on\_banking\_level} + \\ + \beta_3 \text{Macroeconomic\_factors} + \text{dummy\_size\_group} + \varepsilon. \end{aligned}$$

On the side of the variable being explained appear the individual calculated liquidity flows. These are the positive flow (POS) representing the creation of liquidity, the negative flow (NEG) representing the outflow of liquidity and the net change (NET) as the difference between the above mentioned flows. The individual flows were calculated on the basis of the method created by Valla, Saes-Escorbiac and Tieset (2006), called gross liquidity flows. To obtain these flows, the following method of processing the value of liquid assets is used:

- 1) Determining the year-on-year changes in liquid assets

$$\Delta I_{it} = I_{it} - I_{it-1}, \quad (1)$$

where

$I_{it}$ ..... the liquidity value of bank  $i$  in time  $t$ ,

$I_{it-1}$ .... the liquidity value of bank  $i$  in time  $t-1$ .

- 2) Determining the adjusted growth rate

Relation (2) is used to determine the adjusted growth rate of liquidity in time  $t$  for each bank:

$$g_{it} = \frac{\Delta I_{it}}{(I_{it-1} + I_{it})/2}. \quad (2)$$

- 3) Determining the liquidity flows

By aggregating the values obtained from relation (2), either positive (3) (where  $g_{it} \geq 0$ ) or negative (4) (where  $g_{it} \leq 0$ ) nominal flows are obtained.

$$\text{POS}_t^{\text{nom}} = \sum_{i|g_{it} \geq 0}^N g_{it} \left( \frac{(I_{it-1} + I_{it})/2}{\sum_{i=1}^N I_{it-1}} \right), \quad (3)$$

$$\text{NEG}_t^{\text{nom}} = \sum_{i|g_{it} \leq 0}^N |g_{it}| \left( \frac{(I_{it-1} + I_{it})/2}{\sum_{i=1}^N I_{it-1}} \right). \quad (4)$$

For positive flows, only positive (or zero) values of adjusted growth rate of individual banks are considered, weighted by the average share of total liquidity; for negative flows, only negative (zero) values of  $g_{it}$  are considered.

- 4) Calculation of the net changes

Whether a drop or a growth in liquidity of the given system occurred is determined via net liquidity flows.

$$\text{NET}_t^{\text{nom}} = \text{POS}_t^{\text{nom}} - \text{NEG}_t^{\text{nom}}. \quad (5)$$

The value of liquid assets in the time period was obtained from the Bankscope database on an annual basis. The database defines liquid assets as follows:

Liquid assets = Trading securities at FV through income,  
+ Loans and advances to banks,  
+ Reverse repos and cash collateral,  
+ Cash and due from banks,  
– Mandatory minimum reserves.

On the side of the independent variables stand the internal factors with potential influence on bank liquidity. These variables include:

- value of equity (EQU) (+/-),
- value of profit, i.e. profit after taxation, net income (NETI) (-),
- net loans (N\_LOAN) (-),
- allowances for loans losses (ALL) (+),
- client deposits (deposits and short term funding) (DEP) (+),
- total assets, i.e. size of banks (TA) (+/-),
- financial ratio gross loans/client deposits (RATIO) (-).

Internal variables used are adjusted into annual changes.

As other possible variables are assigned variables at the level of banking sector – interest rates:

- long-term interest rate (yield on government bonds with a maturity of ten years) (LONG) (+/-),
- short-term interest rate (three-month interbank rates) (SHORT) (+).

Last group of variables represents macroeconomic variables:

- GDP (GDP at market prices, percentage change over previous period) (GDP) (+),
- Unemployment (annual average) (UNEM) (-),
- Inflation (HICP, 2005 = 100) (INFL) (+).

Data were obtained from Bankscope and Eurostat.

The expected signs for creation of liquidity (POS) based on literature review, are given in brackets as the most studies searching determinants for creation. In the case of liquidity outflow (NEG), representing the negative flow, simplified consideration of the problem would allow the assumption of an opposite relationship. However, it must be noted that any given factor can influence one of the flows without influencing the other, or influence one of the flows in a more significant way. In addition, as Valla, Saes-Escorbiac and Tieset (2006) point out, there could be a simultaneous effect of some factor on liquidity. They document this e.g. in the case of GDP, where as it was said, during economic upturn, there is higher creation. Valla, Saes-Escorbiac and Tieset (2006) however argue that economic upturn is also

connected with higher outflow of liquidity. Banks use liquidity for investment purposes – that is influenced by the expected return of investments and market conditions. At a time of economic growth more profitable opportunities to invest appear, which increases outflow. Which effect will be dominant and will lead to the net change (positive or negative) depends, according to them, on specific factors. In the case of net changes (NET), it is impossible to determine the predicted sign in advance, since this depends on one flow being dominant.

The studied sample are the Czech, Slovak and Slovenian banking sector as a whole, excluding the branches of foreign banks and saving banks. Due to the fact that development of the whole sector is, in these cases, given mainly by the development of the large group of banks (respectively in the Slovenian banking sector by the large group together with medium-size group) panel regression models for the size groups are also added. Size group dummy variables were also added into models to show the differences among these size groups and the whole selected sectors. As was stated, the size of the banks and their position in the given sector is connected with the particular liquidity management strategy.

On this basis it is possible to expect different results among size groups, as well as with the comparison to the results of the whole sectors. In the case of size groups; banks are divided into 3 size groups according to the total value of their assets per period.

The development is evaluated between the years 2001 and 2013. The calculations were performed in Stata software.

## RESULTS AND DISCUSSION

The following Tabs. I, II and III present the results for the creation, outflow and net change of liquidity. These three flows are closely interconnected. The creation and outflow are oppositely acting flows, while net change represents their difference, i.e. the final result of the value of liquidity.

In the case of factors affecting both the opposite flows (creation and outflow), it is the direction of the effect which is key. If the effect on the flows is opposite, the influence of the factor on one of the forms is further enhanced by the effect on the other form. This situation can be seen, for example, in the variables of net loans, deposits or interest rates (see Tabs. I and II). In net loans, a negative relation to liquidity creation was detected: the higher the value

I: Results for creation of liquidity

POS (creation)	(1) all sectors	(2) large	(3) medium	(4) small
dummy_sk	0.0602*** (13.26)	0.270*** (4.29)	-0.00653 (-0.34)	-0.234*** (-9.43)
dummy_slo	0.0373*** (3.15)	0.0730 (1.35)	-0.0468*** (-3.56)	-0.0784*** (-6.04)
EQU		-0.332*** (-4.25)		
N_LOAN	-0.660*** (-3.04)	-0.802*** (-7.90)		-0.132*** (-3.02)
ALL	0.141*** (5.56)	0.0747* (1.76)	0.126*** (3.29)	
DEP	0.702** (2.41)			
TA	0.406** (2.42)	1.407*** (8.43)		0.284** (2.33)
RATIO		-0.248*** (-2.97)		
GDP			-0.0188* (-1.65)	0.00673*** (3.23)
UNEM		-0.0232*** (-3.42)		0.0119* (1.75)
LONG	-0.0612** (-1.97)		-0.0661*** (-3.71)	
SHORT	0.0327** (2.17)		0.0553*** (3.69)	
cons	0.262** (2.01)	0.426*** (4.08)	0.340*** (6.47)	0.154** (2.25)
No. of obs.:	39	39	39	39
R <sup>2</sup> :	0.726	0.735	0.398	0.414

Note: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Source: own calculations

of net loans, the lower the liquidity creation. This initial situation is further affected by the positive effect on liquidity outflow: the higher the values of net loans, the higher the liquidity outflows, which logically led to lower values of net liquidity change, as was found in all the studied groups, or sectors (see Tab. III). In deposits, the situation is similar, but the creation of liquidity is further promoted by lower outflow at higher values of deposits, which creates higher positive net change, as shown by the results for net change (Tab. III).

On the other hand, in the case where the effect of factors on the variable is the same, for creation and outflow, mutual compensation occurs. It then depends on the magnitude of the effect, which of the flows will be dominant and what the net change will be. This situation did not occur in the results, however.

Some of the factors had a multiple impact on a number of groups; others affected only some of them. For example, the net loan value, along with adjusting items, played a part in almost all the studied groups for both creation and outflow. Multiple representation was also observed in the value of total assets, representing the size of banks. However, this occurred mainly in the creation of liquidity. A positive relation was documented in both small and large group of banks, even

though in large group of banks a negative relation was expected. Despite the dominant position of large banks in the sector, or alternatively for the Slovenian sector a significant representation of state ownership, these banks, like banks of the small group, adequately increased their liquidity value when growing. A positive relationship could partly be caused also by the influence of the global crisis throughout a significant portion of the reference period, when banks, due to higher risk, created and held more liquidity. In outflow, the value of assets has proven significant only in the group of small banks, where the opposite influence on contradictory forms of flow (creation and outflow) led to a higher final liquidity value; in higher asset values, the value of liquidity assets grew, further supported by lower outflow. In other groups, the relation for outflow was not significant. The results show that even though creation in all groups of banks was sensitive to the value of assets, outflow was also affected in the banks of the small category. When creating liquidity, the banks thus tried to limit outflow and hold liquidity in the portfolio, which corresponds with the assumption that smaller banks will hold liquidity more, since they have to rely more on themselves.

On the other hand, other factors solely influenced only certain groups of banks or certain forms of

## II: Results for outflow of liquidity

NEG (outflow)	(1) all sectors	(2) large	(3) medium	(4) small
dummy_sk	0.101*** (5.59)	0.0810*** (15.03)	-0.00592 (-0.83)	0.0483*** (4.37)
dummy_slo	0.0124*** (4.12)	0.0277*** (3.77)	-0.0221*** (-5.44)	0.00571 (1.48)
EQU			-0.221*** (-8.52)	0.105*** (4.18)
NETI			-0.0109** (-2.30)	-0.00423** (-2.06)
N_LOAN		0.178*** (3.88)	0.207*** (3.85)	
DEP	-0.477*** (-3.02)	-0.324*** (-4.70)		
TA				-0.0425*** (-13.39)
UNEM	-0.00437** (-1.97)			
INFL		0.0197*** (4.49)		
LONG				0.0545*** (3.42)
SHORT		-0.0290*** (-2.69)		-0.0420*** (-4.29)
cons	0.188*** (10.87)	0.127*** (7.08)	0.138*** (21.30)	-0.0423 (-1.06)
No. of obs.:	39	39	39	39
R <sup>2</sup> :	0.251	0.230	0.182	0.531

Note: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Source: own calculations



## III: Results for net changes

NET (net changes)	(1) all sectors	(2) large	(3) medium	(4) small
dummy_sk	-0.0161*** (-3.48)	0.00749 (1.09)	-0.0172 (-1.17)	-0.184*** (-6.83)
dummy_slo	0.0367*** (2.89)	0.104** (2.31)	0.0256*** (2.62)	-0.0773 (-1.41)
EQU			0.482*** (4.53)	-0.164** (-1.99)
NETI				0.00615*** (3.04)
N_LOAN	-0.431* (-1.96)	-0.622*** (-7.18)	-0.549** (-2.20)	-0.104** (-2.17)
ALL			0.157* (1.79)	
DEP	1.621*** (5.36)	1.531*** (27.95)		
TA				0.362*** (2.98)
RATIO		-0.230*** (-2.82)		
LONG			-0.0792*** (-4.70)	-0.0727** (-2.28)
SHORT			0.0413*** (2.87)	0.0582*** (4.41)
cons	-0.0978* (-1.74)	0.0740** (2.34)	0.244*** (4.36)	0.328*** (3.95)
No. of obs.:	39	39	39	39
R <sup>2</sup> :	0.469	0.472	0.321	0.418

Note: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Source: own calculations

liquidity flow. The value of equity has proven significant in the creation of liquidity only for the group of large banks with a negative influence. This negative relation to the creation of liquidity is in accordance with the findings of other studies (see Berger and Bouwman, 2009; Distinguin, Roulet and Tarazi, 2013; Lei and Song, 2013 etc.). In the remaining two groups, equity was significant only in the case of outflow (Tab. II) and was so with the opposite effect on the groups studied. In the group of medium-sized banks, the influence was negative, i.e. the higher the equity, the lower the outflow of liquidity. On the contrary, in the group of small banks, a positive influence was found, i.e. the higher the equity, the higher the outflow. In addition, in the case of these two groups, the relation was also reflected in net change, where medium-sized banks logically had higher net values. The fact that both relations were significant need not necessarily be an error. Although empirical studies support overall a negative relationship, theoretical concepts present both possible effects, negative (given by the hypothesis of the so-called crowding out of deposits, see Gorton and Winton, 2000) and positive (risk absorption hypothesis, see Allan and Gale, 2004; Repullo, 2004). In the category of medium-sized banks, it seems that there is a predominant concept where capital is seen as an absorber of risk

and its higher values result in the amount of liquid assets also being higher (i.e. there is a lower liquidity outflow). On the other hand, in banks from the small and large group, the second hypothesis was proven to be valid, i.e. the crowding out of deposits. Higher values of capital led to the crowding out of other passive items, i.e. deposits. When deposits are lower, the banks are not forced to create such an amount of liquid assets to cover potential runs, which leads to its lower value, or in smaller banks to higher outflow.

The creation of liquidity in small and medium-sized banks was, aside from internal variables, also significantly affected by external variables. The results for medium-sized banks correspond with the results presented by Laštůvková (2014), who also documents the significant influence of external conditions on the behaviour of the medium class of banks. Due to the smaller sizes and smaller influence in sectors, these banks face a higher risk that they will have to rely on themselves more if an issue arises than larger banks would; those are more likely to be supported by the central bank or the state. The smaller banks thus have to react more strongly to outside changes. Interestingly, in the case of GDP, the effect was again opposite in the two studied groups of banks. In banks from the small category, the relation was positive, leading to higher creation at higher GDP value, while in the

banks from the medium category, the relationship was negative, leading to higher creation at lower GDP values. Even in this difference can we see the influence of strategies of liquidity risk management, determined by the size of the banks (as studied, for example, by Laštůvková, 2014). At a time of favourable economic conditions, small banks create reserves for issues which might arise in the future. Similarly, they increased creation during times of high unemployment which could lead to failures to repay on the part of clients. Banks from the medium category, on the other hand, created liquidity when the worse economic conditions occurred. In the meantime, they acted more like banks from the large group and did not hold liquidity, since it brings almost no revenue to the bank. Instead, they obtained liquidity from the markets. The assumption of reserves being created by smaller banks is further supported by the above-mentioned influence of the value of assets on the creation and outflow of liquidity, where banks of this group limited outflow during the process of liquidity creation.

From the dummy variables, we can assert that the Slovenian and Slovak sector showed an increased liquidity creation when compared to the Czech sector (base), due mainly to its higher creation in the large group of banks. Here it should mention that large Czech banks are larger than large Slovak

or Slovenian banks. Their dominance on the market may be much higher in their case, and liquidity is thus not created to such an extent. On the other hand, medium and small banks from the Czech sector had a much higher liquidity creation than these bank classes had in the other two sectors.

The Slovenian and Slovak sector, including the small and large bank class, however, also had higher outflow than the Czech sector in these groups. The outflow in the Slovak sector and its groups was so significant that it caused lower net change than in the Czech sector (see Tab. III). On the other hand, the Slovenian sector, despite the higher outflow, showed a higher net change than the Czech sector due to higher liquidity creation.

The results for the Slovak sector serve as a good illustration of the differences in the chosen methodology of measuring bank liquidity. The gross flows method by Valla, Saes-Escorbiac and Tieset (2006) allows the determination of not only creation, but also of outflow and other forms of liquidity. While the results showed high liquidity creation for the Slovak sector, high outflow was also identified, which in the end, was the decisive factor. In the method of liquidity creation by Berger and Bouwman (2009), this outflow was not detected at all. In terms of complexity of the results and the total final value of liquidity, liquidity creation would represent only a minor portion.

## CONCLUSION

The aim of the paper was to determine the factors of liquidity affecting the chosen sectors and their size groups.

The results show that certain factors had a multiple effect on several forms of liquidity or several classes at the same time (see net loans etc.), while others had influence on certain forms and classes only. Based on these findings, we can conclude that identification of factors for liquidity creation only provides incomplete results.

Similarly, the individual classes were sensitive to the factors to a different extent. In addition, despite the effect of one factor on a number of groups, the factor affected different forms of liquidity (for example in the case of capital). Different sensitivity of the classes stemmed mainly from their size or the strategy of liquidity risk management. In this respect, smaller banks were more sensitive to macroeconomic quantities, since they have to rely more on themselves. The class of small banks created liquidity reserves during favourable economic conditions to cover potential problems in the future. This difference in behaviour and sensitivity to different factors leads to the need for a more flexible setting of regulatory measures or limit values of indicators for differently sized bank classes, or different bank types. In this regard, higher optimisation might be implemented, since the rules and indicators for banks are highly generalised and do not respect their specificities.

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## REFERENCES

- ALLEN, F. and GALE, D. 2004. Financial Intermediaries and Markets. *Econometrica*, 72(4): 1023–1061.
- ASPACHS, O., NIER, E. and TIESSET, M. 2005. *Liquidity, Banking Regulation and the Macroeconomy. Evidence on bank liquidity holdings from a panel of UK-resident banks*. Bank of England Working Paper.
- BERGER, A. N. and BOUWMAN, C. H. S. 2009. Bank Liquidity Creation. *The review of financial studies*, 22(9): 3780–3837.

- BERROSPIDE, J. 2013. Bank Liquidity hoarding and the Financial Crisis: An Empirical Evaluation. *Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs*, 2013-3: 1–41.
- BUNDA, I. and DESQUILBET, J. B. 2008. The bank liquidity smile across exchange rate regimes. *International Economic Journal*, 22(3): 361–386.
- CUCINELLI, D. 2013. The Determinants of Bank Liquidity Risk within the Context of Euro Area. *Interdisciplinary Journal of Research in Business*, 2(10): 51–64.
- DISTINGUIN, I., ROULET, C. and TARAZI, A. 2013. Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking and Finance*, 37: 3296–3317.
- GORTON, G. and WINTON, A. 2000. *Liquidity Provision, Bank Capital, and the Macroeconomy*. [Online]. Available at: <http://ejournal.narotama.ac.id/files/SSRN-id253849.pdf>. [Accessed: 2015, December 9].
- HACKETHAL, A., RAUCH, C., STEFFEN, S. et al. 2010. Determinants of Bank Liquidity Creation. *Social Science Research Network*.
- HORVATH, R., SEIDLER, J. and WEILL, L. 2012. *Bank capital and liquidity creation. Granger-Causality evidence*. Working paper series – European Central Bank, No. 1947.
- HORVATH, R., SEIDLER, J. and WEILL, L. 2013. How bank competition influence liquidity creation. *BOFIT Discussion Papers*, 15(16): 4–23.
- LAEVEN, L., RATNOVSKI, L. and TONG, H. 2014. *Bank Size and Systemic Risk*. IMF Staff discussion note, May 2014.
- LAKŠTUTIENE, A. and KRUŠINSKAS, R. 2010. Lithuanian banks liquidity creation in 2000–2008. *Economics & Management*, 986–991.
- LAŠTŮVKOVÁ, J. 2014. Liquidity management strategies in the Czech banking sector. *MENDELU Working Papers in Business and Economics*, 47/2014. Brno: Mendel University in Brno.
- LAŠTŮVKOVÁ, J. 2015a. Determinants of the Slovak bank liquidity flows. *MENDELU Working Papers in Business and Economics*, 51/2015. Brno: Mendel University in Brno.
- LAŠTŮVKOVÁ, J. 2015b. Dimensions of liquidity and their factors in the Slovenian banking sector. *MENDELU Working Papers in Business and Economics*, 55/2015. Brno: Mendel University in Brno.
- LEI, A. C. H. and SONG, Z. 2013. Liquidity creation and bank capital structure in China. *Global Financial Journal*, 24: 188–202.
- MOORE, W. 2010. *How do financial crises affect commercial bank liquidity? Evidence from Latin America and the Caribbean*. MPRA Paper, No. 21473.
- MOUSSA, M. A. B. 2015. The Determinants of Bank Liquidity: Case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1): 249–259.
- PANA, E., PARK, J. and QUERY, T. 2010. The impact of bank mergers on liquidity creation. *Journal of Risk Management in Financial Institutions*, 4(1): 74–96.
- OWOLABI, S., OBIAKOR, R. and OKWU, A. 2011. Investigating Liquidity – Profitability Relationship in Business Organizations: A study of Selected Quoted Companies in Nigeria. *British Journal of Economics, Finance and Management Sciences*, 1(2): 11–29.
- REPULLO, R. 2004. Capital Requirements, Market Power, and Risk-Taking in Banking. *Journal of Financial Intermediation*, 13: 156–182.
- ROMAN, A. and SARGU, A. C. 2015. The impact of bank-specific factors on the commercial banks. 7<sup>th</sup> International Conference on Globalization and Higher Education in Economics and Business Administration, GEBA 2013. *Procedia Economics and Finance*, 20(2015): 571–579.
- TRENCA, L., PETRIA, N., MUTU, S. et al. 2012. Evaluating the liquidity determinants in the central and eastern European banking system. *Finance Challenges of the Future*, Year XII, No. 14/2012.
- VALLA, N., SAES-ESCORBIAC, B. and TIESSET, M. 2006. Bank liquidity and financial stability. *Financial Stability Review*, 9: 89–104.
- VODOVÁ, P. 2011a. Liquidity of Czech Commercial Banks and its Determinants. *International Journal of mathematical models and methods in applied sciences*, 5(6): 1060–1067.
- VODOVÁ, P. 2011b. Determinants of commercial banks' liquidity in Slovakia. In: *Lessons Learned from the Financial Crisis. Proceedings of 13<sup>th</sup> International Conference on Finance and Banking*. Slezská univerzita v Opavě, 12 November. Karviná: Obchodně podnikatelská fakulta v Karviné, 740–747.
- VODOVÁ, P. 2012. Liquidity of Czech and Slovak commercial banks. *Acta Univ. Agric. Silvic. Mendelianae Brun*, LX(7): 463–476.

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