

Liquidity ratios of banks in the Czech Republic

Ukazatele likvidity bank v České republice

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Abstract

The financial crisis showed the importance of adequate liquidity risk measurement and management. This paper therefore aims to evaluate comprehensively the liquidity positions of commercial banks in the Czech Republic via different liquidity ratios in the period of 2001 - 2010 and to find out whether the strategy for liquidity management differs by the size of the bank. Liquidity has declined during last ten years. Czech banks were least liquid in 2009 due to the financial crisis. We have found that while ensuring liquidity, big banks rely on the interbank market and small and medium sized banks hold buffer of liquid assets.

Key words

Liquidity, liquidity risk, liquidity ratio, Czech commercial banks.

JEL Classification: G 21, G 01

1. Introduction

Many banks struggled to maintain adequate liquidity during global financial crisis (BCBS, 2009). Unprecedented levels of liquidity support were required from central banks in order to sustain the financial system. Even with such extensive support, a number of banks failed, were forced into mergers or required resolution. The crisis showed the importance of adequate liquidity risk measurement and management.

The aim of this paper is therefore to evaluate comprehensively the liquidity positions of commercial banks in the Czech Republic via different liquidity ratios in the period of 2001 - 2010 and to find out whether the strategy for liquidity management differs by the size of the bank.

There exist a relatively large number of studies which use liquidity ratios. However, most of them use liquidity ratios only as an input for further analysis, for example of investigation of the relationship between business cycle and bank performance (Jiménez et al., 2010; Maechler et al., 2007), determinants of bank lending activities (Ghosh, 2010; Tamirisa and Igan, 2008), determinants of bank liquidity (Aspachs et al., 2005; Bunda and Desquilbet, 2008; Moore, 2010), or for liquidity scenario analysis (Rychtárik, 2009). The other studies focus more on the liquidity of the whole banking sector and so does not use the values of ratios of individual banks (Andrieu, 2009; Praet and Herzberg, 2008; analysis of central banks and regulatory authorities). The contribution of this paper is therefore obvious, as it

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evaluates the liquidity of almost all banks operating in the Czech banking sector in the past ten years.

The paper is structured as follows. After introduction as a first chapter, second chapter defines liquidity and liquidity risk. Next chapter describes methodology and data used. Chapter 4 deals with values of liquidity ratios of Czech commercial banks. Last chapter captures concluding remarks.

2. Liquidity and liquidity risk

Bank for International Settlements (BCBS, 2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans.

The term liquidity risk includes two types of risk: funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that a bank cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption (Drehman and Nikolau, 2009).

According to Aspachs et al. (2005), there are some mechanisms that banks can use to insure against liquidity crises:

- Banks hold buffer of liquid assets on the asset side of the balance sheet. A large enough buffer of assets such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities or reverse repo trades reduce the probability that liquidity demands threaten the viability of the bank.
- Second strategy is connected with the liability side of the balance sheet. Banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. However, this strategy is strongly linked with market liquidity risk.
- The last strategy concerns the liability side of the balance sheet, as well. The central bank typically acts as a Lender of Last Resort to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage.

3. Methodology and data

3.1 Liquidity ratios

Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions.

Various authors like Aspachs et al. (2005), Moore (2010), Praet and Herzberg (2008) or Rychtárik (2009) provide various liquidity ratios. For the purpose of evaluation of the liquidity positions of commercial banks in the Czech Republic we will use following four different liquidity ratios (1) – (4):

$$L1 = \frac{\text{liquid assets}}{\text{total assets}} * 100(\%) \quad (1)$$

The liquidity ratio $L1$ should give us information about the general liquidity shock absorption capacity of a bank. As a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same for all banks in the sample.

Nevertheless, high value of this ratio may be also interpreted as inefficiency. Since liquid assets yield lower income liquidity bears high opportunity costs for the bank. Therefore it is necessary to optimize the relation between liquidity and profitability.

$$L2 = \frac{\text{liquid assets}}{\text{deposits} + \text{short term borrowing}} * 100(\%) \quad (2)$$

The liquidity ratio $L2$ uses concept of liquid assets as well. However, this ratio is more focused on the bank's sensitivity to selected types of funding (we included deposits of households, enterprises and other financial institutions). The ratio $L2$ should therefore capture the bank's vulnerability related to these funding sources. The bank is able to meet its obligations in terms of funding (the volume of liquid assets is high enough to cover volatile funding) if the value of this ratio is 100 % or more. Lower value indicates a bank's increased sensitivity related to deposit withdrawals.

$$L3 = \frac{\text{loans}}{\text{total assets}} * 100(\%) \quad (3)$$

The ratio $L3$ measures the share of loans in total assets. It indicates what percentage of the assets of the bank is tied up in illiquid loans. Therefore the higher this ratio the less liquid the bank is.

$$L4 = \frac{\text{loans}}{\text{deposits} + \text{short term financing}} * 100(\%) \quad (4)$$

The last liquidity ratio $L4$ relates illiquid assets with liquid liabilities. Its interpretation is the same as in case of ratio $L3$: the higher this ratio the less liquid the bank is.

These liquidity ratios are still in common. It is possible to calculate them only on the basis of publicly available data from banks' balance sheets and it is easy to interpret their values. Their disadvantage is the fact that they do not always capture all, or any of liquidity risk.

3.2 Data used

We used unconsolidated balance sheet and profit and loss data over the period from 2001 to 2010 which were obtained from annual reports of Czech banks. The panel is unbalanced as some of the banks do not report over the whole period of time.

Table 1 shows more details about the sample. The sample includes most of the Czech banking sector (not only by the number of banks, but also by their share on total banking assets).

Bank	01	02	03	04	05	06	07	08	09	10
Banco Popolare / IC banka		x	x	x	x	x	x	x	x	x
Calyon Bank Czech Rep.	x	x	x	x	x					
Citibank	x	x	x	x	x	x	x			
Česká spořitelna	x	x	x	x	x	x	x	x	x	x
Československá obch.banka	x	x	x	x	x	x	x	x	x	x
Dresdner Bank	x	x	x	x						
eBanka	x	x	x	x	x	x	x			
Evropsko-ruská banka								x	x	x
Fio banka										x
GE Money bank	x	x	x	x	x	x	x	x	x	x
HVB Bank	x	x	x	x	x					
Hypoteční banka	x	x	x	x	x	x	x	x	x	x
J & T banka	x	x	x	x	x	x	x	x	x	x
Komerční banka	x	x	x	x	x	x	x	x	x	x
LBBW BankCZ	x	x	x	x	x	x	x	x	x	x
PPF banka	x	x	x	x	x	x	x	x	x	x
Raiffeisenbank	x	x	x	x	x	x	x	x	x	x
UniCredit Bank						x	x	x	x	x
Volksbank	x	x	x	x	x	x	x	x	x	x
Wuestenrot hypoteční banka				x	x	x	x	x	x	x
Živnostenská banka	x	x	x	x	x					
% share of observed banks on total assets	86	93	96	97	91	93	95	95	96	96

Table 1: Sample of banks

4. Results

We have calculated four different liquidity ratios (1) – (4) for each bank in the sample. In this chapter, we present descriptive statistics of liquidity ratios. Furthermore we focus on the relationship between bank liquidity and the size of the bank.

4.1 Descriptive statistics of liquidity ratios

Descriptive statistics of liquidity measured by liquidity ratio $L1$ can be found in Table 2. As higher value of this ratio means higher liquidity, it is evident that liquidity has declined during last ten years. Financial crisis had negative impact on liquidity: Czech banks were least liquid in 2009. However, there has been some improvement in last year.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
mean	42.42	44.12	39.06	37.11	33.09	26.31	22.86	23.77	22.08	23.50
median	36.28	38.36	38.91	38.03	23.55	19.79	14.81	17.59	17.56	19.98
st.dev.	23.99	22.57	20.06	18.70	24.45	18.70	19.76	21.90	15.45	46.58
max.	90.62	91.48	79.16	67.66	100.0	63.09	56.70	83.75	58.79	60.61
min.	0.31	0.09	1.58	0.03	0.03	0.02	0.05	1.88	1.42	4.27

Table 2: Descriptive statistics for liquidity ratio $L1$ (in %)

Average values can be sometimes tricky so it is useful to consider other items of descriptive statistics as well. We can see relatively extreme values of minimum and maximum. Hypoteční banka and Wuestenrot hypoteční banka have the lowest share of liquid

assets in total assets. Both banks focused on mortgage loans, which represent the biggest part of their assets. Maximum values were recorded by Calyon Bank Czech Republic and Evropsko-ruská banka. Calyon Bank Czech Republic transferred all assets to Calyon Bank S.A. on 1st November 2005 and entered into liquidation on 2nd November 2005². Evropsko-ruská banka obtained a banking license in 2008 and opened the first branch in 2009³.

Table 3 contains values of the liquidity ratio $L2$ which has been calculated as a share of liquid assets in deposits and short term borrowing. Although values of this ratio differ significantly from values of ratio $L1$, the trend is the same. Results confirm decrease in liquidity of Czech banks and a slight improvement in 2010.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
mean	59.89	61.89	65.85	56.10	46.20	44.72	35.66	28.96	30.54	28.45
median	58.53	60.02	55.24	50.87	39.16	35.42	23.93	23.27	33.21	27.49
st.dev.	23.95	33.60	46.25	37.07	39.49	38.62	30.56	29.87	32.36	33.19
max.	99.92	164.5	181.4	175.0	165.1	157.5	109.3	2831	5459	3940
min.	25.14	7.51	12.75	4.11	0.00	2.57	3.49	0.00	12.19	7.33

Table 3: Descriptive statistics for liquidity ratio $L2$ (in %)

Extreme values of the ratio have occurred in Calyon, Evropsko-ruská banka and Hypoteční banka. Hypoteční banka had very low value of the ratio $L2$ in 2002 – 2006, which was caused by very low value of liquid assets. On the contrary, this bank has had extremely high value of this ratio since 2007, which is a result of combination of increase in liquid assets and very low value of deposits (majority of its lending activity is financed by mortgage bonds issuing). Compared with average values, Banco Popolare had relatively high liquidity, too. Before changing the owner in 2007, Banco Popolare had very little deposits and conversely a lot of liquid assets. According to the values recorded in the Table 3, almost all Czech banks are sensitive to potential massive deposit withdrawals.

Descriptive statistics for liquidity ratio $L3$ is presented in Table 4. Increase in lending activity confirms that Czech banks have become less liquid.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
mean	39.96	42.14	46.23	50.17	50.18	60.30	62.66	62.80	61.05	61.50
median	36.25	38.07	42.87	45.92	51.44	61.56	56.96	72.51	66.60	63.69
st.dev.	22.81	23.54	20.39	19.20	25.93	22.76	24.94	28.35	22.61	21.36
max.	93.79	93.85	93.01	96.88	88.20	96.05	95.97	97.32	97.17	94.21
min.	5.99	4.63	17.44	26.68	0.00	28.71	27.59	0.00	21.24	21.55

Table 4: Descriptive statistics for liquidity ratio $L3$ (in %)

Minimal and maximal values indicate significant differences in business strategies of banks. Both banks specialized on mortgages (Hypoteční banka and Wuestenrot hypoteční banka) have the highest share of loans in total assets and are most willing to provide loans. This fully corresponds with the fact that mortgage loans represent an important part of loans

² The liquidation of Calyon Bank Czech Republic had negative impact on values of all liquidity ratios in 2005. Because it was an extraordinary event, we will not comment values of ratios $L2 - L4$ of Calyon in 2005.

³ It is obvious that a new banking institution has usually relatively high share of liquid assets and low share of loans and deposits in the first years of business. This fact of course considerably affects the value of all liquidity ratios. We will not therefore comment values of liquidity ratios of Evropsko-ruská banka in 2008 and 2009.

provided in the Czech Republic (Vodová, 2009). By contrast, Calyon, Evropsko-ruská banka, Československá obchodní banka and e-Banka reached minimum values of the ratio $L3$. eBanka started to focus on lending in 2003; the value of the ratio are very low until the end of 2002. The share of loans in total assets of Československá obchodní banka are rather low for the whole analyzed period; lowest values were achieved in the last two years. This bank focuses more on trading with securities. However, greater decline in lending in 2009 and 2010 could be partly caused by the financial crisis.

Results of the liquidity ratio $L4$ can be found in Table 5. As in case of results from Table 4, high value of this ratio means low liquidity. The value of the last ratio also confirms that the liquidity of banks in the Czech Republic is gradually decreasing.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
mean	54.58	54.66	59.08	63.32	66.75	146.2	135.7	110.7	118.7	110.1
median	50.67	54.95	56.65	57.39	86.38	87.33	99.61	101.1	103.7	88.47
st.dev.	30.10	27.34	23.83	21.29	33.37	259.2	197.4	115.5	93.3	114.7
max.	7553	8417	9998	9897	9885	9756	6107	8745	9124	9954
min.	6.60	4.91	31.81	29.52	0.00	42.58	36.19	0.00	37.47	33.68

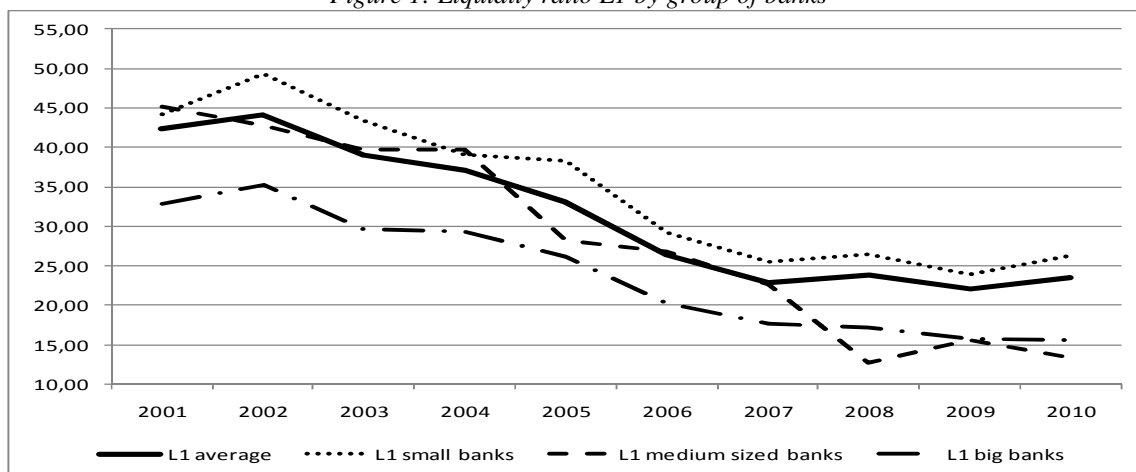
Table 5: Descriptive statistics for liquidity ratio $L4$ (in %)

Calyon, Evropsko-ruská banka and eBanka (with low level of loans in 2001 and 2002) significantly contributed to reducing the average value of the ratio $L4$. The extremely high maximum value reached only Hypoteční banka. As it was mentioned above, deposits are not the main source of financing of the lending activity of this bank.

4.2 Liquidity ratios by group of banks

Now we focus on the relationship between the size of the bank and its liquidity. We will take into account only the values of ratios $L1$ and $L3$, because these ratios are easy to interpret and did not achieve so extreme values.

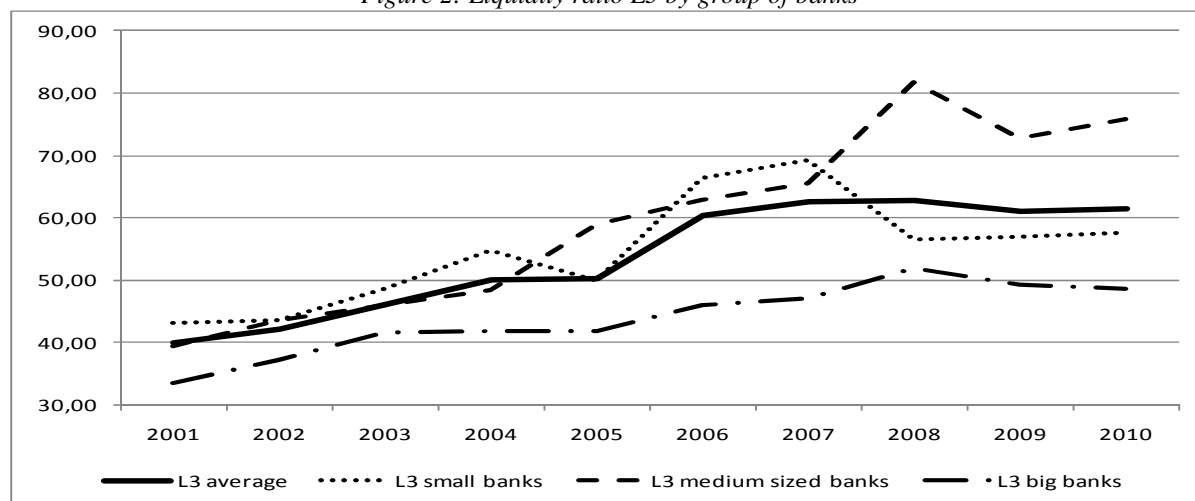
Figure 1: Liquidity ratio $L1$ by group of banks



As it can be seen from Figure 1, liquidity is decreasing with the size of the bank: small banks are the most liquid, the liquidity of medium sized banks is about average and big banks are least liquid. It seems that big banks insure against liquidity crises mainly by strategies connected with the liability side of the balance sheet: they rely on the interbank market or on a liquidity assistance of the Lender of Last Resort. This finding fully corresponds to the well

known “too big to fail” hypothesis. If big banks are seeing themselves as “too big to fail”, their motivation to hold liquid assets is limited.

Figure 2: Liquidity ratio $L3$ by group of banks



The results of liquidity ratio $L3$ by group of banks are quite surprising: small and medium sized banks are most willing to lend and thus theoretically the least liquid (see Figure 2). This is the completely opposite finding. To interpret the values of both ratios together, we should conclude that big banks lend only little but at the same time, their liquidity is also very low. However, it should be emphasized that the average is deceptive in this case because it was strongly influenced by the values of Československá obchodní banka (as it was mentioned above). Values of other big banks (Česká spořitelna, Komerční banka and UniCredit Bank) are higher and closer to the average.

5. Conclusion

The aim of this paper was to evaluate comprehensively the liquidity positions of commercial banks in the Czech Republic via different liquidity ratios in the period of 2001 - 2010 and to find out whether the strategy for liquidity management differs by the size of the bank.

We have calculated four different liquidity ratios for each bank in the sample. Results of all ratios showed that liquidity has declined during last ten years, partly as a consequence of increase in lending activity. Czech banks were least liquid in 2009 due to the financial crisis. Except banks, which began or ended their business in the relevant years, there are some banks whose values of ratios were beyond the average. For example, banks focused on mortgage loans have very low liquidity, measured both by the share of liquid assets in total assets and by the share of loans in total assets. As their share of liquid assets in deposits and short term borrowing is lower than 100%, almost all Czech banks are sensitive to potential massive deposit withdrawals.

Furthermore we focused on the relationship between the size of the bank and its liquidity. We have found that liquidity measured by the share of liquid assets in total assets is decreasing with the size of the bank. While ensuring liquidity, big banks rely on the interbank market or on a liquidity assistance of the Lender of Last Resort. On the contrary, small and medium sized banks hold buffer of liquid assets. Big banks (mainly Československá obchodní banka) are simultaneously least willing to provide loans.

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Summary

Finanční krize připomenula význam adekvátního řízení a měření rizika likvidity. Cílem tohoto příspěvku je proto s využitím různých poměrových ukazatelů likvidity komplexně vyhodnotit likvidní pozici bank v České republice v období let 2001 – 2010 a zjistit, zda je strategie pro řízení rizika likvidity ovlivněna velikostí banky. Výsledky ukazatelů prokázaly, že v posledních deseti letech likvidita bank klesala. V důsledku finanční krize byly české banky nejméně likvidní v roce 2009. Zjistili jsme, že při zajišťování likvidity velké banky spoléhají zejména na mezibankovní trh, případně na půjčky od věřitele poslední instance, naproti tomu malé a střední banky udržují polštář likvidních aktiv.