Liquidity of Czech Commercial Banks and its Determinants

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***Abstract*—**As liquidity problems of some banks during global financial crisis re-emphasised, liquidity is very important for functioning of financial markets and the banking sector. The aim of this paper is therefore to identify determinants of liquidity of Czech commercial banks. The data cover the period from 2001 to 2009. The results of panel data regression analysis showed that there is a positive link between bank liquidity and capital adequacy, share of non-performing loans and interest rates on loans and on interbank transaction. We have found negative influence of inflation rate, business cycle and financial crisis on liquidity. According to our findings, the relation between size of banks and their liquidity is ambiguous.

***Keywords*—**Commercial banks, determinants of liquidity, liquidity ratios, panel data regression analysis.

I. Introduction

According to Bank for International Settlements [1], many banks struggled to maintain adequate liquidity during global financial crisis. 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. Several years before the crisis, the liquidity of banking sector was sufficient. Funding was readily available at low cost. Liquidity risk and its management has not been a priority, especially comparing with other types of risks. However, the crisis completely changed market conditions and thus illustrated the importance of adequate liquidity risk measurement and management.

Commercial banks were heavily exposed to maturity mismatch both through their balance sheet and off-balance sheet vehicles and through their increased reliance on repo financing [2]. A reduction in funding liquidity then caused significant distress. In response to the freezing up of the interbank market, the European Central Bank and U.S. Federal Reserve injected billions in overnight credit into the interbank market. However, some banks needed extra liquidity supports. Liquidity problems of some banks and liquidity injections are described e.g. in [3].

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It is evident that liquidity and liquidity risk is very up-to-date and important topic. The aim of this paper is therefore to identify determinants of liquidity of Czech commercial banks.

The paper is structured as follows. Next chapter defines bank liquidity and characterizes methods of its measuring. Chapter III deals with previous studies about determinants of liquidity. Chapter IV describes methodology and data used. Last chapter contains results of the analysis.

II. Bank Liquidity and its Measuring

Bank for International Settlements [4] 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.

There are strong interactions between funding liquidity risk and market liquidity risk, especially in periods of crisis. [5] pointed to the fact that shock to funding liquidity can lead to asset sales and may lead to decrease of asset prices. Lower market liquidity leads to higher margin which increase funding liquidity risk. [2] explains the same fact with two liquidity spirals which work together: loss spiral and margin spiral (Fig. 1).

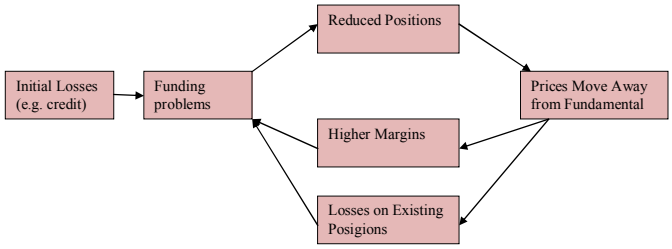

Fig. 1 Loss spiral and margin spiral, [2, p. 23]

A loss spiral can start off with a single market participant, suffering a liquidity shock. This might occur because of any losses. The participant may have to adjust his portfolio by selling assets (even for low prices) in order to hold the leverage ratio constant. These sales depress prices further. Margin spiral reinforces the loss spiral. As margins rise, the investor has to sell even more because he needs to reduce the leverage ratio. Margins and lending standards lead to a general tightening of lending. So the mechanism works as follows: funding problems force investors to change their positions. This changes cause more losses and higher margins, which in turn exacerbates the funding problems and so on. According to [2], this mechanism can explain how a relatively small shock can cause liquidity to dry up suddenly.

Banks collect demandable deposits and invest these funds in long-term and illiquid assets, such as loans. For this reason banks may be vulnerable to liquidity shocks arising mainly from the liability side of their balance sheets. If a large fraction of depositors demand cash, the bank may need to liquidate illiquid assets. Since this entails a loss of value, a liquidity shortage may turn into a solvency crisis [6]. Many banks in recent history have defaulted not because of lack of profits but because of short term liquidity problems [7].

The first symptoms of a liquidity crisis in the banking sector generally take the form of a liquidity deficit in the balance sheet of a bank. Liquidity risk may entail contagion. [8] describes contagion in the context of peer monitoring of the money market, liquidation of interbank deposits in response to unexpected deposit withdrawals, expected scarce reserves or adverse selection in inter-bank lending when the solvency statute of interbank borrowers is unknown. They also describe factors which drive contagious failures of banks, such as the limited capacity of financial markets to absorb asset sales, the inefficiency of the mechanisms at work when assets needs to be liquidated, the strength of direct balance sheet interlinkages and phenomena related to changes in asset prices.

According to [6], there are some mechanisms that banks can use to insure against liquidity crises:

1) 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.
2) 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.
3) 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.

[9] emphasises the fact that there exists an interesting implication of the trade-off between efficiency and liquidity: investors with high expected liquidity needs are more likely to choose less control. On the contrary, investors with low expected liquidity needs would probably prefer more control. The mechanism is based on the assumption that investors with high expected liquidity needs are affected more by the low sale price associated with control, whereas those with low expected liquidity needs are affected more by the efficiency in management. In this case, the assets under control are less likely to be liquidated prematurely.

[10] highlight the fact that liquidity risk is not an isolated risk but a consequential risk, with its own intrinsic characteristics, that can be triggered or exacerbated by other financial and operating risks within the banking business (see Fig. 2).

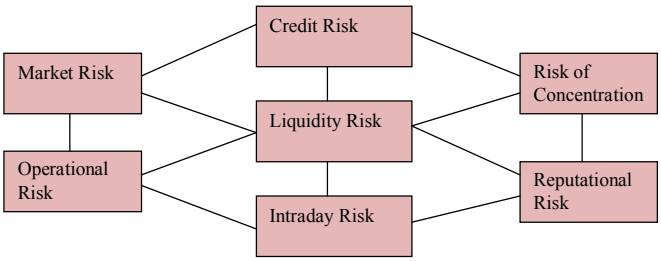

Fig. 2 The link between liquidity and other types of risk [10, p. 89]

For example, if a bank failures to meet obligations as they come due, besides exposing the bank to liquidity risk, may even give rise to legal action and reputational risk [11].

[12] deals with the link between financial innovation and liquidity: innovative financial products in emerging markets give a sense to stimulate liquidity, but the regulators should take into account the fragility of these markets, given by consistency and volatility. The way to prevent financial shocks is difficult and more regulation triggers a critical misunderstandings and a return to illiquidity.

[13] highlights three main sources of liquidity risk:

1) on the liability side, there is a large uncertainty on the volume of withdrawals of deposits or the renewal of rolled-over inter-bank loans, especially when the bank is

under suspicion of insolvency or when there is a temporary aggregate liquidity shortage,
2) on the asset side, there is an uncertainty on the volume of new requests for loans that a bank will receive in the future,
3) off-balance sheet operations, like credit lines and other commitments, positions taken by banks on derivative markets.

According to [14], liquidity is not dependent simply on objective, exogenous factors (such as efficient market infrastructure, low transaction costs, large number of buyers and sellers, transparent characteristics of traded assets), but is crucially influenced by endogenous forces, especially by the dynamic reactions of market participants in the face of uncertainty and changes in asset values. In favourable conditions, liquidity is easily available and cheap and can be determined by exogenous factors. But under stress conditions, liquidity becomes very scarce and expensive and it may become even effectively unavailable.

As liquidity problems of some banks during global financial crisis re-emphasised, liquidity is very important for functioning of financial markets and the banking sector. However, an important gap exists in the empirical literature about liquidity risk measuring. Only few studies concern this topic and use following methodology:

1) Estimation of the demand function of banks for excess reserves – studies try to estimate the demand function for excess reserves (or liquid assets) by commercial banks usually use the model of Agénor [15] which specified the demand for liquidity as a function of the ratio of excess liquid assets over total bank deposits, the ratio of required liquid assets to total bank deposits, current and lagged values of the coefficient of variation of the cash-to-deposit ratio, the deviation of output from trend, and the discount rate. Studies following this paper usually modify variables used for estimation of the demand function, e.g. [16] or [17].
2) [18] investigated aggregate bank excess liquidity preference curve for the pre-crisis and crisis periods. This approach builds on Keynes and his liquidity trap. There is one important difference: while Keynes wrote about perfect substitution between cash and bonds, this paper looks at the relationship between bank excess reserves and the lending rate.
3) [8] analyzed the liquidity in the French banking system between 1993 and 2005 by net changes in the stock of liquidity in banks' balance sheets. They have found substantial evidence of simultaneous liquidity expansion and contraction, as well as extensive balance sheet liquidity reshuffling, in a context where bank liquidity is expanding overall. Bank liquidity exhibits interesting cyclical properties. Positive and negative flows procyclically lead the cycle by approximately two quarters. Bank liquidity is determined by output, asset prices and monetary policy impulses.
4) [5] define funding liquidity risk in much more narrow way: as an ability of a bank to settle obligations with central bank money immediately when due. This definition enables them to develop a measure of the funding liquidity risk based on banks' bids during open market operations. They argue that if there are frictions in interbank and asset markets (like asymmetric information or imperfect competition), banks with higher funding liquidity risk will bid more aggressively. Hence, a higher spread indicates higher risk (banks with higher funding liquidity risk are willing to pay a higher price to obtain funds from the central bank to hedge this risk). They based their analysis on data of 135 main refinancing operation auctions conducted between June 2005 and December 2007 in the euro area. The results showed that higher funding liquidity risk implies lower market liquidity.
5) [19] develop the basis for an approach to measure the liquidity risk sensitivity of banks. He tested different scenarios and measured the impact of all simulations by relative changes of liquidity ratios.
6) Some studies use also panel data regression analysis to identification of determinants of liquidity risk – e.g. [6] or [20].
7) The last possible method is to measure the liquidity risk by liquidity adjusted Value at Risk or incorporating market liquidity risk into Value at Risk models – e.g. [10], [21] or [22].

However, most of above cited studies uses at least as an input for further calculations one of two basic methods for measuring the liquidity risk: liquidity gap or liquidity ratios.

The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit [23].

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 [6], [Moore], [19] or [24] provide various liquidity ratios.

For the purpose of this research we will use for evaluation of liquidity positions of commercial banks in the Czech Republic following four different liquidity ratios (1) – (4):

$$L1 = \frac{liquid\ assets}{total\ assets} \tag{1}$$

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.

$$L2 = \frac{liquid\ assets}{deposits + short\ term\ borrowing} \qquad (2)$$

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.

$$L3 = \frac{loans}{total\ assets} \qquad (3)$$

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.

$$L4 = \frac{loans}{deposits + short\ term\ financing} \qquad (4)$$

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.

III. Determinants of Bank Liquidity

Although liquidity problems of some banks during global financial crisis re-emphasized the fact that liquidity is very important for functioning of financial markets and the banking sector, an important gap still exists in the empirical literature about liquidity and its measuring. Only few studies aim to identify determinants of liquidity.

Bank-specific and macroeconomic determinants of liquidity of English banks studies [6]. They assumed that the liquidity ratio as a measure of the liquidity should be dependent on following factors (estimated influence on bank liquidity in parenthesis):

1) probability of obtaining the support from lender of last resort, which should lower the incentive for holding liquid assets (-),
2) interest margin as a measure of opportunity costs of holding liquid assets (-),
3) bank profitability, which is according to finance theory negatively correlated with liquidity (-),
4) loan growth, where higher loan growth signals increase in illiquid assets (-),
5) size of the bank (?),
6) gross domestic product growth as an indicator of business cycle (-),
7) short term interest rate, which should capture the monetary policy effect (-).

Determinants of liquidity risk of banks from emerging economies with panel data regression analysis are analysed by [20]. The liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behaviour of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors:

1) total assets as a measure of the size of the bank (-),
2) the ratio of equity to assets as a measure of capital adequacy (+),
3) the presence of prudential regulation, which means the obligation for banks to be liquid enough (+),
4) the lending interest rate as a measure of lending profitability (-),
5) the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets (+),
6) the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers (+),
7) the realization of a financial crisis, which could be caused by poor bank liquidity (-),
8) the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes.

The empirical analysis of the hypothesis that interest rates affect banks' risk taking and the decision to hold liquidity across European countries provides [25]. This study takes into account variables connected with interbank market, specific characteristics of banks and proxies for bank risk-taking behaviour. The liquidity measured by different liquidity ratios should be influenced by:

1) behaviour of the bank on the interbank market – the more liquid the bank is the more it lends in the interbank market (+),
2) interbank rate as a measure of incentives of banks to hold liquidity (+),
3) monetary policy interest rate as a measure of banks ability to provide loans to customers (-),
4) share of loans on total assets and share of loan loss provisions on net interest revenues, both as a measure of risk-taking behavior of the bank, where liquid banks should reduce the risk-taking behavior (-),
5) bank size measured by logarithm of total bank assets (+).

The effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries

investigated [17]. Liquidity should depend on:

1) cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio (-),
2) current macroeconomic situation, where a cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity (+),
3) money market interest rate as a measure of opportunity costs of holding liquidity (-).

Liquidity created by Germany's state-owned savings banks and its determinants has been analyzed by [26]. They focused particularly on macroeconomic factors but they captured bank specific characteristics as well. According to this study, following factors can determine bank liquidity:

1) monetary policy interest rate, where tightening monetary policy reduces bank liquidity (-),
2) level of unemployment, which is connected with demand for loans (-),
3) savings quota (+),
4) level of liquidity in previous period (+),
5) size of the bank measured by total number of bank customers (-),
6) bank profitability (-).

Entirely unique is the approach of [16]. Except of bank specific and macroeconomic variables, they pay attention to the influence of political instability. They considered these determinants of liquidity:

1) level of economic output (+),
2) discount rate (+),
3) reserve requirements (?),
4) cash-to-deposit ratio (-),
5) rate of depreciation of the black market exchange rate (+),
6) impact of economic reform (-),
7) violent political incidence (+).

Studies cited above suggest that commercial banks' liquidity is determined both by bank specific factors (such as size of the bank, profitability, capital adequacy and factors describing risk position of the bank) as well as macroeconomic factors (such as different types of interest rates, interest margin or indicators of economic environment). It can be useful to take into account some other influences, such as the realization of financial crisis, changes in regulation or political incidents.

IV. Methodology and Data

In order to identify determinants of liquidity of Czech commercial banks, the panel data regression analysis is used. For each liquidity ratio, we estimate following equation:

$$L_{it} = \alpha + \beta' \cdot X_{it} + \delta_i + \varepsilon_{it} \qquad (5)$$

where L_{it} is one of four liquidity ratios[1] for bank i in time t, X_{it} is a vector of explanatory variables for bank i in time t, α is constant, β' are coefficient which represents the slope of variables, δ_i denotes fixed effects in bank i and ε_i is the error term.

It is evident that the most important task is to choose the appropriate explanatory variables. The selection of variables was based on previous relevant studies. We considered whether the use of the particular variable makes economical sense in Czech conditions. For this reason, we excluded from the analysis variables such as political incidents, impact of economic reforms or the exchange rate regime. We also considered which other factors could influence the liquidity of banks in the Czech Republic. The limiting factor then was the availability of some data. Table I shows a list of variables which we have used in regression analysis.

TABLE I
VARIABLES DEFINITION

Variable	Definition	Source	Est. effect
	Bank specific variables		
CAP	the share of own capital on total assets of the bank	Annual reports	+
NPL	the share of non-performing loans on total volume of loans provided by the bank	Annual reports	-
ROE	return on equity: the share of net profit on own capital of the bank	Annual reports	-
TOA	logarithm of total assets of the bank	Annual reports	+/-
	Macroeconomic variables		
FIC	dummy variable for realization of financial crisis (1 in 2009, 0 in rest of the period)	own	-
GDP	Growth rate of gross domestic product growth (93599BPXZF...GDP volume % change)	IMF	-
INF	inflation rate: (93564..XZF...CPI % change)	IMF	+
IRB	interest rate on interbank transactions: (93560B..ZF...Money market interest rate)	IMF	+
IRL	interest rate on loans: (93560P..ZF…Lending rate)	IMF	-
IRM	difference between interest rate on loans (93560P..ZF…Lending rate) and interest rate on deposits (93560L..ZF...Deposit rate)	IMF	-
MIR	monetary policy interest rate – two week repo rate: (93560...ZF...Bank rate)	IMF	-
UNE	Unemployment rate: (93567R..ZF...Unemployment rate)	IMF	-

We consider four bank specific factors and eight macroeconomic factors. As it can be seen from Table I, we expect that three factors could have positive impact on bank liquidity (the share of own capital, inflation rate and interest rate on interbank market), the rest of factors are expected to have negative impact on bank liquidity.

Macroeconomic data were provided by International Financial Statistics of International Monetary Fund (IMF). Bank specific data were obtained from annual reports of Czech banks. We used unconsolidated balance sheet and profit and loss data over the period from 2001 to 2009. The panel is unbalanced as some of the banks do not report over the whole period of time. Table II shows more details about the sample.

TABLE II
DATA AVAILABILITY

[1] Liquidity ratios *L1 – L4* were calculated according to (1) - (4).

Indicator	01	02	03	04	05	06	07	08	09
Total number of banks	21	22	20	20	18	18	17	16	16
Number of observed banks	16	17	17	18	17	15	15	14	14
% share of observed banks on total assets	86	93	96	97	91	93	95	95	96

Because our sample includes most of the Czech banking sector (not only by the number of banks, but also by their share on total banking assets), we used fixed effects regression.

V. Results

We use an econometric package EViews 7. After tests of stationarity, we proceed with regression estimation. We estimate (5) separately for each of four defined liquidity ratios. We gradually change the content of the vector of explanatory variables X_{it}. The aim is to find a model which has a high adjusted coefficient of determination and simultaneously the variables used are statistically significant.

As it can be seen from following tables, results of the analysis suggest that each liquidity ratio is determined by different factors.

TABLE III
DETERMINANTS OF LIQUIDITY MEASURED BY L1

Variable	Coefficient	Standard deviation
C	-32.22911**	14.30259
CAP	0.394122*	0.111375
FIC	-12.18207*	3.457011
INF	-2.422175*	0.648306
IRL	10.46715*	2.525620
NPL	0.544098**	0.217598
Adjusted R^2	0.750647	
Total panel observations	135	

The starred coefficient estimates are significant at the 1 % (*) or 5 % (**) level.

If we measure liquidity with ratio *L1*, we find determinants of liquidity captured in Table III. The explanatory power of this model is very high; however, signs of coefficients mostly do not correspond with our expectations. The positive influence of the share of capital on total assets is consistent with the assumption that bank with sufficient capital adequacy should be liquid, too. The negative impact of financial crisis has been mentioned above.

However, influence of other factors is opposite than we expected. Inflation rate has negative impact on bank liquidity. It seems that inflation deteriorates overall macroeconomic environment and thus lowers bank liquidity.

Positive effect of interest rate on loans can be quite surprising. It highlights the fact that higher lending rates do not encourage banks to lend more. This is consistent with the problem of credit crunch and credit rationing, whose presence in the Czech banking sector has been proved in [27].

Although we estimated negative influence of non-performing loans, results of the analysis show the opposite effect. This could be a sign of prudent policy of banks: they offset the higher credit risk with cautious liquidity risk management.

TABLE IV
DETERMINANTS OF LIQUIDITY MEASURED BY L2

Variable	Coefficient	Standard deviation
C	-8785.403*	1826.702
CAP	24.23011*	6.648880
INF	-62.56230**	28.13294
IRL	355.5998*	115.6788
TOA	605.0599*	118.2894
Adjusted R^2	0.210631	
Total panel observations	137	

The starred coefficient estimates are significant at the 1 % (*) or 5 % (**) level.

Table IV shows determinants of liquidity measured by the ratio *L2*. Explanatory power of the model is lower. We found that capital adequacy, inflation rate and interest rate on loans have the same impact on bank liquidity as in case of model for ratio *L1*. The last explanatory variable which has statistically significant influence on the liquidity is the size of bank, measured by logarithm of total bank assets. According to our findings, liquidity is increasing with the size of the bank.

TABLE V
DETERMINANTS OF LIQUIDITY MEASURED BY L3

Variable	Coefficient	Standard deviation
C	60.22954*	3.819548
CAP	-0.260495**	0.108074
GDP(-3)	1.988391*	0.642655
NPL	-1.237575*	0.319411
Adjusted R^2	0.848969	
Total panel observations	87	

The starred coefficient estimates are significant at the 1 % (*) or 5 % (**) level.

Determinants of liquidity measured by the ratio *L3* are presented in Table V. As high value of this ratio means low liquidity, these results have to be interpreted in reverse: positive sign of the coefficient means negative impact on liquidity and conversely.

Explanatory power of the model is again very high. The results of the analysis show that only three factors influence the share of illiquid loans in total assets.

As in case of previous ratios, the capital adequacy and the share of non-performing loans show positive relations with bank liquidity.

Growth rate of gross domestic product is statistically significant with three years lag. In the context of the ratio *L3*, this lag is in accordance with the philosophy that companies must make a profit first to have sufficient creditworthiness and to be able to get a loan. The positive coefficient on GDP growth rate signals that according to our expectations, liquidity tends to be inversely related to the business cycle. Most

borrowers want to take a loan during expansion when they have valuable investments projects. Banks which would like to satisfy the growing demand for loans would face lower liquidity. During economic downturn, lending opportunities are not so good so banks hold higher share of liquid assets.

TABLE VI
DETERMINANTS OF LIQUIDITY MEASURED BY L4

Variable	Coefficient	Standard deviation
C	-26529.85*	5521.369
CAP	-72.94792*	20.23211
IRB	-417.6170**	169.2004
IRL	-1055.056*	387.8583
TOA	1977.643*	367.3569
Adjusted R^2	0.802661	
Total panel observations	143	

The starred coefficient estimates are significant at the 1 % (*) or 5 % (**) level.

Table IV shows determinants of liquidity measured by the last liquidity ratio *L4*. As in case of results from Table V, these results have to be interpreted in reverse: positive sign of the coefficient means negative impact on liquidity and conversely.

The last model has a high explanatory power. Capital adequacy and interest rate on loans have the same impact on bank liquidity as in case of ratio *L1*.

In accordance with our expectation, interest rate on interbank transaction is positively related with bank liquidity. Higher interbank interest rate encourages banks to invest money on the interbank market and balances with other banks are a part of liquid bank assets.

So far, effects of individual factors have been entirely consistent. However, the relation between the size of the bank and its liquidity in this model completely differs from that described in Table IV. The results of this last model suggest that small banks are more liquid than big banks. 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. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort.

VI. CONCLUSION

The aim of this paper was to identify determinants of liquidity of Czech commercial banks.

We have used the panel data regression analysis for four liquidity ratios. From the list of possible explanatory variables, only some of them proved to be statistically significant. With the only exception of size of the bank, relations of all factors and the banks' liquidity were consistent in all estimated models. The results of models enable us to make following conclusions.

Bank liquidity increases with higher capital adequacy, higher interest rates on loans, higher share of non-performing loans and higher interest rate on interbank transaction.

In contrast, financial crisis, higher inflation rate and growth rate of gross domestic product have negative impact on bank liquidity.

The relation between the size of the bank and its liquidity is ambiguous. It could be useful to divide banks into groups according to their size and to estimate determinants of liquidity separately for small, medium-sized and large banks.

We also found that unemployment, interest margin, bank profitability and monetary policy interest rate have no statistically significant effect on the liquidity of Czech commercial banks.

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