

The Future Regulatory Challenges of Liquidity Risk Management

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Abstract—Liquidity risk management ranks to key concepts applied in finance. Liquidity is defined as a capacity to obtain funding when needed, while liquidity risk means as a threat to this capacity to generate cash at fair costs. In the paper we present challenges of liquidity risk management resulting from the 2007-2009 global financial upheaval. We see five main regulatory liquidity risk management issues requiring revision in coming years: liquidity measurement, intra-day and intra-group liquidity management, contingency planning and liquidity buffers, liquidity systems, controls and governance, and finally models testing the viability of business liquidity models.

Keywords—liquidity, risk management, regulation, global crisis

I. INTRODUCTION

THE aim of this paper is to provide basics of liquidity risk management and its development during the 2007-2009 global crisis. This paper is organised as follows; the second part discusses the term liquidity risk while the third part describes liquidity risk during the global crisis with special focus on the Eurozone and the US. The fourth part analyzes expected liquidity risk management regulation. Finally, the fifth part concludes the paper and state final remarks.

II. LIQUIDITY RISK

The definition of liquidity risk can be written in many ways, as it is not so easy to separate this risk from all other risks and still capture all of its drivers. First, we should always define liquidity itself. Liquidity is in its broadest sense defined by Committee of European banking Supervisors as a capacity to obtain funding when needed [3]. Liquidity risk is then defined as a threat to this capacity to generate cash at fair costs. BIS [1] defines banks' liquidity as is the ability of the bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. This definition is related to the funding liquidity problems of the bank, but when defining liquidity in general, we should always distinguish its two main types: market liquidity defines how difficult is to trade assets while funding liquidity defines how difficult is to obtain funding.

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A. Liquidity risk management

The liquidity management has two challenges, ensure availability of adequate sources of cost-effective funding and appropriate use of these sources. This management is more and more challenged as the new complex financial products and derivatives are used. In the first years of crisis in 2007-2008 the liquidity was affected in all kinds of markets. CEBS technical advice refer to changes in interbank market, where was shortened maturity, reduced unsecured lending or cancelled committed liquidity lines extended by other institutions, in the commercial paper market, by limited or no possibility for banks to tap the market or roll over funding and in general illiquidity of markets which banks had considered as reliable sources of funding, even in times of stress.

Cornett and Saunders [2] recognize two liquidity management approaches that are used to deal with liability-side. Purchased liquidity management is trying to adjust to the net outflows of deposits (net deposit drains) by purchasing the liquidity. Purchasing liquidity can be done in two ways, either a bank borrows money on interbank market (short-term loans) or it can issue or sell securities (fixed maturity wholesale certificates, bonds, notes). However, this way of borrowing can be expensive. A bank „gets rid of“ paying low interest cost on drained deposits, while it has to cover it by funds bearing higher market rates on the wholesale money market. Stored liquidity management is the second management and deals with the net deposits drains with the use of cash. This is basically assuming that instead of obtaining the needed funds after net deposit drain occurs; a bank is prepared for this situation ex ante by holding the cash. This management allows a bank to bear net deposit drains without relatively expensive borrowing, but they are still facing the loss by not earning the interest from possible long-term investments.

Banks can combine both of these policies. They are generally not obliged for any of these two management policies to use with small bias towards the store liquidity management. It can be seen from mainly low or none minimum cash reserve requirements required by central banks at present. As of date, U.K. has zero minimum reserves set by Bank of England, while reserves policies by FED and the European Central Bank (ECB) are stricter.

III. LIQUIDITY RISK DURING THE FINANCIAL CRISIS

The financial crisis spread to the banking sectors in advanced and also emerging markets countries, where it „has put further pressure on banks' balance sheets as asset values continue to degrade, threatening their capital adequacy and further discouraging fresh lending" [6]. The whole financial crisis with the global uncertainty in banking sector and volatile environment came in after the stable period with sound macroeconomic conditions that on the first glance did not predict this economic fall [7]. Jenkinson to develop products that could better possess the needs of investor and his risk appetite which encouraged him to go for a higher yield (in this period „greater integration of markets went hand in hand with the acceleration of financial innovation and rapid growth of market activity"). BIS [1] highlights the lack of carefulness during times of boom, while dealing with wide range of liquid markets. The assessment of liquidity should always be examining whether the liquid market stays liquid also under the times of stress.

The new market developments that affected liquidity in financial sector are more specifically defined in [4], [3]. The deposit-based funding is for banks no more the main source of funding and is replaced by market funding sources, where the real numbers are showing higher volatility of wholesale funds and brokered certificates of deposits. CESB [3] analyzes also the indirect effects of U.S. sub-prime crisis on these institutions that relied on wholesale funding and had liquidity commitments. The liquidity problems could arise from limiting several factors as shortening maturity in inter-bank market, limited possibility for banks to tap the market or roll over funding, disability of accessing liquidity by securitising portfolios due to the dry-up markets (ABCP and ABS) and also failing of the most reliable sources of funding that should have been reliable even in times of stress.

IMF **Error! Reference source not found.** suggests the three most important elements that would reduce the global uncertainty in banking system. The first point is requesting supervisors to take more active role in determining the viability of institutions and appropriate corrective actions. Secondly, impairment of banks' balance sheets should be fully and transparently disclosed and consistently criticized. Thirdly, the report suggests improvement in clarity about what type of capital is required and also better specifications of time in which the new required capital ratios should be reached.

Moreover, IMF [6] incorporates funding and market liquidity index as a specific indicator that should describe perceptions of funding conditions, secondary market liquidity, and counterparty risks. This indicator consists of spread between major-market government securities yields and interbank rates and expected overnight interest rates, bid-ask spreads on major mature-market currencies and daily return-to-volume ratios of equity markets.

Central banks around the world tried to ease the short-term liquidity pressures that came up during the crisis. The liquidity support measures were applied by all main central banks. Federal Reserve and also Bank of England lent government securities in exchange for securities that were illiquid, which should have assisted repo and other collateralized transactions. Many of the central banks including the ECB used currency swap arrangements between each other and also between central banks and commercial banks. This should have facilitated foreign currency provision to banking sector, in the face of segmentation of foreign exchange markets. In some emerging economies was used foreign currency provision in domestic market.

Applications of liquidity support measures or basically providing liquidity to the markets highly affected the growth of money base in economies. This huge increase of money in the economy again raises the question: how far should central banks go as a last resort or provider of liquidity. Key interest rates were sharply decreased by ECB, twice in the end of 2008 and one more time in the beginning of 2009 (Fig. 1). Evolution was similar in USA and there was an unprecedented month-to-month increase of money base both in Eurozone and USA, where in USA, percentage increase was held three month in row over 15 % in the September-November 2008 period. This rise in money base was then partially reversed, however, another liquidity turmoil made FED and ECB again worried and forced them to go for another lowering of interest rates that was smaller, but pushed the interest rates too close to zero.

The overall result of liquidity crisis and affects on the money base is much stronger in a case of USA than Eurozone. Money base in USA rose in period from August 2008 till November 2009 by almost 240 %, while in Eurozone, during the same period, money base increased by much less, 117 %. These steps taken by central banks were mostly successful in a way of preventing a complete dry-up of the markets. However, this is true mainly for developed countries, while in emerging countries the effect was not that strong. This is according to GSFR [6] due to bigger external vulnerability, shallower financial markets, and stability objectives conflicts between macroeconomic and systemic level.

B. The USA

The FED used many ways to support the liquidity in financial markets, where most of them were used just for a short time-period to prevent a liquidity crush and were closed after the situation got back from the worst numbers. In December 2007, after the increasing problems of institutions with credit needs of their clients, there was created the Term Auction Facility (TAF), that should have funded depository institutions, while putting not too much pressure on the „quality" of the collateral there could have been used at the discount window. One of the tools was again liquidity swap arrangements with other 14 foreign

central banks¹. This instrument also belongs to the group of temporary instruments. In March 2008, was announced establishment of The Term Securities Lending Facility (TSLF). Through this facility, Federal Reserve was lending securities to primary dealers for 28 days. Just a few days later was established The Primary Dealer Credit Facility, that helped primary dealers to provide financing to participants in securitization markets.

Another way of fighting liquidity shortage was creating funding facilities – Money Market Investor Funding Facility (MMIFF), Commercial Paper Funding Facility (CPFF) and Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity (AMFL). MMIFF was created to „provide senior secured funding to a series of special purpose vehicles to facilitate an industry-supported private-sector initiative to finance the purchase of eligible assets from eligible investors“ [5]. The Troubled Assets Relief Program, that served for these capital injections to eligible banks funded sources in amount of \$198 billion. CPFF funded purchases of highly rated, U.S. - dollar denominated, three-month, unsecured and asset-backed commercial paper issued by U.S. issuers. Asset Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) was used to help banking organizations to purchase asset backed commercial paper from money market mutual funds.

The Term Asset-Backed Securities Loan Facility was introduced in November 2008, to support issuance of asset backed securities especially collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration.

In November 2008, started direct purchases of assets, central bank purchased \$100 billion in government-sponsored enterprise debt and \$500 billion in mortgage-backed securities backed by Fannie Mae, Freddie Mac, the Federal Home Loan Banks, and Ginnie Mae. In March 2009, there was another purchase of \$200 billion of enterprise debt and \$1.25 trillion of mortgage-backed securities. To ease funding conditions, Federal Reserve also extended wholesale funding guarantees by six months during the crisis. Besides mentioned actions that were taken as a general steps to recover liquidity, there were institutions that needed a special treat if they wanted to survive unexpected liquidity shortage. In March 2008, investment bank Bear-Stearns suffered by unexpected illiquidity of their assets. JP Morgan Chase & Co. agreed to a special financing for this company, when it assumes its financial obligations. Even a limited liability company, Maiden Lane LLC, was created to acquire certain assets of Bear Stearns and manage them to maximize repayment of the credit extended and also to minimize disruption to financial markets.

The biggest wave of liquidity problems came in the last quarter of 2008 and beginning of 2009, when another three important financial institutions of US financial market had liquidity problems. In September 2008, American International Group got \$85 billion from Federal Reserve Bank of New York as direct support to meet their obligations and in October AIG got additional \$37.8 billion to finance investment-grade, fixed-income securities that it held. After this in November Federal Reserve purchased \$40 billion of newly issued AIG preferred shares and lowered the interest from LIBOR + 850 basis points to only LIBOR + 300 basis points.

Another two limited liability companies had to be created for the purpose of restructuring of Federal Reserve lending to AIG. Maiden Lane II LLC got a \$22.5 billion loan from the Federal Reserve and a \$1 billion subordinated loan from AIG. This company then purchased residential mortgage-backed securities from AIG. Maiden Lane III LLC got a \$30 billion loan from the Federal Reserve and a \$5 billion subordinated loan from AIG. The money was used to purchase multisector collateralized debt obligations on which AIG has written credit default swap contracts. Central bank here acts again „as a last resort“, but this already can be seen as too artificial act that crosses the line. On the other hand, when we look at the position of this insurance company in the US financial market, the collapse of AIG could have more directly touched the ordinary people as the bankruptcy of an investment bank and the bigger psychological burden could have caused an unsolvable domino effect.

Citigroup undergone similar problems that again led the Treasury and Federal Deposit Insurance Corporation (FDIC) to intervene in November 2008, when provided capital protection against outsized losses on a pool of about \$306 billion in residential and commercial real estate and other assets, Citigroup has issued preferred shares to the Treasury, which has purchased an additional \$20 billion in Citigroup preferred stock using TARP funds.

Bank of America that merged with Merrill Lynch on January 2nd 2009, has problems that was solved as in the case of Citibank. It was provided by protection against the possibility of unusually large losses on a pool of approximately \$118 billion of financial instruments. On the other hand Bank of America had to issue preferred shares to the Treasury and FDIC as the providers of the protection.

C. The Eurozone

The ECB as other central banks tried to prevent against financial crisis by using all possible tools to prevent further deterioration of the financial market and after all return to the positive numbers, However, there are differences between the Eurozone and the US in the structure of financial markets. In Eurozone sector, the financial market is much more biased towards the banking sector than in the US. On the other hand, the ratio of direct debt securities

¹ the Reserve Bank of Australia, the Banco Central do Brasil, the Bank of Canada, Danmarks Nationalbank, the Bank of England, the European Central Bank, the Bank of Japan, the Bank of Korea, the Banco de Mexico, the Reserve Bank of New Zealand, Norges Bank, the Monetary Authority of Singapore, Sveriges Riksbank, and the Swiss National Bank.

account to GDP in euro area is two times smaller than in the US. According to the facts of stronger role of banking sector in euro area, the ECB was the first that took action already in August 2007 after the first signs of stress. There was lent €5 billion in overnight lending. These provisions kept on going until September 2008, when the difficulties rose to the level that required stronger actions for in providing liquidity. Trichét [13] in his speech described three main building blocks of the new procedure of providing liquidity.

The first block should help banks to provide credit to households on the same level as before. ECB used refinancing operations at very low lending rates with expansion of maturity up to six months, which made the liquidity unlimitedly available, because ECB was also prepared to provide any shortage of liquidity, even for this interest rates, so it acted „as a surrogate for the market in terms both liquidity allocation and price setting.“ [14].

The second block was used to make it easier for banks to lend money. ECB used similar tool as in USA, where they enlarged the list of assets used as collateral. In Euro area government securities accounted only for 44 % of the nominal value of all assets used in collateral.

The third block includes operational changes in October 2009 that was used to increase the number of counterparties that are able to participate in refinancing operations. Before crisis there were 1,700 credit institutions participating in refinancing operations, after the changes, the number increased to 2,200.

The ECB also used central banks swap lines and direct capital injections to companies were used in Euro area also relatively widely. In most of the countries, where the capital injections were used, it was done through acquisitions of preferred shares, only some countries decided to make it through the ordinary shares.

When comparing the size of interventions (calculated as a percentage of GDP from year 2007 of a particular country), interventions in the countries from the Eurozone were mostly much smaller and did not reach the level of interventions in the UK or the US. However, interventions in UK are the highest, where the commitments of banks to U.K. government (and also through Bank of England) were £850 billion, which is around 60 % of UK's GDP in 2007. The only state from the Eurozone that is comparable to the UK and the US, where interventions almost reaches 50 % of respected GDP, is the Netherlands with the amount over a half of their GDP from 2007. The biggest liquidity trouble in this country were caused by Belgian-Dutch group Fortis, what also affected the size of interventions in Belgium that was together with The Netherlands, Austria and Finland the only country from the Eurozone where interventions reached more than 30% GDP.

IV. THE CHALLENGES OF LIQUIDITY RISK MANAGEMENT

During the global crisis, inter-bank lending stalled and capital markets froze, resulting in a liquidity crisis that subsequently highlighted inadequate liquidity buffers and poor liquidity risk management within banks [14]. As a consequence, liquidity risk management regulation needs to be revised. The already-mentioned liquidity coverage ratio proposed by BCBS is one of the first new regulatory liquidity standards for financial institutions expected in the future (Table 1). However, global coordination of liquidity standards is needed otherwise there could be an overall cost to a country or region's attractiveness from more aggressive regulation underpinning competitiveness of financial institutions affected by this regulation. For more details on risk management during the global crisis we refer to [8], [9], [10], [11] or [12].

V. CONCLUSION

In the paper we presented basics of emergency liquidity risk management and its development during the 2007-2009 global crisis. Liquidity is defined as a capacity to obtain funding when needed. Liquidity risk -defined as a threat to this capacity to generate cash at fair costs- materialized during the global crisis. As a result, central banks around the world tried to ease the short-term liquidity pressures that came up during the crisis. The liquidity support measures were applied by all main central banks. We see five main regulatory issues requiring revision in coming years: liquidity measurement, intra-day and intra-group liquidity management, contingency planning and liquidity buffers, liquidity systems, controls and governance, and finally models testing the viability of business liquidity models.

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TABLE I
PERSPECTIVES OF LIQUIDITY MANAGEMENT REGULATION

Regulatory topic	Possible future action	Implications	Examples
Liquidity measurement	Prescriptive measurement methodology and stressed parameters per product	Significant upgrade of data gathering, liquidity measurement and MIS* system capabilities	Europe: CEBS** guidance to compute stressed liquidity position by projecting cash/collateral flows
Intra-day, intragroup liquidity management	- Demonstrate self-sufficiency across all group entities - Buffers/commitments to withstand severe intra-day stress	- Need to quantify liquidity risk contribution by each group entity and account for trapped liquidity - Management of intraday exposure across settlement/payment systems	UK: FSA*** guidance on measurement and management of intra-day and inter-group liquidity management as part of a bank's systems/controls requirements
Contingency planning and liquidity buffers	Formulaic specification of contingency/buffer requirements	- Construction of liquidity buffer from diversified set of highly liquid assets, capability to execute contingency plans under stress - Regional parameter calibration	Switzerland: SNB**** outline on increased liquidity buffers across wholesale and retail funding to be finalized by Q2 2010
Liquidity systems, controls and governance	Inclusion of regulatory oversight on an operational basis	Establish and demonstrate robust capabilities to measure and monitor evolving liquidity situation with senior management oversight	USA: Inter-agency guidance on liquidity management including corporate governance, strategies, policies, procedures and risk limits
Liquidity viable business models	- Forced separation of business areas to isolate and contain liquidity risks - Limitations on asset options available	- Implied shift in the source and maturity of funding and assets held by institutions - Quantification and inclusion of liquidity premium in pricing	Global: BCBS*****consultation paper outline on differential buffer requirements (e.g. wholesale vs. retail funding)

Notes: *MIS = Management Information System, **CEBS = Committee of European Banking Supervisors, FSA***= Financial Services Authority, ****SNB = Swiss National Bank, ***** BCBS = Basel Committee on Banking Supervision

Source: Authors based on Oliver Wyman (2010)