TRENDS IN THE POLISH BANKING SYSTEM'S LIQUIDITY RISK MEASURED BY BASEL III STANDARDS

Błażej Kochański

Abstract

Basel III liquidity proposals are still "work in progress" as new versions of regulations appear, but general shape of two major new liquidity ratios (short term LCR – liquidity coverage ratio and medium-term NSFR – net stable funding ratio) seems to be established. In the paper LCR and NSFR measurement in time is proposed to assess changes in systemic liquidity risk in Poland.

Estimations of two Basel ratios for years 1996-2012, based on the data on aggregate banking system from National Bank of Poland, reveal that both ratios gradually deteriorated throughout most of this period. The ratios stabilized in 2008 - probably a combined result of banks' reaction to financial crisis abroad and new regulations.

It seems that on average Polish banks can meet Basel's liquidity requirement. However, reverse stress test for LCR uncovers that currently an average Polish bank would withstand a run-off of no more than 20% retail deposits - while fifteen years earlier similar stress test would show that banks were able to endure even 60% run-off rate. Also, "net cash capital" surplus present in the system at the beginning of the analysed period has practically disappeared, even if favourable Basel weights for mortgage loans are taken into account.

Key words: banking, Poland, liquidity risk, Basel III, systemic risk

JEL Code:

Introduction

Maturity transformation and liquidity transformation are usually considered principal functions of banks in the economy. However, there is an obvious systemic liquidity risk associated with maturity transformation (Diamond & Dybvig, 1983) and "excessive" maturity transformation is cited as one of the main reasons of the financial crisis (Viñals et al., 2010).

Basel III is viewed as a response to financial crisis (Reuse & Svoboda, 2013) – it introduces two new regulatory standards for liquidity. One of them is liquidity coverage ratio (LCR), another is net stable funding ratio (NSFR).

The aim of this paper is to estimate, based on the publicly available data, the LCR and NSFR ratios for the aggregate Polish banking system. Thanks to this estimation trends in systemic liquidity risk may be assessed. Systemic risk is a risk that a substantial portion of financial system will simultaneously experience difficulties and suffer losses (Boss, Krenn, Puhr, & Summer, 2006; Eijffinger, 2009). While in the narrow sense systemic risk is a risk driven by direct contagion effect, in the more broad sense systemic risk may be a result of the sensitivity of the banking system to the common shock (de Bandt & Hartmann, 2000). It can be claimed that LCR and NSFR ratios measure the systemic risk in the broad sense since they do not explicitly refer to contagion effects.

The calculation is performed based on data for year-ends 1996-2012 – the data, described in section 1, is taken from the Excel tables placed on website of the National Bank of Poland (Polish central bank).

The rest of the paper is organized as follows. Section 1 contains assumptions for LCR&NSFR calculation. Section 2 presents result of the estimation of the trends of both Basel III ratios. Section 3, containing additional discussions on a simple reverse stress test and "net cash capital" surplus, is followed by the conclusion.

1   LCR and NSFR - assumptions

LCR (liquidity coverage ratio) is a short term measure reflecting bank's ability to endure 30-day liquidity tensions. NSFR (net stable funding ratio) constitutes a medium-term structural liquidity measure.

The formulas for calculation of LCR and NSFR indicators are following:

$$LCR = \frac{high\ quality\ liquid\ assets}{net\ cash\ outflows\ over\ a\ 30\ day\ period} \qquad (1)$$

where *net cash outflows = 30-day cash outflows – 30-day cash inflows*

$$NSFR = \frac{available\ amount\ of\ stable\ funding}{required\ amount\ of\ stable\ funding} \qquad (2)$$

Detailed instructions of ratios calculations are presented in documents issued by Basel Committee. The ratios' definitions are still work in progress (especially in the case of NSFR). There have been at least three major versions of Basel documents which describe proposed liquidity ratios (Basel Committee on Banking Supervision, 2009, 2010, 2013). Author selected the version from 2010 for the basis of this exercise as this version seems to have been the source of new European regulations introducing liquidity and capital standards, and the 2013 document does not contain a definition of NSFR.

The data provided publicly by the Polish central bank is not detailed enough to precisely calculate LCR or NSFR. For instance, Basel ratios require data on residual maturities of liabilities (original term is only available from NBP) or information on a kind of relationship between a depositor and a bank. The calculations presented in the next section are thus just a simplified approximation/estimation of the ratios. Simplifying assumptions required for ratios calculations are presented in tables 1-5.

Tab. 1: LCR estimation assumptions – HQLA factors

Asset type	Assumed effective HQLA factor	Comments
Cash in vaults and in NBP	100%	
Domestic treasury/central bank securities,	100%	Simplified assumption – no accounting for possible encumbering.
Domestic non-financial debt securities	34%	Basel III gives a 85% load to eligible securities. 40% eligibility criterion.
Foreign securities	23,125%	Adopted criterion of 25% eligibility (fifty-fifty split between 85% and 100% load)

Source: prepared by the author.

Tab. 2: LCR estimation assumptions – cash outflow factor

Outflow sources	Effective factor assumed	Comments
Private deposits	7,45%	Blend of customers with 5% and 10% factor.
SME and similar deposits	9,25%	Blend of customers with 5% and 10%, but less customers eligible for the 5% rate.
Corporate deposits	65%	20% of deposits assumed to receive a 25% factor, the rest – 75%.
Non-monetary financial institutions	92,50%	10% assumed to receive a 25% factor, 100% for others.
Government and local authorities	70%	10% assumed to receive a 25% factor, 75% for others.
Monetary financial institutions	100%	Assumed 100% deposits.
Debt securities issued	10%	10% of securities assumed to mature within 1 month.
Foreign private deposits	10%	No relationship assumed.
Foreign corporates	75%	No relationship assumed.
Foreign financial institutions	16%	Deposits and loans maturing within 1 month assumed to constitute 60% of the total liability.

Source: prepared by the author.

Tab. 3: LCR estimation assumptions – inflow factors

Inflow sources	Effective factor assumed	Comments
Loans to private individuals and corporates with original term:		
- less than 1 year	8,333%	1/6 of the receivable amount & 50% correction.
- from 1 to 5 years	1,389%	1/36 of the receivable amount & 50% correction.
- from 5 to 10 years	0,556%	1/90 of the receivable amount & 50% correction.
- from 10 to 20 years	0,278%	1/180 of the receivable amount & 50% correction.
- more than 20 lat	0,139%	1/360 of the receivable amount & 50% correction.
Non-monetary financial institutions, governments:		
- less than 1 year	8,333%	1/6 of the receivable amount & 50% correction.
- from 1 to 5 years	1,389%	1/36 of the receivable amount & 50% correction.
- more than 5 years	0,500%	1/100 of the receivable amount & 50% correction.
Receivables from banks	100,00%	Assumed 100% deposits.
Receivables from foreign financial institutions	75,00%	Assumed 75% in callable deposits.

Source: prepared by the author.

Tab. 4: NSFR estimation assumptions – available stable funding factors

Type of liabilities / equity	Assumed ASF ratio	Comments
Basic and ancillary own funds	100%	
Deposits and liabilities from domestic private individuals	85,1%	Proportion of stable (90%) and less stable (80%) deposits consistent with that assumed for LCR calculation.
Deposits and liabilities from domestic SMEs	81,5%	Proportion of stable (90%) and less stable (80%) deposits consistent with that assumed for LCR calculation.
Other liabilities from non-financial entities	50%	Assumed 50% factor as for corporates in the Basel document.
Securities with original term of 2 years+	90%	As there is no data on residual term, approximation is based on original term.
External financing (foreign financial institutions)	60%	It is assumed that 60% of the amount are non-revocable loans from foreign entities with a residual term longer than one year.

Source: prepared by the author.

Tab. 5: NSFR estimation assumptions – required stable funding factors

Assets	Assumed effective RSF ratio	Comments
PLN mortgages	65%	
Foreign currency mortgages	98%	It is assumed that FX loans will not get a more favorable risk weight in the capital adequacy calculation.
Other receivables from households	90%	It is assumed that significant share of other household receivables are a short-term consumer loans (85% factor for 1-year residual maturities).
Corporate receivables	63%	Assumption: 60% of loans to corporates have residual

		maturity below up to one year (factor 50%), next 20% meet criteria for a 65% factor, the rest receives a 100% factor.
Government receivables	56%	Assumption: 60% of loans to government institutions have a residual maturity of less than one year (factor 50%), the rest will receive a 65% factor.
Non-monetary financial institutions	100%	It is assumed that there is no basis to assume a more favourable factor.
Foreign financial institutions	25%	It is assumed that 75% of receivables are short term deposits.
Receivables from foreign private individuals and corporates	70%	It is assumed that this group consists in 80% from corporate receivables (65% factor assumed), and in 20% individual receivables (90% factor).
Domestic securities	7,25%	Simplifying assumption: mainly government and central bank securities (5% ratio in the Basel document).
Foreign securities	47,50%	Half of the amount assumed to be in government and similar papers (5% factor), the rest assumed to have an average factor of 90%.
Cash and receivables from domestic banks	0%	100% of receivables from domestic financial institutions assumed to be deposits.
Other assets	100%	

Source: prepared by the author.

2   LCR and NSFR estimation

Fig.1 presents results of the estimation of the liquidity coverage ratio for the aggregate balance sheet of the Polish banking system. It seems that the ratio is almost four times lower in 2012 than it was 16 years earlier: it went down from 446% to 122%, which means significant increase in systemic liquidity risk.

Analysis of the data on the chart shows that the ratio has been stable since 2007. Possible explanation for this stabilisation may be twofold. Firstly, new liquidity standards where introduced by the Polish banking supervisory authority in 2007, along with four "supervisory norms", two of which were similar in construction to LCR. Secondly, the financial crisis that reached Polish banking system in 2008, has increased awareness of prudent liquidity buffer management.

Based on the chart it may be claimed that an average Polish bank meets the Basel III liquidity criteria. However, as studies by KNF, Polish Financial Supervisory Commission and by Polish Banks' Association/PwC reveal, there are banks where LCR minimum of 100% would not be met (Jakubiak, 2012; PwC, 2011).

Results of the NSFR estimation for the aggregate Polish banking system are presented in fig. 2. The trends observed are similar. There was a deterioration in medium term structural liquidity with the trend visible for years 1998-2008, followed by stabilization or even

improvement. Based on the results it may be claimed that, again, Polish banks on average meet Basel III's stable funding criterion (and, again, there are some banks with serious shortfall as of 2011, according to KNF). However, there was a period when the sector failed the NSFR test in total: estimation shows that the ratio was below required 100% in 2007-2009.

Fig. 1: LCR estimation for the aggregate Polish banking system
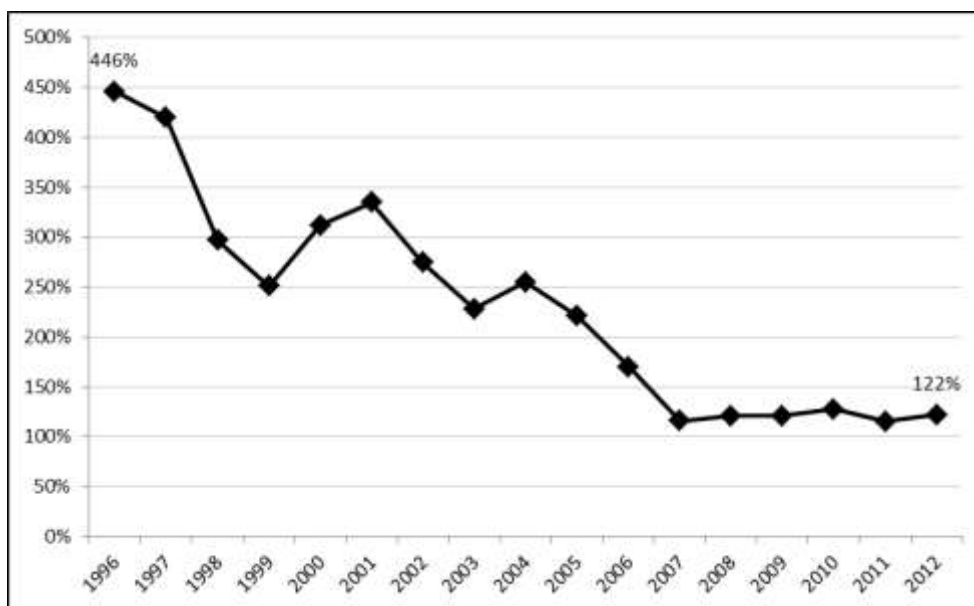
Source: author's calculations based on NBP's data.

Fig. 2: NSFR estimation for the aggregate Polish banking system
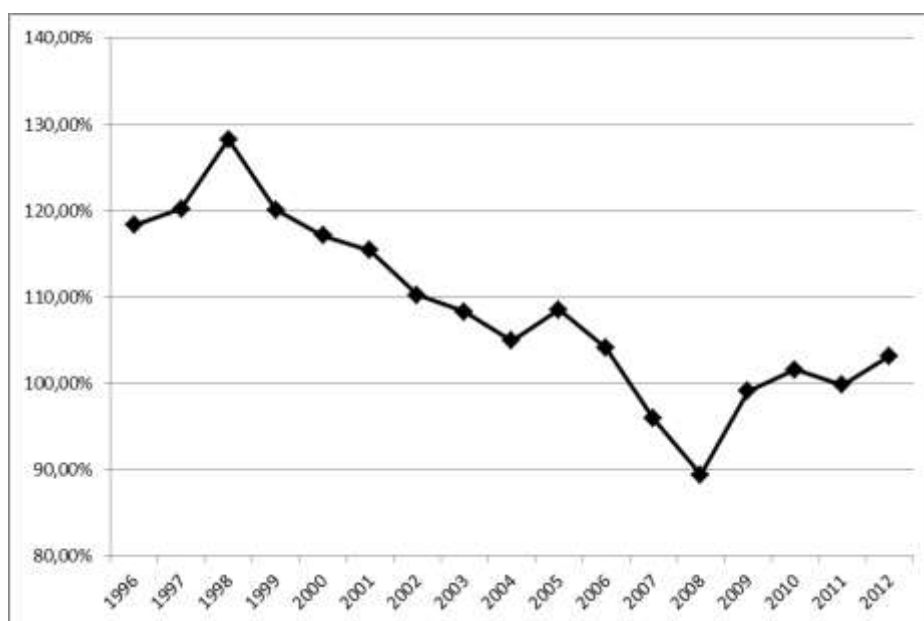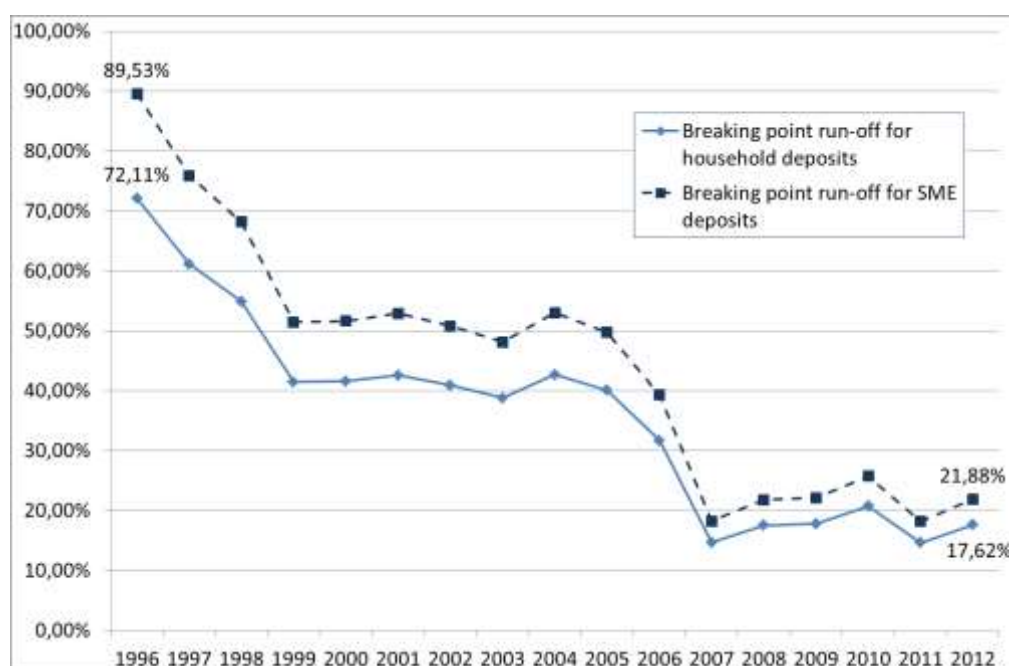
Source: author's calculations based on NBP's data.

3 Reverse stress test and "net cash capital"

It is clear from the previous section that – although systemic risk increased significantly - the Polish banking system fulfills (on average) minimum LCR standard of 100%. The question remains how big a stress should be for an average bank to fail. Reverse stress tests, known also as a "breaking point method" or "stress until it breaks" approach (Ong, Maino, & Duma, 2010) are a recommended way to enhance stress testing practices in the financial industry (Grundke, 2011).

Fig 3. presents information on the results of the reverse stress test performed based on the used in the previous section. LCR „30-day stress test" scenario was taken as a starting point. Then, for each year in the observation period, the retail deposits run-off was increased gradually so as to find the level of the run-off that causes the system to „break" (LCR<100%). It was assumed that both segments of retail deposits (households and SMEs) are stressed, and the magnitude of run-off is increased proportionally.

The reverse stress test performed shows that in 1996 more than 70% of deposits would have to run off in order to cause an average bank to fail. In 2012 an average Polish bank would withstand a run-off of no more than 20% retail deposits.

Fig. 3: LCR – reverse stress test results

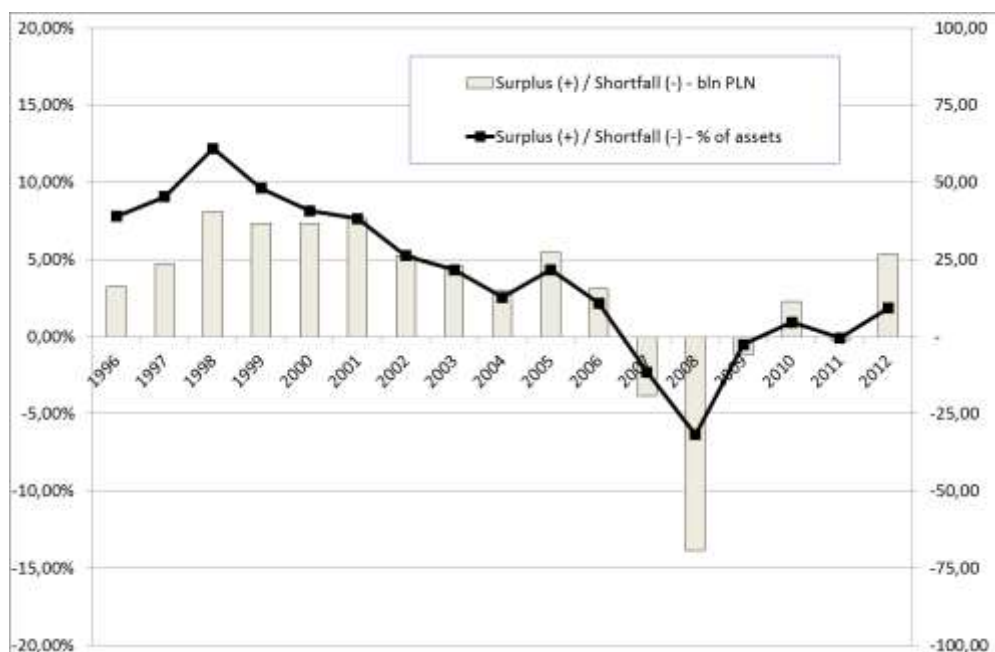Source: author's calculations based on NBP's data.

„Net cash capital" is a concept developed initially by the Moody's Investor Service to assess structural liquidity standing of banks. This analysis is designed to „compare the cash demands from a bank's contractual obligations with the issuer's inflow of cash, excluding the cash generated from refinancing debt" and is calculated as follows (Raffis, 2007):

$$Net\ cash\ capital = Long\text{-}term\ funding – Illiquid\ assets – Illiquid\ securities \qquad (3)$$

It seems that similar liquidity buffer analysis may be performed with NSFR definition. In this case a liquidity buffer („net cash capital") would be a difference between available and required stable funding.

Fig. 4 presents results of such a calculation. Before 2003 the buffer (in other words, the surplus of the available stable funding over required amount) was at the level higher than 5% of total assets of the aggregate banking system. The surplus, in relative terms, gradually melted down to zero. It started to go up recently, but it should be taken into account that Basel III gives favourable required funding factors (65%) to household mortgage loans, presumably on the grounds of possible securitization of such loans. As sales/securitization of such loans is not a realistic possibility in Poland the improvement in „net cash capital" in 2010-2012 as presented in fig. 4 should be treated as overly optimistic. If less favorable factor (98%) is applied to mortgages, the surplus switches to 2-3% shortfall.

Fig. 4: "Net cash capital" liquidity buffer for the Polish banking system

Source: author's calculations based on NBP's data.

Conclusion

Results of the estimations show that systemic risk driven by the liquidity structure of the balance sheets of the Polish banks has been increasing in the last 17 years, especially in 1996-2007. Thanks to the increase in awareness driven by the crisis and new regulatory standards by Polish FSA, the trend has been halted. It would, however, be overly optimistic to claim that the risk went down, it just stopped growing.

Due to the limited availability of data, the calculations presented in the paper are based on several highly simplifying assumptions. In author's view, however, change of assumptions or retrieving detailed data from banks (not feasible for such a long period going back to banking business prehistory) would not produce a significant change in trends observed. It is hard to imagine a set of assumptions and parameters that would show that banking system's liquidity risk structure has not deteriorated in the described period.

Possible further research in this area may include calculation of the trend for a set of banks to check whether the trend for an "average" bank is also followed by the "weakest links" of the network. Also, a cross-country analysis would constitute an interesting extension – similar exercise could be performed for another country/countries. Of course, the problem of compatibility and comparability of data would have to be addressed.

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Contact

Błażej Kochański

Politechnika Gdańska (Gdańsk University of Technology)

Wydział Zarządzania i Ekonomii Politechniki Gdańskiej

ul. G. Narutowicza 11/12

80-233 Gdańsk

blazej.kochanski@wp.pl