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## **Liquidity Premium in the Economic and Monetary Union's and Poland's Banking Sectors – an Indicator of Financial (In)Stability**

**Abstract.** *The aim of the paper is to estimate the effects of liquidity premiums used as part of fund transfer pricing by commercial banks in Poland and in the European Monetary Union between 2008 and 2014. Based on the European Central Bank's methodology applied on average interest rates of 2-year deposits, a calculation of liquidity premium in four qualitatively different sub-periods (January 2008 – September 2008, October 2008 – June 2011, July 2011 – August 2013, September 2013 – May 2014) is performed. The results show that the financial crisis in the European banking sector is far from being over, but Poland's banking industry remains stable.*

**Keywords:** *fund transfer pricing, liquidity premium, interest rate swaps, banking sector, Economic and Monetary Union, Poland*

### **Introduction**

The general term *asset and liability management* (ALM) entered common usage from the mid-1970s onwards. In a changing interest rate environment, it became imperative for banks to manage both assets and liabilities simultaneously, in order to minimise interest rate and liquidity risks, and to maximize interest rate income. Thus ALM is a bank unit in charge of managing the interest rate risk and the liquidity of the bank. ALM policies use two target variables: the interest



income and the Net Present Value (NPV) of assets minus liabilities. Intuitively, the stream of future interest incomes varies in line with the NPV. The main difference is that NPV captures the entire stream of future cash flows generated by the portfolio, while the interest income relates to one or several periods. The NPV view involves the use of specific techniques, one of which is transfer pricing discussed in this paper. Prior studies on pricing in the banking industry<sup>1</sup> focused on one side of balance sheet services and they served as a foundation for more complex and simultaneous approaches developed by their followers. The most seminal studies and textbooks on the topic were published by e.g. J. Dermine, W.D. Douglas and G.R. Raghuram, J. Bessis, A. Adam, M. Choudhry, L. Matz, and P. Neu, or R. Duttweiler<sup>2</sup>.

Generally, it can be stated that the common objective of the ALM is to fine-tune a bank's book structure so that the financial income is optimized, reflecting the different risk exposures across each business line<sup>3</sup>.

The paper aims to answer two research questions: do developments in liquidity premiums suggest the end of financial instability in the banking system of the Economic and Monetary Union (EMU), and do they suggest the end of financial instability in Poland's banking system?

It is evident that the paper belongs to a segment of asset-liability management. It aims to estimate the developments in liquidity premiums as a part of fund transfer pricing used by commercial banks in the Economic and Monetary Union's and Poland's banking sectors between January 2008 and May 2014. Based on the

<sup>1</sup> See e.g. P.F. Smith, *Pricing Policies on Consumer Loans at Commercial Banks*, "Journal of Finance", May 1970, No. 25, pp. 512-525; G. Benston, C.W. Smith, *A Transaction Cost Approach to the Theory of Financial Intermediation*, "Journal of Finance", May 1976, No. 31, pp. 15-232; D.F. Greer, *Rate ceilings and loan turndowns*, "Journal of Finance", December 1975, No. 30, pp. 1376-1383.

<sup>2</sup> J. Dermine, *Deposit Rates, Credit Rates and Bank Capital: The Klein-Monti Model Revisited*, "Journal of Banking & Finance" 1986, No. 10(1), pp. 99-114; W.D. Douglas, G.R. Raghuram, *Liquidity Risk, Liquidity Creation and Financial Fragility: A Theory of Banking*, "Journal of Political Economy" 2001, No. 109(10), pp. 287-327; J. Bessis, *Risk Management in Banking*, John Wiley & Sons, London 2002, p. 792; A. Adam, *Handbook of Assets and Liability Management*, John Wiley & Sons, New York 2007, p. 576; M. Choudhry, *The Principles of Banking*, John Wiley & Sons, Singapore 2012, p. 886; M. Choudhry, *Bank Asset and Liability Management. Strategy, Trading, Analysis*, John Wiley & Sons, Singapore 2012, p. 1140; L. Matz, P. Neu, *Liquidity Risk Measurement and Management: A Practitioner's Guide to Global Best Practices*, John Wiley & Sons, Chichester 2007, p. 569; R. Duttweiler, *Managing Liquidity in Banks: A Top Down Approach*, John Wiley & Sons, New York 2007, p. 304.

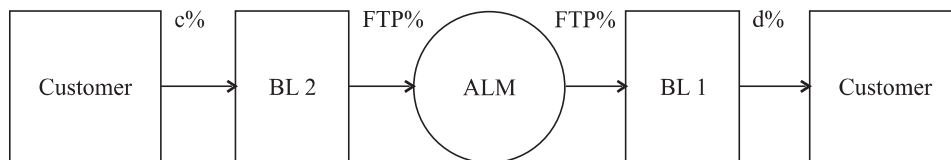
<sup>3</sup> Cf. E. Zimková, M. Zvarík, *Vývoj likvidnej prirážky v bankovom sektore Slovenska a jej vplyv na úverovú kapacitu bánk*, Acta arierarii publici, Banská Bystrica 2012, No. 9(2), pp. 78-82; E. Zimková, M. Zvarík, *Influence of Financial Crisis on Fund Transfer Pricing Used by Commercial Banks in Slovakia*, Managing and modelling of financial risks, Ostrava 2014, manuscript accepted for publication in proceedings.

methodology of the European Central Bank applied on average interest rates of 2-year deposits, a calculation of liquidity premium in four qualitatively different sub-periods (January 2008 to December 2008, January 2009 to April 2009, May 2009 to December 2011, and January 2012 to May 2014) is performed. This case study contributes to literature focusing on developments in liquidity premiums across the Economic and Monetary Union's and Poland's banking industries, which, to the best of the author's knowledge, has not been specifically studied. The result shows that the banking crisis in the EMU is far from being over, while Poland's banking system seems to be, in terms of liquidity, rather safe.

Except for the introductory and concluding parts, the body of the paper is organized into 2 other sections. In Section 2, the methodology of fund transfer pricing and liquidity premium estimation is reviewed and the source of data is declared. In Section 3, the empirical results are presented.

## 1. Methodology and data

It has already been mentioned that fund transfer pricing (FTP) can be seen as a process used in banks to measure the performance of different business lines in a bank. It consists of two segments: the price of the interest rate risk and the price of the liquidity risk, which are denoted in the paper as interest rate premium and liquidity premium. The role of fund transfer pricing for internal and external prices is clarified in figure 1.



BL 1 – business line 1

BL 2 – business line 2

FTP – fund transfer price = interest rate risk premium + liquidity premium

c% – interest rate on deposits = fund transfer price + risk margin + business margin

d% – interest rate on deposits = fund transfer price – business margin

Figure 1. The role of fund transfer pricing

Source: own.

**The interest rate risk premium** is the interest rate based on the fixation of a product. **The liquidity premium** is a measure of the difference in price (yield or expected return) between a liquid and an equivalent illiquid asset or liability.

The interest rate risk premium is measured by 2-year interest rate swaps (IRS), while the variable component is represented by 6-month Euribor. To offset the intrinsic volatility of daily quotations of interest rate swaps, monthly averages were used for the calculations.

The paper presents a calculation of liquidity premium performed on average interest rates of 2-year deposits from retail clients in four qualitatively different sub-periods (January 2008 to December 2008, January 2009 to April 2009, May 2009 to December 2011, January 2012 to May 2014). The data used in the empirical analysis were disclosed by the National Bank of Poland and the European Central Bank and include monthly interest rates for 2-year deposits in the EMU's and Poland's banking sectors between January 2008 and May 2014. The interest rate swaps data covering the same time span come from Bloomberg. The introductory data are displayed in figures 2 through 5, and their statistical description is provided in table 1.

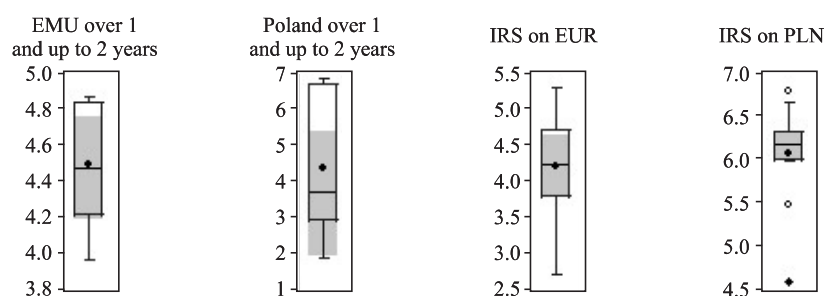


Figure 2. Box plots of interest rates on deposits up to 2 years in Poland and in the Economic and Monetary Union, and interest rates swaps on EUR and PZL in the first period being examined

Source: own.

According to the box plots displayed in figure 2 and the descriptive statistics given in table 1, in the pre-crisis period the average costs on 2-year deposits in the Economic and Monetary Union were only slightly higher than on Polish 2-year deposits (by 0.1 pp). Volatility measured by standard deviation was much higher in Poland. The Euro interest rate swaps were higher by 1.8 per cent and they were less volatile compared to Zloty interest rate swaps.

The box plots displayed in figure 3 and the descriptive statistics supplied in table 1, which characterize the trends in average costs on 2 years deposits in the EMU and Poland from January 2009 to April 2009, show a drop in average costs on deposits in the European banking sector and a corresponding increase in Poland's banking sector. This is due to the fact that the European Central Bank provided unconventional monetary liquidity to the sector at a cheap price, which

meant that banks could raise funds via less costly deposits in the EMU. At the same time, the spread between the maximum and the minimum interest rate on 2-year deposits in the European Union and in Poland widened. In the second period under analysis, the interest rates on deposits fell considerably from 4.53% to 3.23 % in the EMU, and rose from 4.39 to 5% in Poland. Interest rate swaps experienced a fall in both areas being examined.

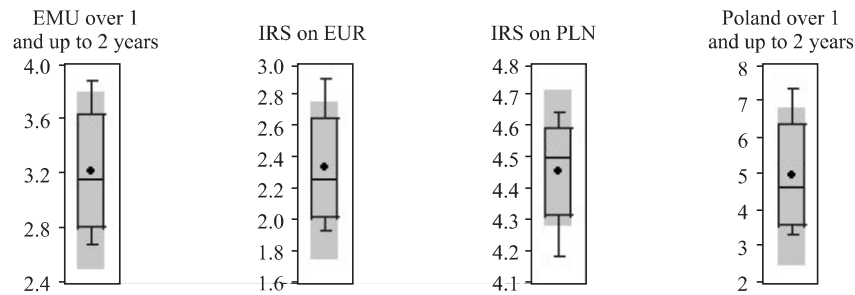


Figure 3. Box plots of interest rates on deposits up to 2 years in Poland and in the Economic and Monetary Union, and interest rates swaps on EUR and PZL on the second period being examined

Source: own.

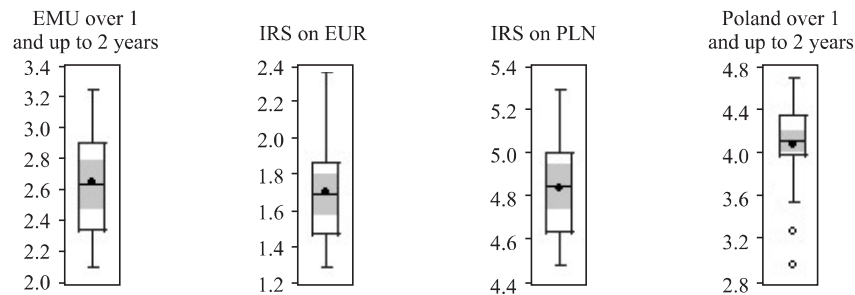


Figure 4. Box plots of interest rates on deposits up to 2 years in Poland and in the Economic and Monetary Union, and interest rates swaps on EUR and PZL on the third period under analysis

Source: own.

In the third period being examined – from May 2009 to December 2011 – we can see a slight decline in interest rates in both the banking systems. This development was in the EMU influenced by an increase in the European Central Bank's key interest rates, and a subsequent decline in the key interest rates in the EMU. The National Bank of Poland pursues its own independent monetary policy, which, of course, responds to domestic as well as international

developments. In the third period, interest rate swaps fell slightly both in Poland and in the EMU.

Table 1. Descriptive statistics of input variables

Specification	Interest rates on EMU deposits	Interest rates on PLZ deposits	IRS on EUR	IRS on PLZ
First phase				
Mean	4.5	4.39	6.08	4.21
Median	4.48	4.18	6.18	4.24
Maximum	4.87	6.84	6.80	5.30
Minimum	3.97	1.9	4.61	2.73
Std. Dev.	0.32	1.88	0.57	0.77
Skewness	-0.12	0.33	-1.44	-0.46
Kurtosis	1.5385	1.5440	4.9475	2.4040
Observations	12	12	12	12
Second phase				
Mean	3.23	5	4.95	2.72
Median	4.30	4.66	4.28	2.54
Maximum	3.89	7.34	4.59	2.46
Minimum	2.94	3.35	4.19	1.36
Std. Dev.	0.53	1.78	0.2	0.42
Skewness	0.32	0.49	-0.67	0.53
Kurtosis	1.64	1.72	2.1	1.81
Observations	4	4	4	4
Third phase				
Mean	2.66	4.9	4.85	1.71
Median	2.65	4.12	4.85	1.7
Maximum	4.57	4.18	5.29	2.37
Minimum	4.19	3.58	4.49	1.29
Std. Dev.	0.34	0.4	0.23	0.29
Skewness	0.26	-0.97	0.13	0.59
Kurtosis	1.85	3.89	2.4	2.59
Observations	32	32	32	32
Fourth phase				
Mean	2.26	3.84	3.67	0.65
Median	4.28	4.31	3.32	0.54
Maximum	3.48	4.88	4.96	1.37
Minimum	1.31	1.31	2.57	0.37
Std. Dev.	0.59	0.93	0.79	0.28
Skewness	0.32	-0.45	0.52	1.28
Kurtosis	2.11	1.52	1.65	3.35
Observations	29	29	29	29

Source: own.

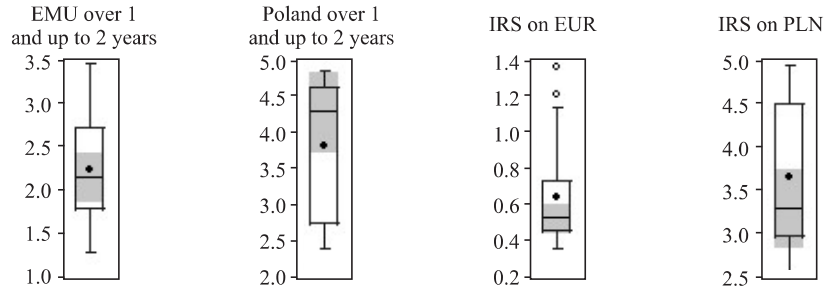


Figure 5. Box plots of interest rates on deposits up to 2 years in Poland and in the Economic and Monetary Union, and interest rates swaps on EUR and PZL over the fourth period of analysis

Source: own.

Box plots for interest rates on deposits up to 2 years in Poland and in the EMU, shown in figure 5, indicate a declining trend. The maximum interest rates on 2-year deposits fell sharply. The mean of interest rate swaps declined, too, reflecting the low-interest rate policy of the European Central Bank.

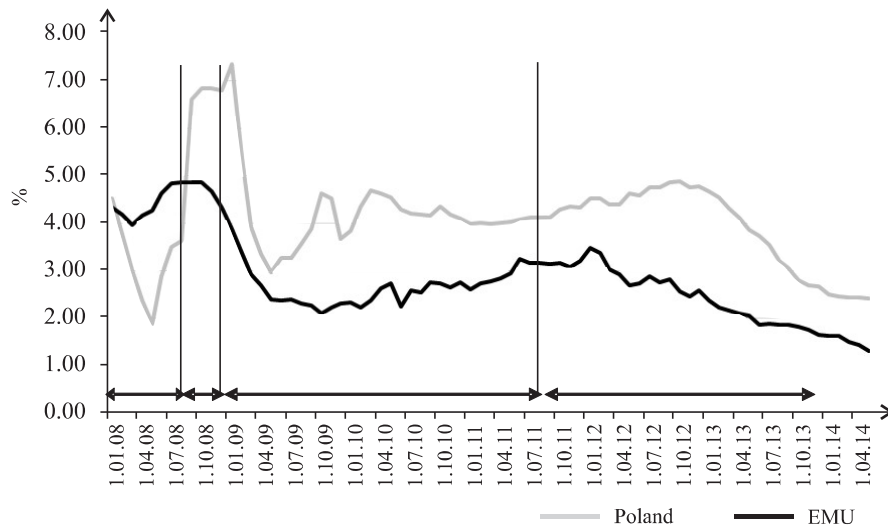


Figure 6. Interest rates on deposits up to 2 years in Poland and in the Economic and Monetary Union

Source: own.

As shown in figure 6, the trend in market rates of term deposits in Poland was almost concurrent with the evolution of term deposit market rates in the Economic and Monetary Union. As of 2009, the correlation of 2-years retail term

deposits in Poland's and EMU's banking sector was 0.91. This finding confirms the existence of some interdependence between the two banking sectors under examination. The correlation stems not only from the European Central Bank's overarching policy and market openness, but also from that fact that most FTP rates are determined at the headquarters of European commercial banks. The high correlation allowed us to approximate the results based on EMU rates to those for commercial banks operating in Poland.

The input variables characterized above were used to estimate the liquidity premium in Poland's banking sector and the average for the EMU banking sector in the four sub-periods we analyzed. To calculate the liquidity premium, which is paid at about the market premium (rate), the market premium (rate) of 2Y deposits has to be decided first. The author considered two different possibilities: government bonds and interest rate swaps.

It can be assumed that prior to the crisis eligible EMU government bonds were regarded as basically risk free investments. Due to Greece's default and the ensuing problems in other countries, risk premiums went up sharply to offset increased credit risk. Therefore, when the crisis had taken off, government bond yields could no longer be used for this purpose.

Interest rate swaps are currently seen as risk free instruments. The main reason is that there is a daily exchange of collateral which minimizes the credit/counterparty risk. There are of course different types of interest rate swaps, based on the variable leg (e.g. EONIA, 3M EURIBOR, 6M EURIBOR). In the paper, the interest rate swaps based on 6M EURIBOR variable leg are used. In everyday practice, they are often applied for hedging purposes by banks, corporations and other entities, and therefore represent an adequate benchmark for interest premium. This approach is supported by the European Market Infrastructure Regulation (EMIR).

All computations were performed using Excel and EViews 7 software.

## 2. Results

It has already been pointed out that interest rate swaps, being a risk free instrument, can be currently used for estimating liquidity premiums. Having established this fact, calculations and analyses of liquidity premiums in Poland's and the EMU's banking sectors between January 2008 and May 2014 was executed.

As shown in figure 7, the observation of trends in liquidity premiums in Poland and in the Euro zone was broken down into four periods (January 2008 – December 2008, January 2009 – April 2009, May 2009 – December 2011, January 2012 – May 2014).



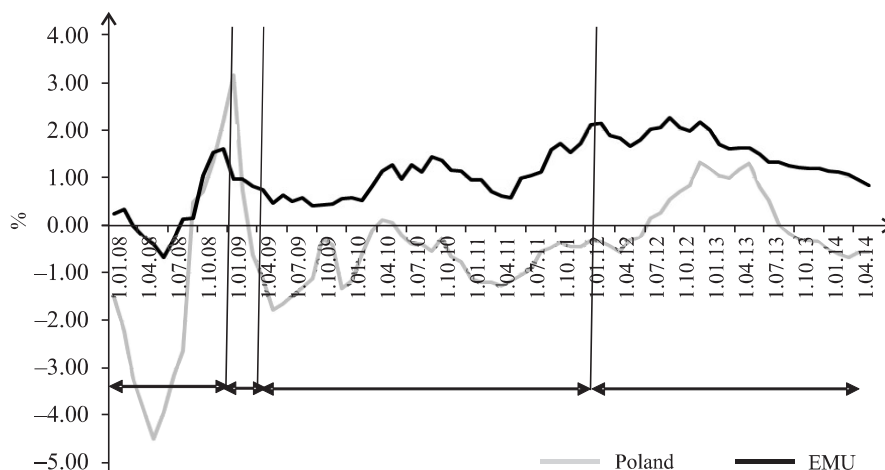


Figure 7. Liquidity premium on deposits up to 2 years in Poland and Economic and Monetary Union

Source: own.

In the period from January 2008 to December 2008, liquidity premium very nearly did not exist. Internal rates consisted of market components only, which means that they were in fact structured as an interbank market rate for a given maturity (EURIBOR/IRS-margin).

In the period from January 2009 to April 2009, there was a sharp increase in liquidity premiums – to 2.91% in Poland's banking sector and to 4.19% in the Economic and Monetary Union's, respectively. The crucial moment was the last quarter of 2008 (the collapse of Lehman Brothers), which triggered a deep crisis. It can be stated that it altered the course of business in the entire world's banking industry. Commercial banks, in an effort to replace wholesale funding which essentially had stopped to exist, focused on retail market time deposits. This resulted in the introduction of a liquidity premium. As it is evident from the analysis, the considerable increase of Poland's liquidity premium reflected problems related to foreign exchange depreciation and the deterioration of foreign credits.

The third period from May 2009 to December 2011 is the most interesting one. At that time, the European Central Bank raised the main refinancing rate from 1% to 1.5%, which immediately changed the trend in rates once more, causing them to drop by 1% to 0.5%. These decisions destabilized the banking sector, which once more tried to retain as many stable retail deposits as possible. Banks in the EMU had interest rate swaps at 4.85 on average, while Polish Zloty interest rate swaps were at only 1.71.

The fourth period, from January 2012 to May 2014, is particularly interesting. It can be seen that the liquidity premium on the Polish Zloty is negative, reflecting

high liquidity in the this currency and the stability of Poland's banking sector, while the interest rate swaps in the EMU continued to decrease, signaling that the crisis was not over.

Looking at the trends in liquidity premiums in the EMU, it can be said that even nearly 6 years after the start of the financial crisis, the liquidity premium which commercial banks pay for deposits is still higher than it was in 2009. Interest rate swaps in Poland returned to the pre-crisis level, reflecting excessive liquidity in, and the stability of, the banking sector. It can be therefore concluded that confusing decisions made by the European Central Bank did have some negative consequences on product pricing in the banking sector in the Euro zone. The lending interest rates include, among others, risk premiums and fund transfer prices. It means that due to high liquidity premiums paid on the deposit side in the EMU, it is not possible to lower interest rates on the loan side.

## Conclusion

The paper mapped the trends in liquidity premiums in the banking sectors of the Economic and Monetary Union and Poland between January 2008 and May 2014. While the trends in liquid margins were highly correlated, which could be traced to the fact that decisions on liquidity premium are mostly taken at the headquarters of commercial banks, the levels of liquidity premium were different. The research findings confirmed fears that the economic crisis is far from being over in the banking sector of the Economic and Monetary Union. The liquidity premiums applied on deposits by banks operating in the EMU proved that unconventional monetary policy instruments, albeit providing the banking sector with extra liquidity, are not effective in long term. Unless accompanied by structural reforms in individual Euro zone countries, monetary policy alone will not be able to boost economic growth. Liquidity premium on Polish Zloty fell below zero, reflecting excessive liquidity and stability in Poland's banking sector. Low liquidity premium in the banking sector in Poland does allow bank managers space to decrease lending interest rates. Therefore, it should be stated that there are enough sources for credits in Poland's economy.

A social scientist should make it clear that companies are to play a greater role in the revival of global economies and remedying the financial crisis, rather than just look to the benefits of weak exchange rates stemming from central banks' monetary policies. Fiscal discipline, of course, is another essential precondition for future financial stability.

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## Premia płynnościowa w sektorze bankowym Unii Gospodarczej i Walutowej oraz Polski – wskaźnik finansowej (nie)stabilności

**Streszczenie.** Celem artykułu było przedstawienie oceny stabilności banków komercyjnych w Polsce i w Unii Gospodarczej i Walutowej w okresie od 2008 do 2014 r. przez pryzmat korekt z tytułu ryzyka płynności (tzw. premii za płynność) wykorzystywanych do ustalania cen transferowych środków finansowych. Przy zastosowaniu metodologii Europejskiego Banku Centralnego bazującej na średnim oprocentowaniu dwuletnich depozytów dokonano wyliczenia premii płynnościowej dla czterech różnych jakościowo podokresów: od stycznia 2008 do września 2008 r., od października 2008 do czerwca 2011 r., od lipca 2011 do sierpnia 2013 r. i od września 2013 do maja 2014 r. Wyniki wskazują, że obwieszczenie końca kryzysu w europejskim sektorze bankowym byłoby dalece przedwczesne, jednakże polskie banki zachowują zadowalającą stabilność.

**Słowa kluczowe:** cena transferowa środków finansowych, premia za płynność, swap stopy procentowej, sektor bankowy Unii Gospodarczej i Walutowej, polski sektor bankowy