

Artur Więznowski

Uniwersytet Ekonomiczny we Wrocławiu

THE CHANGES OF MONEY MULTIPLIER IN POLAND 1998-2009

1. Introduction

Current financial crises shows, that still research is needed to improve our understanding of interrelations between money, financial markets and real economy. In this article changes in money multiplier in Poland are described and evaluated. Primary task of this research is verifying if there are changes in the money multiplier, which can signal – beside other factors – how much financial crisis is hitting Polish economy and how deep the problems are. Secondary objective is describing the behavior of researched variable and making an attempt to explain its causes and consequences. In the analyses simple statistic methods and graphs are used.

2. Money multiplier and financial and real sectors

Money multiplier is a measure of commercial sector' potential to create money. It can be calculated as relation between given monetary aggregate and reserve money¹. It implies that as many multipliers can be calculated as many monetary aggregates can be defined.

The basic conditions for money creation are set by central banks. The most important are amount of reserve money, obligatory reserves rate and cost of money – i.e. central bank rates (discount rate and other). There are also powerful factors which can not be directly influenced by central banks. Among them the most important are commercial bank voluntary reserves ratios and the amount of cash circulating outside financial sector².

¹ D. Miles, *Macroeconomics. Understanding the wealth of nations*, Wiley, Chichester 2005, p. 276.

² F. Mishkin, *The Economics of Money, Banking and Financial Markets*, Addison–Wesley–Longman 2000, p. 541.

The higher the obligatory and voluntary reserves rates or the amount of cash outside commercial banks the lower the multiplier. The higher the amount of reserve money and the multiplier the higher amount of money measured by given monetary aggregate.

Equation [1] summarizes in quantitative form relations described above.

$$kMi = Mi/M0 = (Go + 1)/(Ro + Rv + Go), \quad [1]^3$$

where kMi is money multiplier for monetary aggregate no "i", Mi is amount of money measured for "i" aggregate, $M0$ is monetary base (reserve money or high powered money), $G0$ is rate of cash circulating outside financial sector, Ro is the rate of obligatory reserves and Rv is the rate of voluntary reserves of financial sector.

The money multiplier can be measure of financial sector development. However during financial crises the most important is the information about commercial banks potential to create money⁴. Expected signal of deepening crisis would be the decrease of multiplier caused as much by lower willingness of financial sector to create money (linked to contraction of credit) as to lower demand in the economy. Important factor can be potential depositors' lack of trust in the financial sector, leading to higher rate of cash in circulation. All these factors can become important source of insufficient liquidity in the economy, playing its role in transmission of financial crises into real sector.

Decreasing money multiplier would be therefore the sign of monetary problems in researched economy. Such situation can be the precondition of central bank policies directed at increasing the potential and willingness of banks to create money. Most potent tools are decreasing of obligatory reserves ratio and making central bank credit cheaper and more accessible for commercial banks (that way the voluntary reserves of banking sector can be decreased). If such policies came out to be insufficient, then central bank can take further action to prevent money supply from contracting and secure liquidity in the economy. Such action has to take into account passive role played by crises shaken commercial banks and other financial institutions. The most important tool in such situation can be increasing amount of reserve money by open market operations and by financing government deficits. Due to Polish Constitution later action is forbidden for NBP, which must not directly finance Polish government. However making central bank credit very accessible, when buying government bonds seem to be one of the few relatively safe options for commercial banks, plays the same role. That way NBP can finance public debt indirectly by making credit accessible for commercial institutions when there is an increase in public spending.

³ A. Orphanides, *Monetary policy rules, macroeconomic stability and inflation: a view from the trenches*, Division of Monetary Affairs, Federal Reserve Board of Governors 2001, p. 29.

⁴ *The New Monetary Policy*, ed. P. Arestis et al., University of Cambridge 2005, UK, p. 153.

Policies increasing liquidity by increase of reserve money can be efficient tool preventing recession only when some conditions are fulfilled. First of all there has to be demand in the economy for extra money and this additional money has to be efficiently used financing additional, rational spending and growth. It is extremely difficult to be secured at central bank level. If it is not then the increase in reserve money is “not consumed” by real sector. Statistical equivalent of such situation is the decrease of money multiplier, when additional increases in reserve money can not cause such changes in overall amount of money. That way the additional amount of monetary base ends in higher “voluntary” reserves of financial and real sectors (so also the rate of cash in circulation increases).

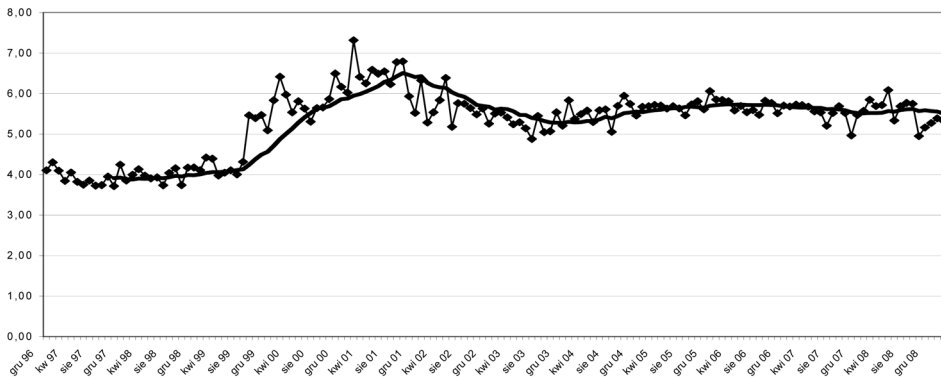
To summarize – the stable or increasing money multiplier accompanying the increases in reserve money is a sign, that there is not a serious and overall problem of liquidity in the economy. Decreasing money multiplier can be a sign of such liquidity problems, most probably with roots in the commercial financial sector. These problems should be solved by central bank action. However if the crises has already spread into real economy then such actions can be insufficient and even the increase in reserve money will be just mirrored by further decrease in money multiplier, with limited real effects.

3. Money multiplier in Poland 1996-2009

Money multiplier for Poland was calculated for aggregate M3. This aggregate was chosen because starting from March 2002 wide definition of money (M3) became the basic analytical and communication monetary category for Poland⁵. Years starting December 1996 onward were analyzed to include in the research volatile years of slow down after 1997, sterilization policy accompanying reduction of obligatory reserves in April 2000, Polish stagnation years 2000-2002 as well as the rapid development that followed. The level of money multiplier for any given month and its moving 12 month average are presented by Schedule 1.

There are two periods of relatively stable multiplier and one very volatile. The multiplier was stabilized until end of 1999 at about 4, and then stabilized again after 2004 at higher level of 5,6-5,8. In the meantime it increased very rapidly in 2000 and 2001, with levels surpassing 7 and average reaching 6,5. The basic cause of this increase seems to be related to slowdown of Polish economy accompanied by extraordinary decreases in central bank reserve money. This was the time of huge NBP sterilization operation directed at preventing higher inflation when decreasing the obligatory reserves rate. This operation deprived Polish economy of huge amounts of cash, when liquidity thirsty economy caused higher rates of money creation (this was made easier by lower obligatory reserves). Unfortunately the inflation also speeded up (from 7 to 10%), what forced NBP to continue restrictive policy. These

⁵ www.nbp.pl.



Schedule 1. Money multiplier (M3), Poland 1996-2009 (monthly level and 12 month moving average)

Source: own compilation based on www.nbp.pl, `miarypieniadza_nowe.xls`, as on April 2009th.

factors are probably responsible for the fact, that money multiplier kept increasing until the end of 2001.

When monetary conditions stabilized and NBP policy became more relaxed, then the multiplier started to decrease. After it the multiplier stabilized on much higher level than before the crises, what probably reflected the development of Polish financial sector and higher demand on “electronic” money.

What is most important for current situation, it is the relatively weak decrease in money multiplier during present crises. The multiplier stays from mid 2008 under its 12 month average, however the gap is not extraordinary. It suggests lower money creation by financial sector, however the present crises looks much less dramatic than the last one (at least until February 2009). Another important difference is that in the stagnation of 2000-2002 the monetary conditions created by NBP were potential cause, among others, of the slowdown of the Polish economy. This time the story looks quite different, when NBP is increasing system liquidity with real sector and commercial banks unwilling or unable to absorb this extra stimulus.

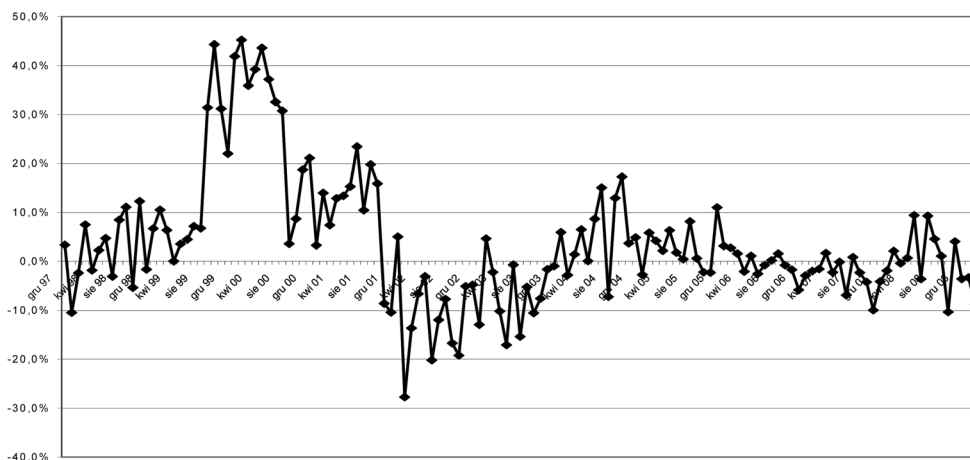
However once more it has to be underlined that the whole disturbance is relatively weak and inconclusive, without any serious deviation from the medium term trend.

4. Changes of reserve money and money multiplier

Now, for more detailed evaluation, the changes in money multiplier are analyzed. The change which occurred in a given month was calculated against the same month of the previous year. The results are summarized in Schedule 2. The results of research based on the level of money multiplier have been confirmed, with even

more striking comparison of present changes and the changes of money multiplier during the crises at the very beginning of this century.

The changes observed in 2008 and first two months of 2009 are much stronger than in years 2006-2007, however years 2006-2007 were very stable. When any earlier year is added to comparison, one has to conclude, that until end of February 2009 the money multiplier was still relatively stable, showing only weak pressure down.



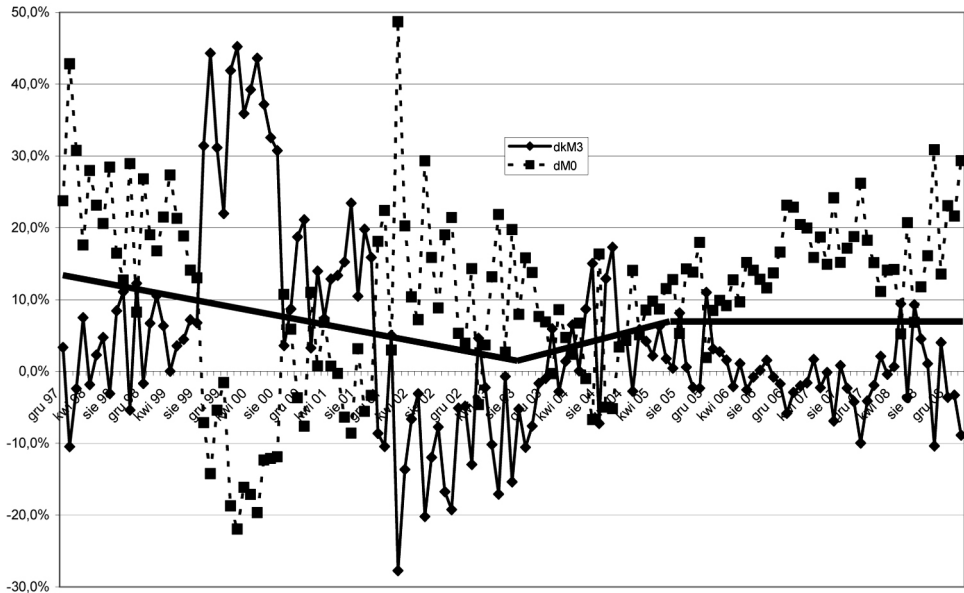
Schedule 2. Changes in money multiplier (M3), monthly based, against the same month of previous year, Poland

Source: own compilation based on www.nbp.pl, [miarypieniądza_nowe.xls](#), as on April 2009th.

To properly evaluate analyzed variable one needs to add the monetary base to the equation. It should let us to tell more about the causes of money multiplier changes and its impact on overall liquidity of Polish economy.

Analyzing Schedule 3 it is clear that at the end of 2008 Polish economy was supplied with the highest increases of monetary base for almost last 7 years. Currently observed increases are among the highest three in the whole researched period. So – opposite to years 1999-2000 – this time NBP is primary source of additional liquidity in Polish economy.

However the most interesting result is the mirror effect between money multiplier and reserve money. There is symmetry between both variables, with sharp increases in reserve money resulting in sharp decreases of money multiplier and opposite. Therefore the symmetry line was approximated and added to Schedule 3. This symmetry line can be treated as “neutral” rate of growth of reserve money. Neutral growth rate seems to be changing from time to time, and can be defined as rate which is securing economy with amount of cash sufficient for proceeding all real transactions. If the actual rate of M0 growth is higher (lower) than neutral, then

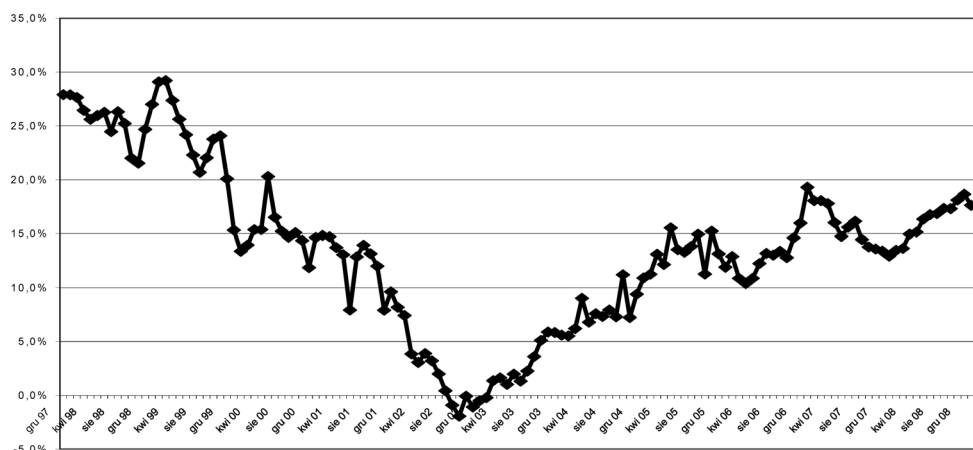


Schedule 3. The kM3 and M0 changes, against the same month of previous year, Poland (the wide line is approximation of symmetry line for both variables)

Source: own compilation.

the over liquidity (under liquidity) is compensated by decreases (increases) of money multiplier. So the short term variations of M0 growth are mirrored in opposite changes in money multiplier, influencing the liquidity of an economy. That way the recent decreases in money multiplier are rather reaction on higher than usual increases of reserve money “pumped” into economy by NBP (reaching even 30% on a yearly basis), then the sign of deepening crises itself.

To create better picture of monetary conditions in Poland the overall measure of liquidity has to be added. Those are the changes of M3. This variable is of special interest as the “neutral” rates of M0 and money multiplier growth are positive, culminating in the growth of M3 and liquidity. However with the crises reducing growth potential of Polish economy, one can expect the reduction of “neutral” rate of reserve money growth (what is not yet observed with stable symmetry line at 8% or above) and much quicker – caused by multiplier effect – reduction of M3 growth rate. This is not the case observed (Schedule 4). The wide money supply in Poland is growing at the rate of about 18% yearly, after slowing down to about 13% in 2007. Anyway there is no sign of lack of overall liquidity in Poland, and the money supply growth looks healthy, especially when compared to end of year 2002, when combined decrease of reserve money and multiplier growth rates caused absolute decreases in M3.



Schedule 4. Polish M3 changes, against the same month of previous year

Source: own compilation based on www.nbp.pl, miarypieniądza_nowe.xls, as on April 2009th.

It is worth to remember that this was the time, when Polish unemployment reached almost 20% and Polish economy was for the second consecutive year in stagnation.

The present monetary data shows, that current crises is (yet?) by no means as deep as one observed at the beginning of this century. It can result from relatively early stage of crises in Poland (it can be just starting to “bite”), active NBP policies directed at securing liquidity in the economy, rapid depreciation of zloty, helping exporters. In the overall picture it confirms quite healthy condition of Polish economy, what can be source of optimism for our ability to deal with crises. On the other hand research clearly shows limits of increasing liquidity by rapid increases of reserve money. Such stimulus is usually lost in decrease of money multiplier caused by inability of economic agents to use additional cash efficiently.

5. Conclusion

Evaluating the results of research it is visible, that there are almost no signs of monetary or liquidity crises reaching Polish economy. NBP creates conditions for growth of money, commercial banks are able to exploit these conditions creating liquidity and the real side of economy is able to absorb this money at the rate of growth of 18% on a yearly basis.

The situation now is much better now than in the years 1999-2002, when the neutral rate of M0 growth deteriorated in the medium term, with negative changes in amount of reserve money resulting, in the end, in decrease of wide money supply, stagnation of Polish economy and record high unemployment.

However we have to remember that crises in Poland is on the early stage yet and monetary conditions can deteriorate, especially if the global conditions force real economy to stagnate, or even cause recession. For more deep rooted conclusions many more variables should be researched, including central bank and money market interest rates, credit growth and access to credit, structure of money supply including M1 and M2 measures. However such research would be out of the limits of this article. At this stage it is worth stressing, that Polish economy still has the chance to pass through the crises years in relatively good condition and this time NBP and monetary conditions are among factors protecting Polish economy against global problems.

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ZMIANY MNOŻNIKA KREACJI PIENIĄDZA W POLSCE W LATACH 1998-2009

Streszczenie

W artykule poddano analizie i oceniono zmiany mnożnika kreacji pieniądza w Polsce. Wpierw przedstawiono zagadnienia teoretyczne związane z tą kategorią ekonomiczną. Następnie porównano bieżące zachowanie badanej zmiennej z danymi historycznymi w poszukiwaniu zakłóceń, które mogłyby świadczyć o nadchodzącym kryzysie. Na podstawie przedstawionych danych stwierdzono, że obserwowana zmienność nie pozwala zidentyfikować zjawisk towarzyszących zwykle recesji, co wskazuje, iż sytuacja polskiej gospodarki w końcu lutego 2009 była znacznie lepsza niż w czasie poprzedniej stagnacji z lat 2000-2002. Tym razem NBP podjął działania dla zapewnienia gospodarce płynnych środków, a podmioty gospodarcze są wciąż w stanie skutecznie absorbować te dodatkowe fundusze.