Money multiplier, demand for loans and broad money:
a comparison between post-crisis United States and early 1920s Germany

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Abstract

After the Lehman crisis, in the United States the monetary base has increased dramatically, while broad money and inflation have risen to a modest extent. There is broad consensus that this is due to the significant decrease in the money multiplier. In most papers, including Cukierman (2017), this decrease is due to the limited availability of banks to provide credit given the stringent regulatory constraints to which they are subject. Here it is argued, instead, that the fall of the money multiplier is due to the profound reduction in the demand for loans from the private sector. The different trend of this demand explains why, with the same growth of the monetary base, the money multiplier increased in Germany between 1921 and 1922 and decreased in recent years in the United States.

Introduction

In a paper published recently in this journal Cukierman (2017) analyses the reasons why the essentially analogous growth of the monetary base that took place in Germany between the end of 1920 and September 1922 and in the United States between September 2008 and September 2014 had very different repercussions on the rate of inflation in the two countries in question.

Between September 2008 and September 2014, when it reached its peak, the total monetary base in the United States rose by 435 per cent. On the other hand, the growth of prices in the U.S for the same period was 11.1 per cent (Figure 1). Also in Germany between December 1920 and September 1922 the monetary base increased by around 435 per cent, albeit during the same period there was a 1050 per cent increase in prices.

Cukierman attributes these different effects not so much to the different trend taken by the multiplier as to the different channels for creating the monetary base set up in the two countries in the two periods under consideration. While in Germany the significant increase in the monetary base resulted from the Treasury's need to cover enormous state deficits and thus entered directly into the production process, in the United States it stemmed primarily from the liquidity

introduced into the banking system. In this latter case, then, it was able to enter into circulation in the economy through the credit activities of the banks. Due in part to the stringent requisites for liquidity and capital introduced under Basel III, these banks were reluctant "… to use the huge increase in banks' reserves (due to QE) to expand credit …".[1]

This paper seeks to demonstrate that the various effects on prices of the analogous growth of the monetary base in Germany in the early 1920s and in the United States after the Lehman crisis can be largely traced back to the demand for banking credit and its repercussions on the banking multiplier.

1. Money multiplier and money creation

Handbooks usually expound the process of money creation through the traditional fractional reserve theory of banking. According to this theory, the total amount of deposits and loans is determined by the central bank's decision regarding the quantity of reserves. Since the multiplier is fixed, an increase (reduction) in reserves leads to an increase (reduction) in the quantity of deposits and loans. In this context, therefore, for banks the availability of reserves represents a constraint on the total amount of loans distributed. The central bank thus controls the quantity of money by deciding on the total amount of bank reserves.[2] On this last point, however, it needs to be pointed out that for some time the majority of central banks follow objectives regarding the interest rate rather than the quantity of reserves or money. Among other things, this decision is based on the ever more unstable relationship between reserves and loans in that the processes of securitization and financial globalization allow the banks various ways of obtaining liquidity. In this context, therefore, the LM is flat.[3] Therefore, in this monetary framework, the causal connection between deposits and loans seems to run from the latter to the former rather than the other way round. The banks create deposits by distributing credit and vice versa. As McLeay et al. (2014; p. 3) write: "Commercial banks create money, in the form of bank deposits by making new loans". The demand for reserves, therefore, is the consequence and the cause of the distributed credits.[4]

The creation of money by the banks is thus conditioned first and foremost by:[5]

  i.   Their propensity to distribute loans;
  ii.   The demand for loans;

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[1] See Cukierman (2016).

[2] For a detailed discussion of this approach and its critical points, see Benes and Kumhof (2012).

[3] See Romer (2000). The quantity of money can be considered endogenous.

[4] See Disyatat (2011), McLeay et al. (2014) and Werner (2014).

[5] See Tobin (1963) and McLeay et al. (2014).

iii.   The demand for deposits.

Point *i.* means that the distribution of loans by banks is conditioned not only by assessments of profitability and the risk of operating loans but also by regulatory constraints.[6] These have become particularly important since the Third Basel Accord on Banking Supervision (or Basel III),[7] the result of which has been the reinforcement of capital requirements on banks (CAR) and the introduction of the Liquidity Coverage Ratio (LRC) requirement and the Leverage Ratio (LR) requirement. An increase in LCR has similar effects to those produced by an increase in the required reserve ratio. Conversely, an increase in CAR weakens the positive effects on the multiplier of the loans granted by commercial banks. Lastly, to the extent that they impact on the remuneration of deposits, both LCR and CAR, when stringent, increase the costs of banks' intermediation, leading to a substitution of deposits with cash and in this way reducing the money multiplier.

Among contributing factors to variations in the money multiplier are not only the behaviour of banks but also the behaviour of individuals, in particular their demand for bank loans (point *ii.*) and deposits (point *iii.*). Both the demand for deposits and for loans depend on the stance of monetary policy and the behaviour of the banks.

The demand for deposits is influenced by the level of transactions and the preference for liquidity on the part of individuals. The demand for loans, on the other hand, depends not only on their cost but also on the financial needs of companies and households. These needs, moreover, are significantly conditioned by the demand for investments and the financial equilibrium of the private sector.

2. Multiplier and money creation in the United States after 2008 and in Germany in the early 1920s

The difference in the trend of the inflation rate in the face of an analogous growth in the monetary base that occurred in Germany in the early 1920s and in the United States after the collapse of Lehman Brothers has to be tracked back to different tendency of individuals' demand for loans.

In early 1920s Germany firms' demand for lending was extremely high. The causes of this were twofold. Firstly, the high rate of inflation that emerged in Germany in the period immediately after the First World War in itself implied a growing demand for liquidity on the part of firms. Indeed, they had to obtain from the banking sector the resources necessary to pay for ever-rising salaries

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[6] See, among others, Farag *et al.* (2013).

[7] See Basel Committee on Banking Supervision (2017).

and to buy raw materials and capital goods at increasing prices due to the depreciation of the mark. Secondly, given the high rate of inflation, on annual average about 149 per cent for the three-year period between 1919 and 1921, it was in the interest of firms to set themselves up as net debtors, so as not to risk capital losses. As Prion (1924; p. 172) writes: "The realization that in times of continuous currency depreciation firms suffer losses on outstanding claims but reap gains from the debts they owe led them to exploit the possibilities this opened up … As the inflation progressed the foremost business maxim became to borrow as much credit as was obtainable but to offer no credit at all to others, or at least to keep outstanding claims on others in strict proportion to the credit one's own firm had received … Eventually, as everybody's prime objective became the exploiting of all available credit opportunities, commercial banks and the Reichsbank became 'lent up' and people began to talk about a 'credit crisis'.

Table 1 shows that, at a time of high inflation, the share of savings deposits as a percentage of total deposits was gradually falling. Between 1920 and 1922 it fell from 51.4 to 6.1 per cent.[8] This process led to a rarefaction of the liquidity of the system.

Table 1 – Money and money multiplier in Germany: 1920-1924

	1920	1921	1922	1923	1924
Deposits in all commercial banks (a)	83891	154989	2216067	1481019370	4977
Saving deposits (b)	43100	46500	136180	-	-
Total money in circulation (c)	81388	122500	1295231	2274000000	3891
a/c	1.03	1.27	1.71	0.65	1.28

Source: Graham (1930).

This gave rise to a credit crisis which risked having severe repercussions for the real economy. Faced with this risk, in the summer of 1922 the Reichsbank started to significantly expand its commercial bills discount activities.[9] The impact of these operations on the total number of banknotes in circulation, which in June stood at 2.6 per cent, rose in December of the same year to 32.6 and increased further during the course of 1923.[10]

[8] See Graham (1930; p. 63-64).
[9] See Feldman (1997; p. 584).
[10] See Graham (1930) and Bresciani-Turroni (1937).

The enormous growth in bank credit and the accommodating behaviour of the banks and the central bank meant that in Germany in the early 1920s the monetary multiplier increased (Table 1)[11] at the same time as an increase in the monetary base.

3. Demand for credit and the money multiplier in the United States

In contrast to what happened in early 1920s Germany, in the United States between 2008 and 2014 the reduction of the monetary multiplier, as shown in Figure 1, was to a large extent due to the significant increase in commercial banks' excess reserves (Figure 1).

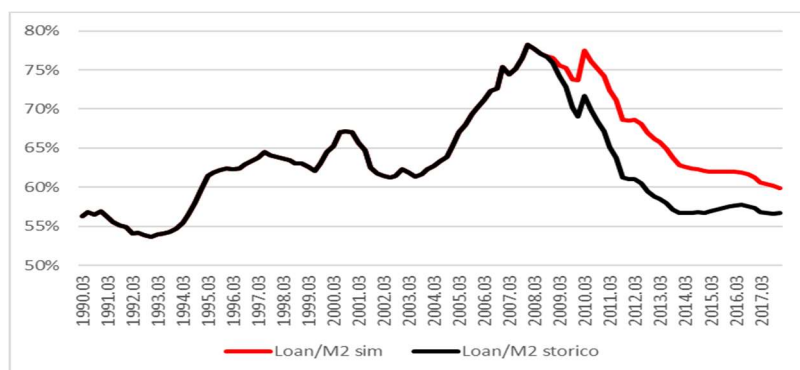Figure 1 – Monetary indicators in the US
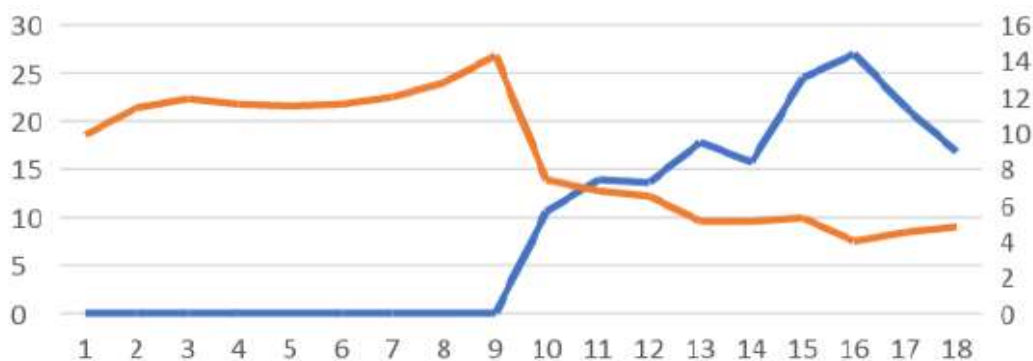
Source: FRED, Economic Data. Legenda: __ Ratio of excess reserves of depository institutions __ Ratio of Broad Money to Monetary Base

This increase corresponds to a contained growth in bank credit. As can be seen from Figure 2, between 1995 and 2004 the relationship between bank loans and M2 (which we will call *loan multiplier*) remained stable at around 61-62 percentage points. From 2005 until the end of 2007 this multiplier increased considerably and continuously until it reached a peak of 78 percentage points. In the same way as the growth of the loan multiplier between 2005 and 2007 proved to be rapid and substantial, equally rapid and impressive was its subsequent fall: between 2008 and the beginning of 2014 the relationship Loan/M2 fell from 78% to 57%, a value that was confirmed in the following years and re-established the levels of the early 1990s (Figure 2).

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[11] "Taking as a base the 1913 ratio of 'Kreditoren' deposits to total money in circulation, the percentage figures for later years were as follows: 1920, 148%; 1921, 164%; 1922, 341%; 1923, 276%". See Graham (1980; p. 68).

Figure 2 – The loan multiplier

As has already been pointed out, various academics see this fall as primarily due to supply factors, like the tightening up of banking regulations[12] or the low opportunity cost of holding reserves.[13] This explanation fails, however, to take into account the trend in the demand for banking credit. After the 2008-2009 crisis, the net lending or borrowing (-),[14] in the private sector as a share of GDP fell substantially (Figure 3). This variable can be assumed as a proxy of the private sector's need of financial resources and of banking loans.

Figure 3 – Net lending or borrowing (-) (percentage of GDP)

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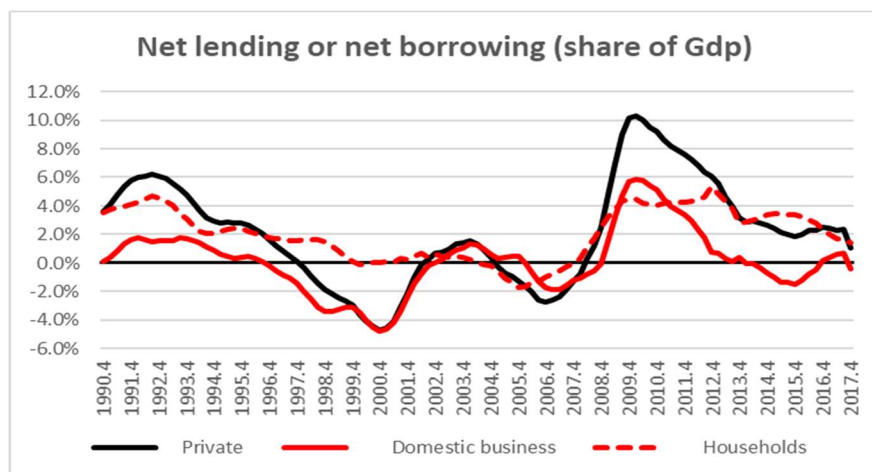
[12] See, among others, Cukierman (2016; 2017).
[13] See, among others, Williams (2012) and Selgin (2017).
[14] Net lending/borrowing is equal to gross saving (profit – dividends) minus investment.

This fall is due to the fact that after the Lehman collapse both households and businesses greatly deleveraged.[15] Households were induced to do so by the need to correct the excessive leverage accumulated in the years prior to the 2008-09 crisis. Conversely, deleveraging by companies seemed to be due less to an effort to achieve financial re-equilibrium than to the weak demand for investment. It is plausible to maintain that the improvement in the financial condition of American households and businesses had a reductive effect on their demand for loans.

In order to test this hypothesis an estimate was made of the demand for bank credit on the basis of a quarterly database covering the period between the first quarter of 1991 and the fourth quarter of 2017. The model used is an Error Correction Model (ECM) which links loans to the private sector with GDP, the opportunity cost of lending and the individual's self-financing capacity. In this model short- and long-run coefficients are estimated simultaneously: to put it briefly, we use a one-step procedure ECM.

The variables used in the equation are the following:

- loans, the loans to the private sector in real terms;
- GDP, the GDP in real terms;
- NL/GDP, the net lending of privates as a percentage share of GDP;
- r_L-r_T, the differential between the interest rates on loans and on Treasury bills in real terms.

    All the variables, except NL/GDP, are expressed in logarithm.

Table 2 – Demand for bank loans by the private sector

Variable	Coefficient	Std. Error	t-statistic	Prob.
Loan(-1)	-0.053	0.021	2.55	1.2%
GDP(-1)	0.079	0.031	2.60	1.1%
NL/GDP(-1)	-0.128	0.040	3.18	0.2%
Δ (NL/GDP)	-0.404	0.204	1.98	5.0%
Δ (r_L-r_T)	-0.007	0.002	3.95	0.0%
ΔLoan(-1)	0.186	0.071	2.62	1.0%
C	0.423	0.167	2.54	1.3%
R^2-Adj	0.71			
S.E. regression	0.0081			
N. Obs.	108			

Notes: Dependent variable ΔLoan. Sample 1991Q1-2017Q4.

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[15] See, among others, Lavender and Parent (2013).

The results of the estimates given in Table 2 show that all the explanatory variables have the expected sign and are significant. Aside from the coefficients, it is important to note that the stability tests of the equation show how the specification requested is able to adequately explain the dynamics of the banks' loans both before and after the great financial crisis. Both the Cusum and Cusumq tests show how the recursive residuals are consistent with the standard regression errors. Again in relation to the results of the estimate, for the purposes of the hypothesis put forward in this contribution, it is relevant to note that the financial balance of individuals influences the demand for bank loans both in the long and the short term: corresponding to a higher positive financial balance there is a lower demand for bank loans.

With the aid of the estimate in Table 2 we are able to assess the extent to which the improvement in the net lending or borrowing of firms and households reduced their demand for credit. To do this we carried out a counterfactual simulation in which the assumption was made that after the global financial crisis there was no improvement in the net lending or borrowing of the private sector: therefore, starting from the first quarter of 2008 the value of NL/GDP was set at an average value for the period 1990-2007. The comparison between the effective data (the black line) and the result of this simulation (the red line) suggests that the improvement in the financial state of the two sectors after 2008 was responsible for a 13 % reduction in the stock of investments at its highest point (end of 2012) and that at the end of 2017 this reductive effect could be assessed at around 6 percentage points.

As can be seen from these figures, if the effects of improving the balance sheets of companies and households are eliminated, the multiplier curve goes up to a significant extent but not such as to reverse the process of reduction described by the historical data. The differential between the two multipliers reached its peak at the end of 2012 with a value of 7.5 percentage points, and then the gap was reduced to 3.2 percentage points by the end of 2017. However, at the end of the period under consideration the credit multiplier reverted to the values of the decade before the credit bubble, and not yet to the low values of the early 1990s.

Conclusions

The different repercussions on price dynamics of similar increases in the monetary base in Germany in the early 1920s and in the United States after the Lehman collapse seem to be significantly linked to the different trend in demand for loans. While this demand was very high in Germany, in part due to growing inflation, it proved to be contained in the United States after

2008 as a result of marked deleveraging by households and companies. The different trend in credit demand had an influence on the level of the money multiplier, which fell significantly after 2008 in the United States while increased in Germany between 1920 and 1922.

References

Adrian T. and Liang N. (2014), Monetary policy, financial conditions, and financial stability, Federal Reserve Bank of New York, Staff Report no. 690.

Basel Committee on Banking Supervision (2017), Basel III: finalizing post-crisis reforms, Basel, BIS.

Benati L. and Ireland P. (2017), Money multiplier shocks, Boston College, Department of Economics, Working Papers in Economics, no. 933.

Benes J. and Kumhof M. (2012), The Chicago Plan revisited, IMF, working paper no. 12.

Bresciani-Turroni C. (1937), The Economics of Inflation: A Study of Currency Depreciation in Post-war Germany, London, Allen & Irwin.

Brunner K. And Meltzer A. (1990), Money supply, in Friedman B. and Hahn F. (Eds), Handbook of Monetary Economics, Amsterdam, Elsevier.

Cagan P. (1956), The monetary dynamics of hyperinflation, in Friedman M. (ed), Studies in the Quantity Theory of Money, Chicago, University of Chicago Press.

Carpenter S. and Demiralp S. (2012), Money, reserves, and the transmission of monetary policy: does the money multiplier exist?, Journal of Macroeconomics, 34, 59-75.

Chari V., Dovis A. and Kehoe P. (2014), On the optimality of financial repression, Federal Reserve Bank of Minneapolis, Research Department Staff Report 1000.

Cukierman A. (2016), The political economy of US bailouts, unconventional monetary policy, credit arrest and inflation during the financial crisis, CEPR Discussion Paper 10349.

Cukierman A. (2017), The behavior of the money multiplier during and after the subprime crisis: implications for the transmission mechanism of monetary policy, CEPR Discussion Paper n. DP 12490.

Cukierman A. (2017), Money growth and inflation: Policy lessons from a comparison of the US since 2008 with hyperinflation Germany in the 1920s.

ECB (2011), The supply of money, bank behaviour and the implications for monetary analysis, Monthly Bulletin, October, 63-79.

Elliott D. (2010), Quantifying the effects on lending of increased capital requirements, Brookings Institution working paper no. 7.

Farag M., Harland D. and Nixon D. (2013), Bank capital and liquidity, Bank of England Quarterly Bulletin, 53, 201-215.

Feldman G. (1997), The Great Disorder, Oxford, Oxford University Press.

Friedman M. and Schwartz A. (1963), A Monetary History of the United States, 1867-1960, Princeton, Princeton University Press.

Furman J. (2015), Business investment in the United States: facts, explanations, puzzles, and policies, Speech delivered at the Reviving Private Investment Forum of the Progressive Policy Institute, Washington.

Graham F. (1930), Exchange, Prices, and Production in Hyper-inflation Germany, 1920-1923, Princeton, Princeton University Press.

Holtfrerich C. (1986), The German Inflation, 1914-1923, Berlin, Walter de Gruyter.

Kopecky K. and Vanhoose D. (2004), A model of the monetary sector with and without binding capital requirements, Journal of Banking and Finance, 28, 633-646.

Lavender B. and Parent N. (2012), The U.S. recovery from the Great Recession: a story of debt and deleveraging, Bank of Canada Review, 13-26.

McLeay M., Radia A. and Ryland T. (2014), Money creation in the modern economy, Quarterly Bulletin, March 14.

Romer D. (2000), Keynesian macroeconomics without the LM curve, in "Journal of Economic Perspectives", 14, 149-169.

Selgin G. (2017), Testimony before the U.S. House of Representatives Committee on Financial Services Monetary Policies and Trade SubCommittee, hearing on "Monetary Policy vs. Fiscal Policy: Risks to Price Stability and the Economy", July 20, 2017.

Tobin J. (1963), Commercial banks as creators of money, Cowles Foundation Discussion Paper no. 159.

Xiong W. and Wang Y. (2017), The impact of Basel III on money creation: a synthetic analysis, Kiel Institute of the World Economy (IFW), Economic Discussion Paper no. 2017-53.