Monetary Targeting revisited

Florian Kern, Philippa Sigl-Glöckner, Max Krahé
Florian.kern@dezernatzukunft.org

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Executive Summary

Central banks define a monetary policy strategy in which they set out the instruments they use to achieve their monetary policy objectives as well as the incoming data they take into account when using these instruments. Independent central banks in particular are expected to provide a detailed and comprehensible explanation of their monetary policy strategy, since the absence of direct democratic legitimation comes along with particular accountability requirements.

Since the end of the Bretton Woods system, both the Federal Reserve Bank (Fed) and the Deutsche Bundesbank, and later the European Central Bank (ECB), have made significant changes to their monetary policy strategy. In the 1970s, both the Bundesbank and the Fed pursued, at least officially, a monetary targeting strategy. We explain the analytical fallacies that underlay this strategy and the ideological assumptions that paved its way into practice. It is still unclear why a framework that is incoherent even at the theoretical level has been upheld for so long. It is conceivable that path dependency and a negative error culture played a role. Accordingly, we propose an evaluation of monetary policy strategy and its changes since 1973 with the aim of identifying and remedying relevant institutional weaknesses. The evaluation should also aim at clarifying whether monetary targeting resulted in institutional choices that continue to prevent monetary policy from achieving the Union's stated objectives in an optimal manner to this day. Considering that the quantity theory of money underlying monetary targeting is also propagated by supporters of cryptocurrencies, who use it specifically to attack the legitimacy of central banks, a reappraisal of the theory should also help to strengthen trust in central banks and reduce the damage caused by cryptocurrencies.

#MONETARY POLICY
#MONETARY TARGETING
#INTEREST RATE TARGETING
#INFLATION TARGETING
#RESERVE POLICY DOCTRINE

1. Managing money supply vs. interest rates - why the monetarists are wrong

The implementation of monetary policy in Europe and the United States has undergone a significant revolution over the past 50 years. From the mid-1970s onward, both the Bundesbank in Germany and the Federal Reserve Bank in the USA adopted a monetarist understanding of monetary policy, at least outwardly. Specifically, it has at times been argued that the central bank should exert its influence on the price level not primarily through the definition of an economically-desirable interest rate, but through the choice of an economically-desirable supply of central bank money. This view, which was brought into central banks from certain parts of academia, was already at odds with the experience of central bank practitioners at the time.[1] Accordingly, it is remarkable how long it has taken central banks and academics to revise this incorrect understanding of how monetary policy operates, and how many publications appeared in which this incorrect understanding was not only propagated but even sometimes presented as empirically grounded. Even today, arguments based on monetarism, i.e. the idea that the (central bank) money supply determines the price level, as well as its flawed assumptions, can still constantly be found in the media, in textbooks, and even in policy recommendations, making the topic still relevant to this day. In this section, we explain where monetarism got things decisively wrong.

1.1 The monetarist fallacies

Monetarism was most popular in the 1960s and 1970s, when it was most decisively pushed by Milton Friedman. It was based on the quantity theory of money as previously described by Irving Fisher in 1922. According to Fisher, the price level stood in direct relation to the supply of central bank money. The theory can be summarised by the well-known quantity equation "P*Y = M*V", which shows that gross domestic product (Y) at current prices (P) is equal to the product of "money supply" (M) and "V", where "V" is often referred to as the "velocity of money in circulation". The quantity equation describes an identity that is always true.[2] Prices, gross domestic product and money supply are measured, and the variable "V" is then obtained by definition by dividing the gross domestic product valued at current prices by the chosen metric for money supply.

In academia, theories are used to gain insights on reality. A gain in insight from the quantity equation can only be obtained if the variables in the equation are independent of one other. Only once the determinants of the individual variables have been defined can empirically-testable hypotheses be used to determine whether the posted relationships are descriptive of reality. To illustrate: one could say, for example, that the total points (P) a football club achieves per season (S) are equal to the product of the number of its players (M) and its scoring efficiency (E). The equation "P*S = M*E", which we could call the "efficiency theory of football", would then always be true by definition. However, it would not provide us with any particular insight, because scoring efficiency is not an independent variable. If the club were to have twice as many players in the following year, we would not expect a doubling of points per season, but instead a decrease in "scoring efficiency". This picture is the same for the quantity equation.[3]

1 cf. Bindseil, U. (2004), "The operational target of monetary policy and the rise and fall of reserve position doctrine", Working Paper Series, No 372, ECB, Frankfurt am Main, June. Available at SSRN 533132.

2 Fisher himself speaks of a "truism". cf. Fisher, I. (1922). “The purchasing power of money: its determination and relation to credit interest and crises”. Second Edition, Macmillan, New York, p. 91.

3 A very good classification of quantity theory can be found in Gebauer, W. (2004). “Geld und Währung“. Bankakademie-Verlag, p. 171ff.

Simply put, the quantity equation assumes that the price level functions like a balloon that is inflated by additional money. The term "inflation" itself goes back to the Latin *inflatio* (“to inflate”), which similarly reinforces this impression. Just as the efficiency theory of football assumes a supposed (but non-existent) independence between team size and scoring efficiency, the quantity theory of money assumes a non-existent independence between money supply and the "velocity of circulation". Figure 1 shows, as the purchase programs after the financial crisis strikingly illustrated, that the "velocity of money" is not an independent variable. When the Fed began purchasing bonds on a large scale in 2008, thereby introducing more central bank money, the velocity of money in circulation collapsed. Prices have not inflated due to the existence of "more money", just as more players on a football team do not automatically make for more points. Contrary to what Fisher[4] argued, the increase in the money supply did not lead to a rise in the price level, but to a fall in the velocity of circulation. The picture is independent of the choice of the monetary aggregate.[5]

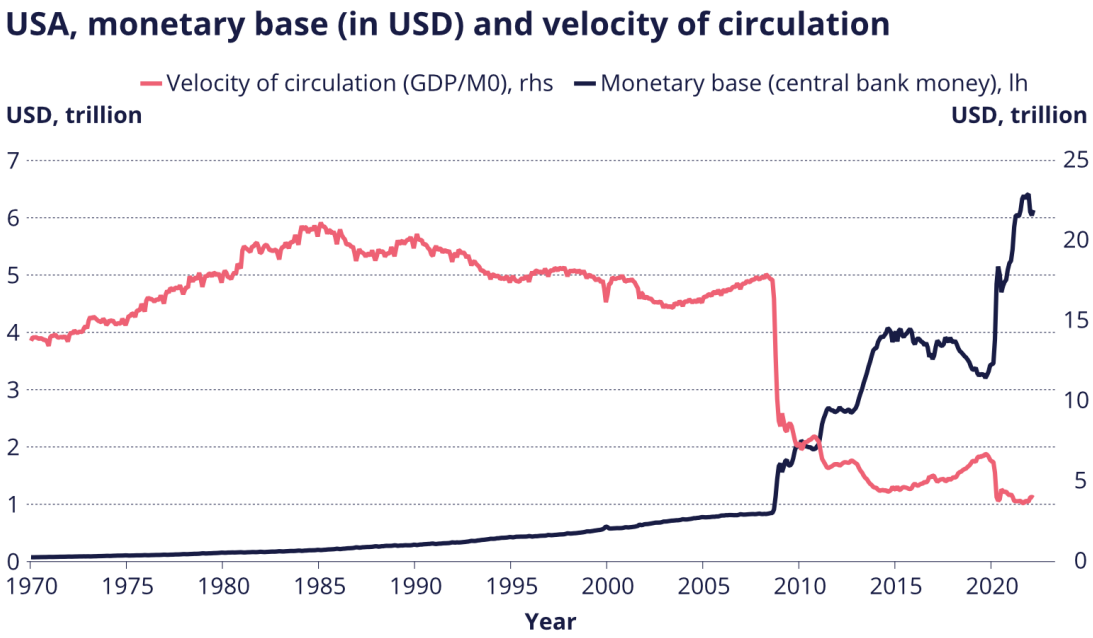


Figure 1: USA, Geldbasis (in USD) und Umlaufgeschwindigkeit; **Source:** Macrobond, Fed, BEA

4 cf. Fisher, I. (1922). „The purchasing power of money: its determination and relation to credit interest and crises”. Second Edition, Macmillan, New York, p. 149.

5 The M2 money supply shown in Figure 2 mainly comprises central bank money (cash and coins) held by non-banks as well as daily available account balances held by non-banks at commercial banks.

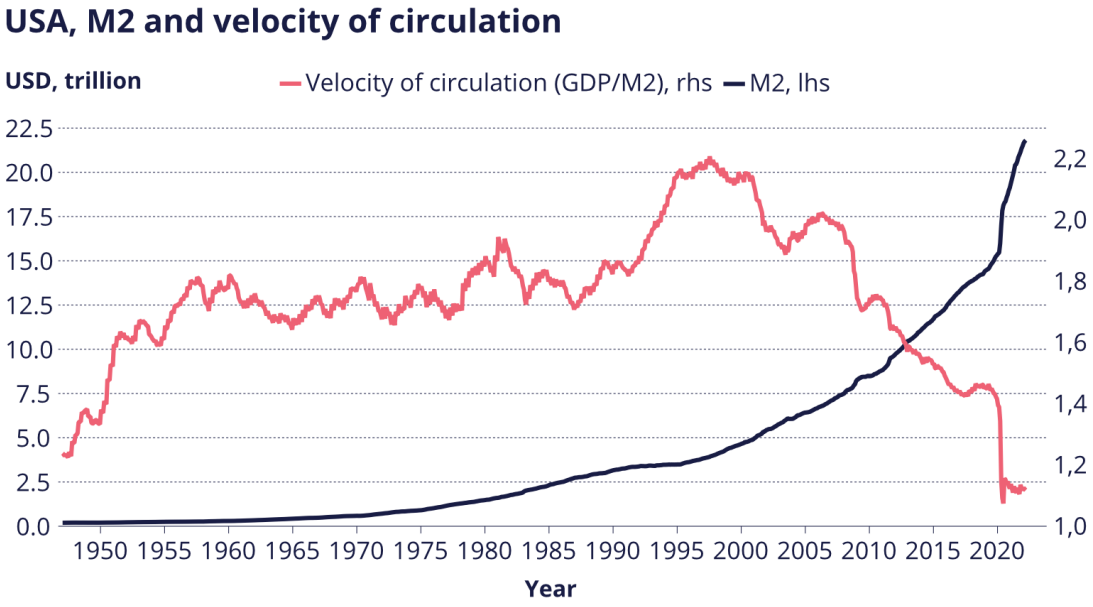


Figure 2: USA, M2 and velocity of circulation; **Source:** Macrobond, Fed, BEA, IMF, TCB

What really matters

Prices are not determined by the money supply, but by supply and demand. The prices of consumer goods, which central banks seek to influence through monetary policy, are determined by the supply of and demand for consumer goods. For example, if companies become more productive, or if production capacities increase due to globalisation, supply increases (to name just two possible influencing factors). If disposable income rises due to e.g. higher wages or lower taxes, then demand increases. The money supply, or its rate of change, only affects the price level if it causes demand to rise or fall. In other words: inflation does not occur when too much money meets too few goods, but when the demand (willingness to pay) is bigger than the supply of consumer goods.

1.2 The money multiplier

The monetarists also knew that the prices move according to supply and demand. Accordingly, it was necessary to find a mechanism through which an increase in the money supply would supposedly lead to an increase in demand.

In "The Role of Monetary Policy" (1968),[6] Milton Friedman wrote in this regard (emphasis ours):

"Let the Fed set out to keep interest rates down. How will it try to do so? By buying securities. This raises their prices and lowers their yields. In the process, it also increases the amount of reserves available to banks, **hence the amount of bank credit**, and, ultimately, the total quantity of money."

Friedman therefore assumed that an increase in reserves, i.e. balances that commercial banks hold with the central bank, must automatically lead to an increase in bank credit. This notion gives rise to a flawed understanding of the banking system and how it works, which we will explain here using the example of a fictitious balance sheet from the fictitious "Dezernat Bank".

6 Friedman, M. (1968). "The Role of Monetary Policy". The American Economic Review, 58(1), p. 1-17.

Use of funds		Source of funds	
Account balance at the Bundesbank	100	Equity	50
Loans	950	Consumer deposits	1000
Total	1050	Total	1050

Table 1: Stylised balance sheet of the Dezernat Bank; **Source:** own visualization

On the right side of the balance sheet, we see the resources and liabilities of the bank. It has 50 units of equity and 50 units of consumer deposits. At the same time, it has an account balance with the central bank ("reserves") in the amount of 100 and has given out loans in the amount of 950. Now, the central bank requires the Dezernat Bank to maintain at least 10 percent of customer deposits in its account at the central bank (the so-called "minimum reserve").[7] If the Dezernat Bank does not fulfil the minimum reserve requirement, the central bank will charge a penalty fee. In our example, the Dezernat Bank has an account balance of exactly 100 and can therefore maintain the minimum reserve. **Monetarists like Friedman, however, wrongly assume that the central bank money supply in the form of the central bank balances of commercial banks is a limiting factor for lending.** According to Friedman, an expansion of the central bank money supply leads to a proportional expansion in credit. To check that claim, let us have a look at the Dezernat Bank's balance sheet after the central bank expands the money supply. Here, the central bank buys 100 units of government bonds from a client of the Dezernat Bank, so the bank credits its customer 100 and receives 100 units of reserves from the central bank.

Use of funds		Source of funds	
Account balance at the Bundesbank	200	Equity	50
Loans	**950**	**Consumer deposits**	**1100**
Total	1150	Total	1150

Table 2: Stylised balance sheet of the Dezernat Bank, monetarist view: situation 1; **Source:** own visualization

The central bank balance of the bank on the left has now risen by 100 to 200, and customer deposits have also risen by 100 to 1100. Given a minimum reserve requirement of "only" 10% and the reserve balance of 200, according to Monetarists the Dezernat Bank could and would issue a total of 2000 in loans (of which the 10% minimum reserve would be 200). The Dezernat Bank would therefore engage in money creation, that is, it would add credit to the client's account balance on the right-hand side of the balance sheet and debit a credit claim against them on the left-hand side of the balance sheet.[8] Its balance sheet would then look like this:

7 The minimum reserve requirement is set by the central bank in order to create an initial demand for central bank money. This was necessary in times when the central bank did not pay interest on reserves. If there had been no requirement to hold reserves at a certain level, banks would have simply held fewer reserves, which - assuming the level of central bank money in the market remained the same - would have led to a drop in interest rates that would be undesirable from a monetary policy perspective.

8 Commercial banks do not need deposits first to be able to lend. They create deposits through lending. Only if the borrower makes a transfer to a client at another bank would the Dezernat Bank need either an account balance at the central bank in order to make the transfer, or a loan (for example, from the receiving bank).

Use of funds		Source of funds	
Account balance at the Bundesbank	200	Equity	50
Loans	**1850**	**Consumer deposits**	**2000**
Total	2050	Total	2050

Table 3: Stylised balance sheet of the Dezernat Bank, monetarist view: situation 2; **Source:** own visualization

Monetarists assume banks will always lend as much as possible given the minimum reserve and their reserve balance with the central bank. However, this is simply incorrect. Multiple factors must come together for a new loan agreement to be concluded between a commercial bank and a consumer. First of all, there must be a borrower who wants to take out a loan on the terms offered and who is also creditworthy in the eyes of the bank. Such borrowers do not pop up out of the blue just because the central bank has provided new central bank money. In addition, in reality regulatory capital requirements restrict lending at a much earlier stage than reserve requirements.[9] With a minimum equity ratio of 5 percent and equity of 50, the Dezernat Bank would be allowed to give out loans in the amount of about 1000 at most. Calculating the maximum possible lending amount implicitly from the level of reserve requirements would be just as nonsensical as determining the number of loan contracts based on the amount of paper in a bank branch - before this theoretical limit takes effect, shortages elsewhere will usually take hold, limiting lending at an earlier stage.[10]

The monetary policy stance is independent of the (central bank) money supply

Prices are determined by supply and demand. The central bank acts on short- and long-term interest rates to influence demand.[11] It is important to understand that the central bank can determine the interest rate independently of the central bank money supply, as long as it provides at least as much central bank money as banks need for payment transactions and for prudential considerations. The Chief Economist of the Bank for International Settlements, Claudio Borio, wrote in 2008:

"Crucially, the interest rate can be set quite independently of the amount of bank reserves in the system. The same amount of bank reserves can coexist with very different levels of interest rates; conversely, the same interest rate can coexist with different amounts of reserves."[12]

1.3 How could academics and central banks be so wrong? An explanation attempt

To be fair to monetarists and central bankers, the situation in the 1970s was particularly messy. The oil crisis meant that oil-importing countries were suddenly faced with rising prices and a drop in demand. This contradicted the common theory at the time that rising prices are always the result of excessively high demand - that an (oil) cartel could raise an (oil) price in a way that the overall price level changed significantly was simply inconceivable prior to the oil crisis. The rising price of oil led to a drop in disposable income after covering heating and transportation costs, which can often hardly be reduced. Lower disposable income meant less demand for other goods and services, which led to layoffs. Stagflation

9 cf. "The role of banks, non-banks and the central bank in the money creation process" (bundesbank.de).

10 Unlike regulatory capital requirements, the minimum reserve in Germany was not a binding lower limit that always had to be met. Instead, the minimum reserve was only to be met on average over a period of a month, and a penalty interest rate was charged for non-compliance. At no time was the minimum reserve in Germany an instrument used to limit credit in the monetarist sense. The fact that the minimum reserve does not restrict lending even today can also be seen in the example of the US Federal Reserve, which has permanently set the minimum reserve to zero.

11 cf. https://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html.

12 Borio, C., & Disyatat, P. (2009). "Unconventional monetary policies: an appraisal", BIS Working Papers 292, p. 3.

resulted, i.e. high unemployment coupled with high inflation, and central banks came under heavy criticism. Unions and employees seeked compensation for real income losses (i.e. income after deducting inflation) by pushing for higher wages, but this only fueled inflation further. All of this took place during a major monetary policy upheaval. The Bretton Woods system, in which the currencies of participating countries were pegged to the U.S. dollar and in which central banks were accordingly unable to conduct independent monetary policy, had just collapsed in 1973.

In this particular situation, monetarism appeared especially attractive. On the one hand, it promised to make inflation more manageable by controlling the money supply. On the other hand, it was an ideological antithesis to the Bretton Woods system, which had only just collapsed. In this system, officials had fixed their exchange rates to the US dollar, with debates repeatedly arising over what the "optimal" exchange rate should be. The monetarists, and Friedman in particular, were ardent supporters of laissez-faire policies that did not presume to know the optimal values of variables (such as exchange rates). Like Friedrich August von Hayek, Friedman believed that technocrats were not any better at knowing how the world ought to be ordered, and that any government intervention in a natural free market order would lead to welfare losses.[13]

While the free market economy proved to be a fundamentally better system compared to the socialist planned economies with their five-year plans drawn up by officials, Friedman's ideals led to a problem in the implementation of monetary policy: he viewed the setting of a specific interest rate level to be similarly intellectually arrogant as setting a five-year plan in which a central committee prescribes what goods should be produced and what projects should be researched in five years.[14] Friedman's misunderstanding of limiting factors in lending and of the effect of monetary policy ultimately led to his erroneous conclusion that the central bank should refrain from attempting to control the interest rate altogether and concentrate on fixing the central bank money supply instead. Ulrich Bindseil, later head of the Directorate General *Monetary Operations* at the European Central Bank, which is responsible for monetary policy implementation, wrote about central bank money targeting in 2004 (reference in square brackets by us):

"It appears that with RPD [reserve policy doctrine], academic economists developed theories detached from reality, without resenting or even admitting this detachment. The dynamics of academic research and the underlying incentive mechanisms seem to have failed to ensure pressure on academics to ensure that models of central bank operations were sufficiently in line with the reality of these operations. Central bankers failed to resist the reality-detached theories of academics."[15]

While it is humen to err, it is quite remarkable that Friedman's misjudgement is not only still partially reflected in textbooks, but that it was also adopted by central banks, which to this day have not come to terms with how this fallacy came about, why it persisted for years, and what needs to be done to prevent it from happening again.

13 cf. "Friedrich August von Hayek: Wider die Anmaßung von Wissen" - Die Weltverbesserer - FAZ or Milton Friedman - "I, Pencil" - Bing video by Friedman.

14 In his article "The Case for a Monetary Rule" (1972), Friedman accordingly called for the central bank to stop trying to fine-tune the economy. Instead, the central bank money supply should simply be increased by a determinable factor that could not be influenced by anyone. Friedman justified this on the basis of the "limitations of our knowledge" and voiced the criticism that the central bank's attempt to control the interest rate had only made the economy more unstable in the past.

15 Bindseil, U. (2004). "The operational target of monetary policy and the rise and fall of reserve position doctrine". Available at SSRN 533132.

What influence did ideology play in the choice of monetary policy strategy?

From our point of view, one possible explanation arises from the dispute between different philosophical schools of thought: on the one hand, a "state-positive" school of thought in the tradition of Hegel, and on the other hand, a "state-critical" school of thought in the tradition of Mises, which regards state intervention as blasphemous acts that can only worsen the results of an inherently good economic system.

In the monetary policy debate of the 1970s, the backdrop against which monetary policies for the post-Bretton Woods world were created, Keynesianism is in the tradition of Hegel[16] and monetarism is in the tradition of Adam Smith and Ludwig Mises. The then-President of the American Economic Association and later Nobel Prize winner, Franco Modigliani, explained the fundamental ideological disagreement between Keynesians (non-monetarists) and monetarists in 1977 as follows:

"In reality the distinguishing feature of the monetarist school and the real issues of disagreement with non-monetarists is not monetarism but rather the role that should probably be assigned to stabilisation policies. Non-monetarists accept what I regard to be the fundamental practical message of the General Theory: that a private enterprise economy using an intangible money needs to be stabilised, can be stabilised, and therefore should be stabilised by appropriate monetary and fiscal policies. Monetarists by contrast take the view that there is no serious need to stabilise the economy; that even if there were a need, it could not be done, for stabilisation policies would be more likely to increase than to decrease instability; and, at least some monetarists would, I believe, go so far as to hold that, even in the unlikely event that stabilisation policies could prove beneficial on balance, the government should not be trusted with the necessary power."

The collapse of the Bretton Woods system in 1973 and the subsequent stagflation, represented for many observers a decisive failure for the state-positive Keynesians. Thus, there was a political willingness to try an entirely different system. Bretton Woods, a system created by technocrats, epitomised a Keynesian-Hegelian philosophy that sought to stabilise an inherently unstable financial and economic system through good design and smart rules. Thus, when the Bundesbank first formulated a completely independent monetary policy strategy for a system of flexible exchange rates in 1973, a special *window of opportunity* existed to try something that represented a structural break with the existing status quo: a complete shift from a state-positive understanding that sought to stabilise inherently unstable financial markets to an understanding that financial markets are self-stabilising and that intervention and rules are responsible for instability in the first place. The strategy of managing the central bank money supply, which was introduced in this environment, promised - at least in the textbook version, which was implemented only for a very brief time - to dismantle the steering wheel of monetary policy control, throw it out the window, and thus eliminate the evil of human interference in a supposedly natural and perfect market mechanism. While from today's perspective it seems that financial markets are not self-stabilising, monetarists - who, after all, had no practical experience in central banking and had never actually implemented monetary policy before - had an incorrect understanding of monetary policy transmission (that is, the mechanism through which monetary policy ultimately affects prices. More on this under 1.2).

16 cf. Geoff Mann, "In the Long Run We Are All Dead: Keynesianism, Political Economy, and Revolution", London: Verso, 2017, pp. 39ff.

In hierarchical central banks with a negative error culture, a once implemented strategy could not be dismissed. Admitting that one had been wrong about the functioning of monetary policy transmission was not opportune in this environment. It was only the establishment of the ECB, which was not bound by any previous statements, that created the possibility first to hide money supply targeting in a second pillar that was rarely heeded in practice, before ultimately laying it to rest with the ECB's current *strategy review*.

What would an intellectually-compelling minimally-invasive monetary policy look like?

To illustrate the monetarists' fallacy, it helps to imagine what a theoretically-workable monetary policy strategy would look like if one believed, as the monetarists do, that human intervention always leads to suboptimal outcomes. Those who demand minimal influence by the central bank on economic activity and reject attempts at fine-tuning would have to demand constant interest rates - instead of constant growth of the money supply. The central bank could then buy government bonds and pay interest on the resulting balances of commercial banks at an interest rate that is fixed over time. This would ensure that monetary policy does not stimulate demand and prices.

If the central bank tries to control the money supply, it needs to accept much higher interest rates in the event of an abrupt increase in the demand for money, as usually happens when uncertainty in financial markets triggers a run on risk-free assets (such as in September 2008 after the bankruptcy of Lehman Brothers or in March 2020 at the beginning of the pandemic), and would thus send a deflationary impulse to the economy - which could not only lead to a depression as in the 1920s, but is also inconsistent with an ideology that seeks to minimise the central bank's influence on the economy. Thus, the monetarist understanding of the mechanisms of monetary policy transmission, unlike, say, the desire for lower taxes or less regulation, is not the logical solution for someone with a liberal-libertarian worldview, but is simply wrong from a technical perspective.

2. Applied monetary targeting in central banks and the transition to floor systems

2.1 At the Bundesbank

On March 19, 1973, the German government, together with the other states of the European Community, decided to break away from the obligation to intervene in exchange rates against the US dollar that had applied in the Bretton Woods system. Subsequently, the Bundesbank introduced monetary targeting, which referred to the volume of central bank money in circulation, i.e. cash plus commercial banks' balances at the central bank.[17] Thus, at least superficially, it followed the demands of the monetarists. Since a central bank can only control either interest rates or the money supply, interest rates became an endogenous variable which could also experience extreme fluctuations. The Bundesbank was aware of this, writing in its 1973 annual report:

"A limit on the overnight rate, as it used to exist in the highest refinancing rate at the Bundesbank, the Lombard rate, is no longer a given. As banks can now no longer make use of free liquidity reserves and, moreover, as the Bundesbank stopped granting 'normal' Lombard credit at the beginning of June 1973, the overnight rate may rise steeply in some circumstances if, in the maintenance of minimum reserves, it is not possible to balance the surplus and deficit amounts in the money market."[18]

Precisely such extreme rises occurred, with interest rates rising by more than 20 percent in April and July, and in one case even by more than 40 percent. The reactions of the public then prompted the Bundesbank to offer special loans at 13 percent interest in November, thus capping interest rates.[19] In the end, the Bundesbank actually operated a strategy of managing the central bank money supply in a pure form for only half a year.

The 1974 Annual Report also devotes considerable space to explaining monetary targeting. However, the text is complex and contradictory, reflecting the uncertainty that had to be present when explaining an inherently incoherent concept. As an example:

"Quantitative targeting (of the central bank money supply), however, precludes the Bundesbank from simultaneously targeting a specific level of interest rates or the exchange rate. It is true that the Bundesbank constantly pursues an interest rate policy. But this serves to achieve the monetary growth target."[20]

The Annual Report thus declared interest rates to be an intermediate target that does not itself act on prices, but only on the money supply - which is then supposed to act on prices again, without explaining the transmission mechanism. One can only assume that the demand effect should happen via the money multiplier - or that there was also uncertainty within the institution as to how monetary policy was actually supposed to work. Monetary targeting officially continued until 1988, while interest rates were effectively capped (and thus more money provided, when rates were to increase above certain thresholds).

17 Annual Report of the Deutsche Bundesbank 1973, p. 3.

18 Annual Report of the Deutsche Bundesbank 1973, p. 4.

19 Ibid.

20 Annual Report of the Deutsche Bundesbank 1974, p. 2.

On January 21, 1988, the Bundesbank declared it would henceforth manage the broader monetary aggregate M3 instead of central bank money.[21] Instead of cash and reserve balances held at the central bank, the focus would henceforth be on households' balances held at commercial banks. This difference is fundamental: in 1974, the Bundesbank had still argued the central bank money supply target should be used to establish a ceiling for lending. Now, the focus was on a variable that is largely determined by lending (which in turn influences aggregate demand and therefore also future inflation), but which can also be distorted by many factors - e.g. because people invest more/less in the stock market, which would cause M3 to fall/increase without a corresponding signal being expected in the price level. However, the Bundesbank communicated the change in the supposedly most important policy variable as a merely technical change, although M3 and reserve balances are fundamentally different in nature.

M3 increases with lending and lending is associated with aggregate demand, thus the variable can have some correlation with future inflation. The causality would be through the effect of lending though, and not through the fact of money as suggested by the quantity theory. However, there is no reason to suggest M3 should provide additional value beyond income, savings and credit in explaining the price level.[22] Additionally, with respect to the years that followed, the extent to which the Bundesbank actually followed the money supply target is highly disputed. If we compare the Bundesbank's money supply targets (based on M0 until 1988, and M3 afterwards) with the actual values realised at the end of the year, the comparison shows that the target was met 13 times and not met 11 times between 1975 and 1998, and this despite the fact that the Bundesbank introduced target ranges with a margin of three percentage points from 1979 onward after the targets had previously been missed four years in a row.[23] Moreover, in practice, the Bundesbank also dealt with missed targets rather casually. If the target value was exceeded in one year, no attempt was made to compensate for this in the following year (which would have been necessary if a correlation between the money supply and the price level had actually been assumed).[24]

The later Chairman of the Fed, Ben Bernanke, as well as later Fed Vice-Chairman Richard Clarida, independently argued that the Bundesbank was not in fact concerned with monetary aggregates but, like other central banks, was influencing price levels through interest rates.[25] Bundesbank economists countered this and claimed that the Bundesbank's monetary policy could in fact be traced back to developments in the money supply.[26] How alone the Bundesbank was from around the mid-1990s in claiming that monetary targeting was a feasible strategy is shown by a conclusion of the Bank for International Settlements: "During the 1980s the role of monetary aggregates in the overall framework of monetary policy changed dramatically in Europe from one where the money stock performed the function of the main intermediate target in the largest European economies to one where, except in Germany, monetary developments are monitored, along with other indicators, in a much more eclectic approach to

21 "M3 at that time included cash owned by non-banks plus non-bank account balances at commercial banks with a maturity of less than 4 years". Annual Report of the Deutsche Bundesbank 1988, p. 34.

22 cf. Kaldor, N. (1985). "The scourge of monetarism". Oxford; New York: Oxford University Press.

23 cf. Gebauer, W. (2004). „Geld und Währung". Bankakademie-Verlag, p. 333f.

24 cf. Gebauer, W. (2004). „Geld und Währung". Bankakademe-Verlag, p. 334f.

25 cf. Bernanke, B., & Mihov, I. (1996). "What Does the Bundesbank Target?". Working Paper 5764, National Bureau of Economic Research; also: Clarida, R., & Gertler, M. (1997). "How the Bundesbank Conducts Monetary Policy". Clarida, R., & Gertler, M. (2007), "Reducing Inflation: Motivation and Strategy" (pp. 363-412). University of Chicago Press.

26 cf. Gerberding, C., Seitz, F., & Worms, A. (2005). "How the Bundesbank really conducted monetary policy". The North American journal of Economics and Finance, 16(3), p. 277-292.

monetary policy. Several economic developments explain this regime shift ... In sum, monetary aggregates were perceived as being less stably related to real income and prices, less controllable by central banks and less effective in constraining nominal demand. Consequently, except in Germany, monetary aggregates nowadays mainly play the role of information variables."[27]

The reasons why the Bundesbank not only decided to pursue a strategy whose analytical foundation was unconvincing, but also defended it for decades, could be uncovered through a process of policy evaluation. Bindseil and others have argued that monetary targeting removes political pressure from the central bank to steer interest rates in a certain direction, as in a monetary targeting regime the interest rate is determined on the money market as a function of money demand (by banks) and money supply (by the central bank). According to Bindseil, relinquishing this responsibility has made it easier to implement unpopular (but, in the eyes of central bankers, necessary to achieve price stability) interest rate hikes. However, in addition to the responsibility diffusion over the interest rate level, monetary targeting offers a second advantage: it assumes complete central bank control over the price level. If the central bank is trusted, the presumption of complete central bank control over the price level (as described in the quantity theory of money) could stabilise inflation expectations and thus contribute to lower inflation. If one of these reasons (diffusion of responsibility in order to better enforce unpopular measures or illusion of control in order to more strongly influence inflation expectations) actually played a role, this would have to be frowned upon under our current understanding of democracy. In a state subject to the rule of law, the end does not justify the means. Even if supposedly necessary interest rate hikes would not have been opportune without the monetarist narrative, this would not be a sufficient reason for an independent and not directly democratically legitimised central bank to communicate cause-and-effect relationships in which it does not believe itself.

Alternatively, it is conceivable that in 1973 an institution that was inexperienced in defining a sovereign monetary policy but strictly hierarchical and lacking a positive error culture committed an analytical fallacy, failed to deal with it because of its claim to infallibility, fell into path dependency and therefore continued to claim that it was conducting monetary targeting.

Apart from the first six months of 1973, the Bundesbank steered interest rates much less erratically than the Fed (see 2.2) and, from its establishment in 1957 until its entry into the monetary union, its monetary policy contributed to an average inflation rate of only 2.6 percent - a figure otherwise matched only by the Swiss central bank. Accordingly, it is not the Bundesbank's actual interest rate policy that is under criticism in this paper, but the rationale given for its decisions.

27 Filosa, R. (1995). “Money demand stability and currency substitution in six European countries (1980-1992)” (No. 30). Bank for International Settlements.

2.2 At the Federal Reserve Bank

In August 1979, Paul Volcker was appointed Chairman of the Federal Reserve Bank (Fed) with the goal of fighting inflation. Under Volcker, the Fed set a target for monetary growth. As a result, from 1979 onward, short-term interest rates rose to as high as 22.5 percent, which corresponded to a real interest rate of about 10 percent. Bankruptcies led to an unemployment rate of over 10 percent. In 1982, the practice was terminated.

In his memoir, Volcker addresses the question of how the shift in strategy towards monetary targeting came about. Volcker describes how the monetary policy board decided to raise interest rates shortly after he took office, but only with a majority of four to three. As a result, financial market participants did not expect interest rates to rise further, and the Fed was expected to cut rates again soon - making financing conditions more favourable than the Fed intended. Volcker writes further:

"The Fed was losing credibility ... We needed a new approach. To have more direct impact, we could strictly limit growth in the reserves that commercial banks held at the Federal Reserve against their deposits. The widely quoted adage that inflation is a matter of 'too much money chasing too few goods' promised a clear, if overly simplified, rationale ... I myself, some years ago, had raised a question as to whether the Fed should pay more attention to growth in the money supply with an approach later labelled 'practical monetarism' (in contrast with the more extreme and mechanistic monetarism that Milton Friedman had advocated)."[28]

Volcker's thinking was thus less academic and more political, and he wanted to set an example. He also realised that it was politically difficult to raise interest rates - his majority on the Fed's committee was narrow. Bindseil writes:

"Overall, the 20th century thus seemed to have witnessed in the domain of monetary policy implementation a strange symbiosis between academic economists stuck in reality-detached concepts, and central bankers who were open to such concepts, partly since they were allowed to avoid explicit responsibility. Masking responsibility seemed to be of particular interest whenever the central bank's policies were strongly des-inflationary and thus causing recession and unemployment (in the US in 1919-21 and in 1979-82)."[29]

Bindseil goes on to cite Charles Goodhart (former board member of the Bank of England, which itself never pretended to manage the central bank money supply), who also argues that monetary targeting was merely a ploy.

"For instance Goodhart (2001) and Mishkin (2004) argue that the whole approach was just about avoiding the Fed to take responsibility for the necessary strong hiking of interest rates to bring down inflation, and the associated economic effects such as a strong rise in unemployment. In the words of Goodhart (2001), the episode, 'if properly analysed, reveals that the Fed continued to use interest rates as its fundamental modus operandi, even if it dressed up its activities under the mask of monetary base control ... there was a degree of play-acting, even deception ... ' The 'smokescreen' created by Volcker would thus have been simply a necessary condition for bringing inflation to an end under conditions of imperfect central bank independence (see also Axilrod 2000)."[30]

28 Volcker, P. A., & Harper, C. (2018). "Keeping At It: The Quest for Sound Money and Good Government". PublicAffairs, p. 108.

29 Bindseil, U. (2004). "The operational target of monetary policy and the rise and fall of reserve position doctrine". Working Paper Series, No 372, ECB, Frankfurt am Main, June.

30 Bindseil, U. (2004). "The operational target of monetary policy and the rise and fall of reserve position doctrine". Working Paper Series, No 372, ECB, Frankfurt am Main, June.

Stephen Axilrod, then Secretary General of the Federal Open Market Committee (FOMC, the Fed's top decision-making body), admits in his book “Inside the Fed” that monetary policy actually worked through interest rates (addition in square brackets by us):

"In retrospect, the Fed might instead have simply embarked on rapidly raising the federal funds rate [the interbank rate on overnight loans in central bank money] to ... 15 to 20 percent ... Because monetary policymakers are traditionally, and usually for good reason, conservative decision makers, they simply were not psychologically capable of deciding to move the funds rate ... so far and so quickly".[31] Axilrod thus considered central bank money supply targeting as a way to overcome a possible *cognitive bias* among conservative board members, but knew that it was effectively the interest rate level which would affect financial conditions, aggregate demand and thus the price level.

Volcker, in turn, explains in his memoir how Axilrod initially warned that monetary targeting could lead to very high interest rates and negative economic consequences. Volcker had pondered the concerns, he said, but then made a stop on his way to the IMF meeting in Belgrade:

"Our trip included a short stopover in Hamburg at the request of German Chancellor Helmut Schmidt. I knew Schmidt, and his blunt manner, well from his days as finance minister. Generally sympathetic to the United States, he had become disenchanted with what he perceived as American policy inconsistencies and ineffectiveness, including, if not confined to, monetary affairs. For almost an hour he harangued us about how waffling American policy makers had let inflation run amok and undermined confidence in the dollar and Europe's efforts to restore exchange-rate stability. I sat there quietly. There could be no more persuasive argument for why I had to act. I invited Bundesbank president Otmar Emminger, who had accompanied Schmidt and long been an interlocutor of mine, to fly with us to Belgrade. I used the opportunity to hint at the new approach I was considering. Predictably, Emminger was supportive. I became impatient to get back home and to work."[32]

So Volcker explains that he was still uncertain before his trip to Belgrade, but that the discussions with Helmut Schmidt and Bundesbank President Emminger on the trip helped to start monetary targeting. When the Fed did in fact declare the beginning of monetary targeting the FOMC, in parallel with the announcement of a monetary growth target, also stipulated short-term interest rates should not rise more than four (later six) percentage points above a similarly specified limit (which could in fact only be achieved by providing additional money in such cases after all).[33] This implies that the Fed also did not want interest rates to behave wildly as would have been the result of a pure monetary targeting regime the way the Bundesbank did it for six months in 1973 and did not believe in the quantity theory of money. Reading the reports of contemporary witnesses, one cannot come to the conclusion that the people involved in the Fed were convinced monetarists.

31 Axilrod, S. H. (2011). “Inside the Fed, revised edition: Monetary Policy and Its Management, Martin through Greenspan to Bernanke”. MIT Press, p. 109.

32 Volcker, P. A., & Harper, C. (2018). „Keeping At It: The Quest for Sound Money and Good Government”. Public Affairs, p. 109.

33 Axilrod, S. H. (2011). “Inside the Fed, revised edition: Monetary Policy and Its Management, Martin through Greenspan to Bernanke”. MIT Press, p. 98.

2.3 The beginning of the end of money supply targeting leads to lower volatility

What was called “monetary targeting” in the USA (the so-called Volcker shock) lasted only from 1979-1982. Afterwards at least a target for short-term interest rates was communicated again. It took until 1998 for the Fed to declare that in the future it would consider short-term interest rates as the operational target of its monetary policy. The Fed's statement led to more certainty in the money market and correspondingly much less volatility in short-term interest rates, as shown in Figure 3:

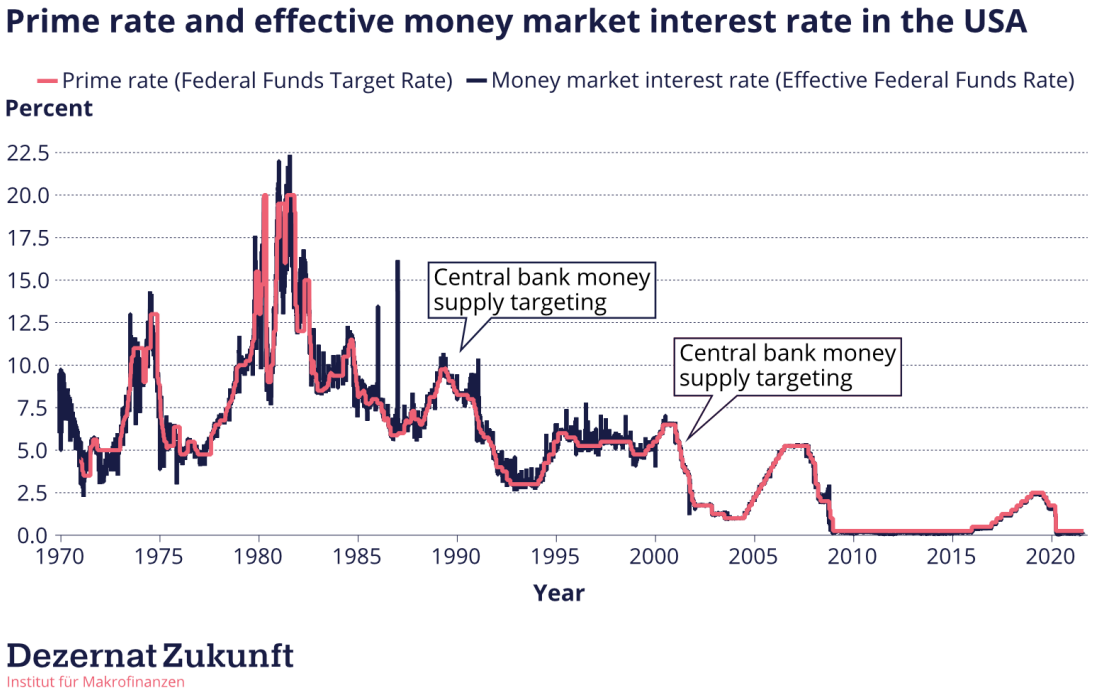


Figure 3: Prime rate and effective money market interest rate in the USA; **Source:** Macrobond, Federal Reserve Bank of New York, Fed, IMF, BEA

Volatility in short-term interest rates is not desirable. The higher the volatility of short-term interest rates, the higher the term premia[34] for longer maturities, which implies higher refinancing costs for the government without producing any benefits (except for financial intermediaries engaged in term transformation). A central bank that wants to influence aggregate demand via interest rate changes and the communication of interest rate changes should be concerned with ensuring that its interest rate signals reach the market in as pure a form as possible and are not distorted by volatility.

34 Term premiums describe (in simplified terms) the difference between the expected average short-term interest rates for a given term and market yields.

2.4 Monetary policy implementation up to the financial crisis and what we can learn from the Fed's actual monetary policy about its interdependencies

Monetary policy today aims to minimise potentially inflationary or deflationary deviations of growth from its potential path[35] by influencing aggregate demand with its instruments and communication.[36] In monetary policy implementation - the engine room of monetary policy, so to speak - a so-called "operational target" is defined, which the central bank can more directly control as aggregate demand, but which will then ultimately affect aggregate demand.[37] Monetary policy instruments are tools available to the central bank to achieve its operational target. In the Eurosystem, the operational target of monetary policy is the €STR (euro short-term rate, the successor to the EONIA), an interest rate paid on (virtually) risk-free[38] overnight transactions. Instruments of the Eurosystem are, for example, the interest that the Eurosystem pays on deposits, but also the interest that the Eurosystem charges on loans.

Until the financial crisis of 2008, the implementation of the ECB's monetary policy still had numerous elements that implied that the money supply would have relevance for the monetary policy stance. The ECB and national central banks tried to estimate the actual money demand of the economy and then provided exactly that amount of reserves in so-called repo operations, in which banks could borrow central bank money against collateral (e.g. government bonds). Banks were also required to hold a certain minimum reserve of central bank money in an account at the central bank over an average period of one month, with a penalty interest rate to be paid if the reserve was not reached. Thus, by requiring minimum reserves and providing a scarce amount of reserves, central banks created the interbank money market in which banks borrow scarce reserves.

Figure 4 shows a typical textbook representation of interactions in the money market, which still play a central role in many introductory courses in macroeconomics. M^s is the money supply provided by the central bank. M^d shows a demand curve of banks for central bank money. The interest rate on the y-axis is the market price of money and a function of the money supply decided by the central bank and the exogenously given demand for money (M^d curve). This representation thus suggests that the money supply is an instrument of monetary policy and that the interest rate is an intermediate target that is not controlled directly, but rather via the money supply (M^s). According to this understanding, if the central bank wanted to lower interest rates, it would have to provide additional central bank money ($M^{s'}$), whereupon the interest rate (i) would fall to i'.

35 The potential path is a concept from neoclassical theory. It is based on the assumption that the economy's potential is fixed in the short term and cannot be influenced by the current development of the economy or by monetary or fiscal policy. According to this theory, monetary and fiscal policy can only try to minimise deviations of economic performance from this potential in order to prevent inflation and unemployment. While the ECB uses the concept, it has (unlike European fiscal policy) not committed to a specific definition of potential. Thus, in its review of the monetary policy framework, it stated: "On this basis, in 2003 the ECB did not commit to any particular estimate of potential output or of the natural rate of unemployment.".

36 cf. "How Monetary Policy Works" - Austrian Central Bank (OeNB).

37 The Austrian central bank is therefore correct when it refers to "interest rate policy" on its homepage, as the Eurosystem controls interest rates in order to influence aggregate demand. cf. "Interest Rate Policy" - Austrian Central Bank (OeNB).

38 Art. 44(2)(e) of the Bank Recovery and Resolution Directive (BRRD) defines that in the EU, short-term interbank loans should be given preferential treatment in restructuring, such that even if the counterparty defaults, no loss is expected from overnight loans.

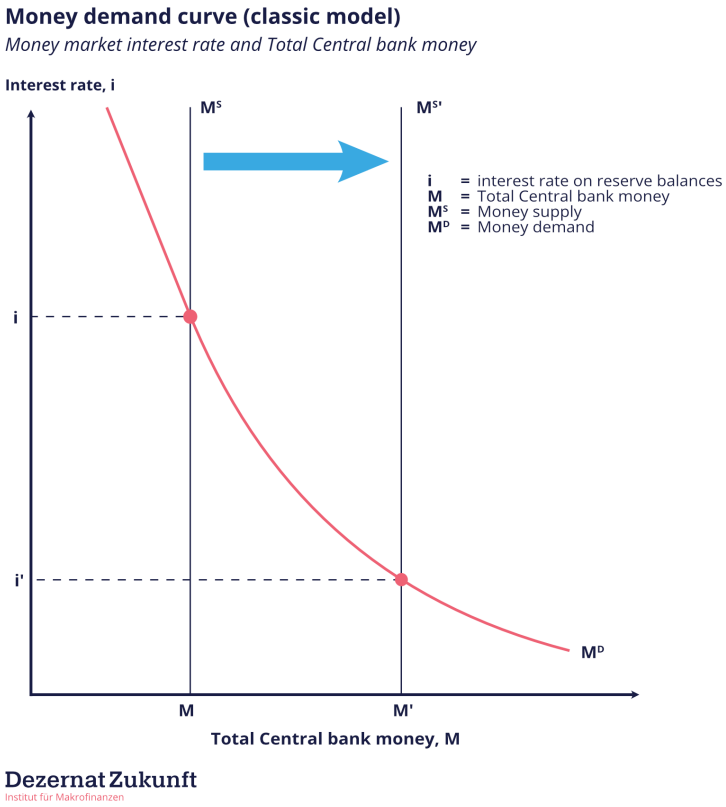


Figure 4: Money demand curve (classic model); **Source:** own visualization

The monetary policy implementation strategy thus implied that a higher quantity of central bank money than the one chosen would be somehow problematic - otherwise, employing bureaucrats to estimate the money demand and traders at money market desks is simply a waste of money. Mervyn King, then Chief Economist and later President of the Bank of England, stated as early as 1994:

"In the United Kingdom, money is endogenous - the Bank supplies base money on demand at its prevailing interest rate, and broad money is created by the banking system."[39]

According to King, the Bank of England sets interest rates and provides as much central bank money at those rates as the banking system demands. "Broad money", i.e. credit balances at commercial banks, is then created by the banks. The Chief Economist of the Bank for International Settlements, Claudio Borio, described in 2009 that the central bank money supply is only relevant if the central bank does not remunerate reserve holdings at the rate desired by monetary policy (target rate). If the central bank does not remunerate reserve holdings but provides more money than is necessary, the price for reserves on the money market quickly falls towards zero. However, if the central bank pays interest on balances, money market rates will not fall below this rate (as no bank would accept lower interest rates on balances from another bank than it receives from the central bank).[40]

39 Quarterly Bulletin August 1994 (bankofengland.co.uk).

40 Borio, C., & Disyatat, P. (2009). "Unconventional monetary policies: an appraisal". BIS Working Papers No 292, p. 10f.

The 2008 financial crisis represents a structural break

In the wake of the 2008 financial crisis, numerous regulatory changes were adopted to increase risk perception in the interbank market and reduce *interconnectedness* in the financial system. The aim was that the failure of one bank should no longer lead to the failure of other banks. The regulatory reforms adopted in this context had a side effect: banks now wanted to hold fewer liabilities to other banks relative to their total assets and preferred to hold balances with the central bank instead.[41] This significantly increased the demand for central bank money.

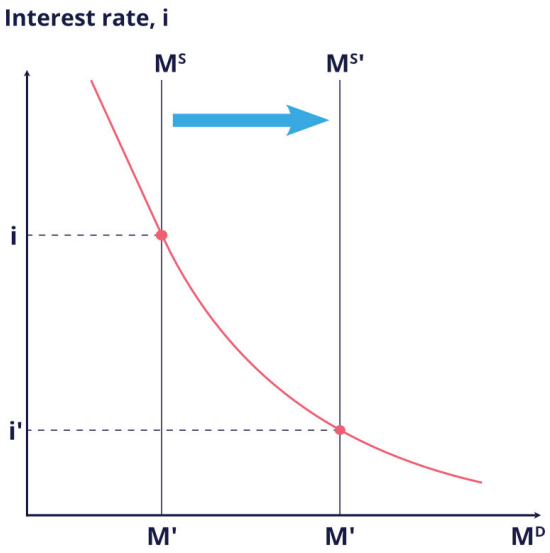
Floor systems show us the modern understanding of monetary policy implementation

The Fed's monetary policy-making body, the Federal Open Market Committee (FOMC), in January 2019 announced an *ample reserve regime*, in which reserves should be abundant. In this strategy, the target rate is achieved by paying the respective amount on reserve balances. While paying a certain rate for reserves provides a floor for rates, it does not automatically create a ceiling. If reserves were to become scarce, rate could increase higher than the floor (and thus the target rate) and thus to a level that is unwanted from a monetary policy perspective. To avoid reserves from becoming scarce, the Fed now intends to buy so many government bonds that reserves will never become scarce again so that money market rates do not accidentally rise higher than planned. While in former times the central bank claimed to make sure reserves would not increase *above* a certain threshold, the Fed's implementation strategy worries more that reserves do not fall *below* a certain threshold. A functioning *ample reserve regime* is therefore implicit evidence that the Fed controls only interest rates and considers the money supply irrelevant to the implementation of monetary policy.

41 Technological changes are also cited for the increase in central bank money demand both to date and as expected in the future, cf. Bindseil, U. (2018). "What Monetary Policy Operational Framework after the Crisis?" Revue française d'économie, 33(3), p. 105-126.

Money demand curve (classic model)

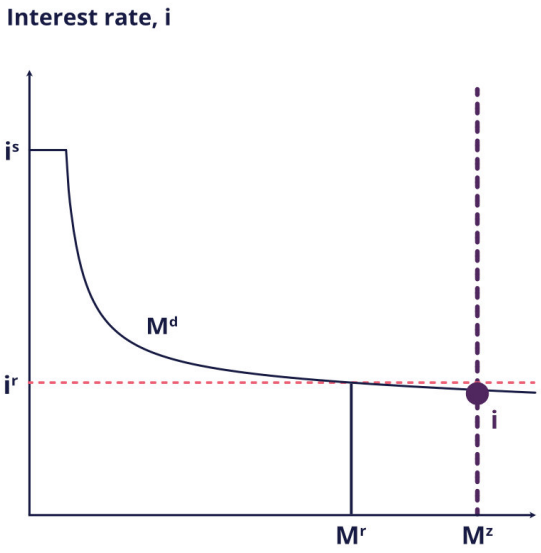
Money market interest rate and Total Central bank money



i = interest rate on reserve balances
M = Total Central bank money
M^S = Money supply
M^D = Money demand

Ample Reserve Regime Framework

Money market interest rate and Reserves



i = effective money market rate
i^s = discount window rate
i^r = Interest rate on Reserves
M^r = Minimum amount of reserves before money market rates would rise
M^z = Actual level of reserves the Fed chooses to make sure rates do not rise above i^r
M^d = Money demand

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Figure 5: Money demand curve (classic model) + Ample Reserve Regime Framework; **Source:** own visualization

3. Conclusion

The end of the Bretton Woods system in 1973 represented a structural break and gave rise to monetarist ideas that had up to that point only been propagated by academics not familiar with practical monetary policy implementation. While the Bundesbank's actual interest rate policy was hardly affected, this strategy was communicated in a modified form as the guiding principle of monetary policy for more than 20 years.

The Bundesbank's independence implies special accountability. It would therefore be in the central bank's interest to evaluate the extent to which it had been misguided in identifying and communicating the functioning of monetary policy. In this context, it should also be examined as to whether a now-outdated understanding of monetary policy interactions might have influenced the institutional set-up of the monetary union, in particular the prohibition of government bond purchases on the primary market (Article 123 TFEU).[42]

Policy evaluation takes courage and requires the self-confidence to expose one's own mistakes. It is therefore often avoided. The Bundesbank, however, is currently experiencing a historic moment: President Joachim Nagel is a proven expert in monetary policy implementation like no Bundesbank president before him. Vice President Claudia Buch is an esteemed scholar who has been advocating for systematic policy evaluation for years and has already called for the creation of a corresponding legal obligation.[43] With respect to a possible evaluation of the monetary policy strategy and its consequences for the institutional framework of the Economic and Monetary Union, one may ask: If not now, when?

42 The so-called "Carli Report" of the Finance Ministers to the Heads of State and Government of the European Community in 1990 on the institutional requirements of a monetary union contains indications that the ban on primary market purchases was intended to limit monetary expansion. If this argument were to become invalid, there could also be consequences for case law. An upcoming paper will dive deeper into the legal considerations.

43 Evaluation und Makroprudenzielle Politik | Deutsche Bundesbank.

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Representative of the Board
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Members Board:
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