**EUROPEAN CENTRAL BANK**

# THE OPERATIONAL TARGET OF MONETARY POLICY AND THE RISE AND FALL OF RESERVE POSITION DOCTRINE

by Ulrich Bindseil

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In 2004 all publications will carry a motif taken from the €100 banknote.

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Abstract

Before 1914, there was little doubt that central bank policy meant first of all control of short term interest rates. This changed dramatically in the early 1920s with the birth of "reserve position doctrine" (RPD) in the US, according to which a central bank should, via open market operation, steer some reserve concept, which would impact via the money multiplier on monetary aggregates and ultimate goals. While the Fed returned to an unambiguous steering of short term interest rates only in the 1990s, for example the Bank of England never adopted RPD. This paper explains the astonishing rise and fall of RPD. The endurance of RPD is explained by a symbiosis of central bankers who may have partially sympathised with RPD since it masked their responsibility for short term interest rates, and academics who were too eager to simplify away some key features of money markets and central bank operations.

**Non-technical summary**

Today, there is little debate, at least among central bankers, about what a central bank decision on monetary policy means: it means to set the level of short-term market interest rates that the central bank will aim at in its day-to-day operations during the period until the next meeting of the central bank's decision-making body. Also before 1914, there was little doubt that central bank policy meant first of all control of short term interest rates (via the setting of the discount rate). In between, namely between around 1920 and the end of the 1980s, "reserve position doctrine" (RPD) dominated at least in the US, according to which a central bank should, via open market operation, steer some reserve concept, which would impact via the money multiplier on monetary aggregates and ultimate goals. While the Fed returned to an unambiguous steering of short term interest rates only in the 1990s, e.g. the Bank of England never adopted RPD. Still today, monetary economics textbooks contain many references to RPD concepts, as for example substantial space is devoted to the money multiplier or the Poole (1970) model, which pretends that the optimal choice between interest rates and monetary quantities as operational target would be an empirical question.

This paper tries to describe and explain in a comprehensive way the rise, endurance and fall of RPD. Section 2 defines and discusses major issues relating to the concept of the operational target of monetary policy. Section 3 looks at how operational targets of monetary policy were defined before RPD appeared on stage in the 1920s. Section 4 presents briefly the basic model that underlines today's monetary policy implementation of central banks. Sections 5-7 each review one step in the rise of RPD, namely first its "discovery" by the Fed in the early 1920s, second its enthusiastic support by Keynes, and third its further equally enthusiastic support by monetarists. Section 8 investigates why RPD did not conquer the Bank of England. Section 9 and 10 look at RPD practice in the US, whereby section 9 is dedicated to the six decades before 1979, and section 10 to the three more intense years 1979-82, which are argued to be the only ones in which a real attempt to put RPD into practice was made. Section 11 reviews the main steps in the decline of RPD since 1982, while section 12 looks at the legacy of RPD in today's central bank practice and academic work. Finally, section 13 tries to draw lessons.

It appears that with RPD, *academic economists* developed theories detached from reality, without resenting or even admitting this detachment. Economic variables of very different nature were mixed up and precision in the use of the different concepts (e.g. operational versus intermediate targets, short-term vs. long-term interest rates, reserve market quantities vs. monetary aggregates, reserve market shocks vs. shocks in the money demand, etc.) was often too low to allow obtaining applicable results. 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, or even promoted them as they got convinced, or as the theories served their aim to mask their responsibility for short term interest rate and thus for economic developments. It is an interesting, but difficult question to disentangle in how far exactly the adoption of RPD as official Fed doctrine on monetary policy implementation was a deliberate way to mask responsibility, and in how far it was just reflecting convictions.

It seems also noteworthy that both academic economists and central bankers showed little interest in studying well-documented historical experience (e.g. Bagehot, 1873, King, 1936, Sayers, 1976). 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, partially since they 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).

Comparing the Fed and the Bank of England at around 1920 helps to understand what the preconditions may be for a doctrine like RPD to be adopted by a central bank. While the Bank of England was fairly independent, and very little transparent and accountable to the public, the Fed was more or less the opposite. This apparently implied the need for the Fed to invent a story of the pre-1920 inflation in which its failure to rise rates would not need to be admitted. While one would probably not want to praise today and wish back the lack of transparency and accountability of the old Bank of England, it seems clear that major weaknesses of the early Fed relative to the Bank of England, that one would still name weaknesses today, were its lack of independence, excess decentralisation, and lack of experience. As one would like central banks to be accountable and transparent, the main conclusion one has to draw, may be, one more time, the need of central bank independence.

## 1. Introduction

Today, there is little debate, at least among central bankers, about what a central bank decision on monetary policy means: it means to set the level of short term money market interest rate that the central bank aims at in its day-to-day operations during the period until the next meeting of the central bank's decision-making body. While for instance the Fed announces after each FOMC meeting as *operational target of monetary policy* the fed funds target rate, the Bank of England's Monetary Policy Committee (MPC) and the ECB's Governing Council each announce the rate at which they will conduct short term reverse open market operations, which is a commitment to achieve similar short term market rates. Although central banks appear to have followed such an approach in practice most of the time, academic economists, and partially central bank rhetoric, favoured during most of the 20th century a rather different approach to defining the operational target of monetary policy. In the words of Goodhart (1989, p. 293):

> *"The central bank primarily conducts its policy by buying or selling securities... Academic economists generally regard such operations as adjusting the quantitative volume of the banks' reserve base, and hence of the money stock, with rates (prices) in such markets simultaneously determined by the interplay of demand and supply. Central bank practitioners, almost always, view themselves as unable to deny setting the level of interest rates, at which such reserve requirements are met, with the quantity of money then simultaneously determined by the portfolio preferences of private sector banks and non-banks."*

Only during one short episode, one central bank, namely the Fed from 1979 to 1982, appeared to have seriously attempted to define in practice its operational target in the form of a reserve quantity. As will be developed in this paper, all reserve quantity oriented techniques – be they purely theoretical or translated into practice, can be classified as variants of an approach that preceded monetarism by several decades and that was coined in 1962 by Meigs in his PhD thesis supervised by Milton Friedman as "Reserve Position Doctrine" (RPD). The opposite view, applied e.g. by today's central banks, will be called here, for the sake of having a complementary expression "Short term interest rate doctrine" (SID).

While for instance Goodhart (1989), (2001), B.M. Friedman (2000) and Woodford (2003) explicitly highlight the surprising contradiction between normal central bank practice and mainstream academic convictions, no attempt has been made so far to compile the entire 20th century history of thought on the operational target of monetary policy. This paper will try to fill this gap. Assembling all main episodes in RPD's history will make easier to assess the validity of the arguments brought forward, and to draw lessons from this long-lasting debate. Clarification is not only of historical interest: despite that SID has also gained back academic ground in recent years, RPD actually still haunts through textbooks and academic journals. This paper will argue that the 20th century history of thought on the operational target of monetary policy is a rather unique case of persistence of fallacious doctrine in economics. A comprehensive review of this episode, and a critique of the persistence of RPD in textbooks, appears overdue. Reviewing the history of RPD allows better understanding the factors that made such persistence possible, such as maybe to avoid them in the future.

The debate about the operational target of monetary policy, i.e. the dispute whether interest rates or some monetary base or reserves concept should be targeted in day-to-day monetary policy, is somewhat related, but surely not identical to the debate on the validity of monetary aggregates as intermediate targets. While, the two issues were often confounded and indeed many followers of RPD and of monetary targeting claimed that quantitative intermediate and operational targets naturally go together, followers of SID would argue that they are not necessarily against

monetary aggregates as intermediate targets.[1] Although it will be at a few occasions unavoidable to also touch upon the debate relating to intermediate targets of monetary policy, this paper tries to always keep the operational perspective, and will highlight the need of a clear separation of the two spheres. This feature, namely not to aim at a general criticism of monetarism, distinguishes the current paper from more general criticism of monetarism, such as Kaldor (1982) or Moore (1988). The papers coming closest to the present one in terms of discussing the debate between RPD and SID are maybe Goodhart (1989), (2001). This paper tries to go beyond those by (i) reconstructing the very origins of SID and RPD and by comparing the diametrically different success of RPD in two key countries, the US and the UK; (ii) fully concentrating on the monetary policy *implementation* perspective; (ii) clarifying the role of Keynes and monetarism in the RPD debate; (iii) elaborating in more detail SID, and presenting the SID model of monetary policy implementation; (iv) drawing general lessons from the close to 80 years of dominance of RPD in academic circles.

That the issue is not only one of interest for the history of economic thought will be shown in particular in section 11. Most modern textbook classics in monetary economics use RPD concepts when discussing the operational target of monetary policy, as if central banks would obviously apply (or have applied) such an approach (e.g. Mankiw, 2002, Walsh, 2003, Mishkin 2004). In particular, the money multiplier remains the common denominator of all these textbooks, which suggests that a monetary base related operational target is assumed. Also, there is an ongoing academic journal literature in the field summarised for instance by Walsh (2003), which takes at least an agnostic position on what the appropriate operational target should be.[2] Finally, one could argue that the 1979-82 episode, which represented the hardest try ever to implement RPD, occurred after the Fed had moved gradually over 10 years towards explicit interest rate targeting, illustrating that as long as RPD is alive in textbook and academic research, its return to affect practice is not excluded.

The paper proceeds as follows. Section 2 defines and discusses major issues relating to the concept of the operational target of monetary policy. Section 3 looks at how operational targets of monetary policy were defined before RPD appeared on stage in the 1920s. Section 4 presents briefly the basic model that underlines today's monetary policy implementation of central banks according to SID. Sections 5-7 each review one step in the rise of RPD, namely first its "discovery" by the Fed in the early 1920s, second its enthusiastic support by Keynes, and third its further equally enthusiastic support by monetarists. Section 8 investigates why RPD did not conquer the Bank of England. Section 9 and 10 look at RPD practice in the US, whereby section 9 is dedicated to the six decades before 1979, and section 10 to the three more intense years 1979-82, which are argued to be the only ones in which a real attempt to put RPD into practice was made. Section 11 reviews the main steps in the decline of RPD since 1982, while section 12 looks at the legacy of RPD in today's central bank practice and academic work. Finally, section 13 tries to draw lessons.

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[1] As Goodhart (2002) puts it: "The fact that the money supply (and the monetary base) are endogenous variables has, in my view, no necessary bearing on the question of whether monetary aggregates have good indicator properties, and stable relationshipos with current and future movements of incomes… and prices… The argument that inflation is everywhere, and at all times, a monetary phenomenon is entirely unaffected by the issue of whether a central bank fixes the interest rate or the high powered monetary base."

[2] E.g. Christiano and Eichenbaum (1992) and further work during the 1990s in their tradition. Thornton (2001) provides a critical survey.

## 2. The concept of an operational target of monetary policy

RPD states that the operational target of monetary policy should be some quantity relating to reserves of banks with the central bank. To discuss in the rest of the paper the rise and decline of RPD, this section thus shortly defines the concept of an operational target of monetary policy, and reviews the possible specifications of operational targets. The concept of an operational target needs to be distinguished clearly from two other concepts: the one of an *instrument* of monetary policy, and the one of an *intermediate* target. The following definitions of the three terms are proposed here.

The **operational target** of monetary policy is an economic variable, which the central bank wants to control, and indeed can control, to a very large extent on a day-by-day basis through the use of its monetary policy instruments. It is the variable the level of which the monetary policy decision making committee of the central bank actually decides upon in each of its meetings. The operational target thus (i) gives guidance to the implementation officers in the central bank what really to do on a day-by-day basis in the inter-meeting period, and (ii) serves to communicate the stance of monetary policy to the public. Today, there seems to be consensus among central banks that the short-term inter-bank interest rate is the appropriate operational target.

A **monetary policy instrument** is a tool available to the central bank that can be used to reach its operational target. Today, central banks use three such tools, namely standing facilities, open market operations, and reserve requirements. In the past (mainly from the 1930s to the early 1980s), a further category of instruments were the so-called "direct methods" of monetary control, like deposit interest rate ceilings or margin requirements (see for instance Friedman, 1960, for a critique of these instruments).

An **intermediate target** is an economic variable that the central bank can control with a reasonable time lag and with a relative degree of precision, and which is in a relatively stable or at least predictable relationship with the final target of monetary policy, of which the intermediate target is a leading indicator. The typical intermediate target has been a monetary aggregate like M1 or M3, an exchange rate, or some medium or longer-term interest rate. It is assumed that via its operational target, the intermediate target can be controlled or at least influenced in a significant way. The popularity of the intermediate target concept has decreased over the last two decades, and most previous intermediate targets are considered today more as indicator variables which convey useful information to the central bank, without that being sufficient to justify a "target" status.

Although these concepts appear reasonably simple and clear, there has been a long tradition on mixing them up through an imprecise use. Poole (1970), by raising the question *"whether to use the interest rate or the money stock as the policy instrument",* had an unfortunate influence in this respect. Poole (1970, p. 198) defines an "instrument" to be a "policy variable which can be controlled without error" and considers three possible approaches to its specification (p. 199):

> *"First, there are those who argue that monetary policy should set the money stock while letting the interest rate fluctuate as it will. The second major position in the debate is held by those who favor money market conditions as the monetary policy instrument. The more precise proponents of this general position would argue that the authorities should push interest rates up in times of boom and down in times of recession, while the money supply is allowed to fluctuate as it will. The third major position is taken by the fence sitters who argue that the monetary authorities should use both the money stock and the interest rate as instruments... the idea seems to be to maintain some sort of relationship between the two instruments."*

The merging of the three concepts, clearly distinct in monetary policy practice, makes an application of Poole (1970) in central banking difficult, but invited academics to work on the same imprecise lines over decades[3]. The extensive related literature is reviewed e.g. by Walsh (2003). As will be argued towards the end of the paper, the ongoing academic work in the Poole (1970) tradition appears to be the most lively 21st century left over from RPD.

If one uses the term operational target in the precise sense as defined above, one may categorise the approaches taken by central banks towards them along the following dimensions. All are somewhat related to the role of the operational target to communicate the policy stance, either internally within the central bank or externally.

- *Explicit versus implicit operational target.* As already mentioned, the Fed defines its federal funds rate target explicitly, while e.g. the Bank of England and the ECB stick with an implicit target in the sense that it is revealed with a fair degree of precision through the rate at which they operate in the market (being an implicit commitment to achieve similar market rates).[4] The Bank of Japan is presently defining an explicit and quantified (see below) quantitative target, namely the amount of total reserves of banks with the Bank of Japan (see e.g. the press release of 19 March 2001 announcing the policy). The Bank of Japan's target implies huge *excess* reserves, and zero short term market interest rates. I would thus interpret this quantitative operational target as a second order target, ranking below the zero percent interest rate target.[5] As the case of the ECB and the Bank of England suggests, explicitness does not seem to be a necessary condition for an effective communication of the monetary policy stance to the public.

- *Quantified versus non-quantified operational target.* A quantified operational target is a target for which the central bank provides, at least internally, an exact figure after each meeting of its decision making body. Quantification is a necessary, but not sufficient condition for explicitness. The Fed's quantitative operational targets were normally not explicit in the sense that they were not even quantified. For instance the Bank of England's implicit short term interest rate target communicated via the fixed rate of tender operation is a quantified target, since the level of the tender rate is precisely applied during the inter-MPC meeting period. Today's fed funds target rate is both explicit and quantified. In contrast, quantitative reserve targets were rarely quantified by the FOMC in its decisions, with the exception maybe of the 1979-82 period (see the FOMC policy records in the Annual Reports of the Board of Governors). Such a non-quantification of a quantitative operational target may be considered odd, and leaves uncertain the exact meaning and content of such operational target. In fact, one could argue that such use of the operational target concept does not really fulfil the definition one would like to give to such a concept today, namely to indicate the monetary policy stance for the inter-committee meeting period, both for the implementation officers in the central bank and to the public. Noting this, Friedman (e.g. 1982) was constantly arguing that the Fed should quantify and make explicit its supposed quantitative operational targets.

- *Public immediate release, or not.* Today, most central banks publish immediately after the meeting of their monetary policy committee the quantification of the level of the operational target variable. However, this was not always done: for instance the Fed before 1994, and from 1974-79 did not immediately announce its target specification, and thus the markets tried to extract it from the (variable rate tender) operations of the Fed New York.

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[3] See also Woodford's (2003, 111 and 298) critique of the Poole model.
[4] At least, the difference between the average (say over a month) overnight rate and the rate at which these central banks operate is always far below the smallest usual change of target rates, which has been 25 basis points in recent years. The exact wording used by the ECB in this respect can be found in ECB (2004, 71).
[5] There is an extensive literature on the quantitative approach adopted by the Bank of Japan from 2001 onwards, and on what else it could or should have tried. See for instance Svensson 2003.

- *A unique versus a variety of operational targets.* Today, e.g. the Fed has specified one unique operational target, the federal funds rate. The Fed thus seems to consider the fed funds rate as a *sufficient* measure for its monetary policy stance. The opposite approach is described e.g. by Anderson (1969, p. 69), according to whom there were in the 1960s eight measures of money market conditions considered by the Fed, namely "the Treasury bill rate, free reserve of all member banks, the basic reserve deficiency at eight New York money market banks, the basic reserve deficiency at 38 money market banks outside New York, member banks' borrowing from the Federal Reserve, United States government security dealer borrowings, the Federal funds rate, and the Federal Reserve discount rate." As mentioned, one could argue that the Bank of Japan today has two operational targets which have however a clearly defined hierarchical relationship: short term interest rates should be zero, and within that setting, the operational target is defined in terms of an (excess) reserves target.
- Choosing between *(i) a short-term interest rate, (ii) a quantitative, reserve related concept, or (iii) a foreign exchange rate*. The latter is done by central banks, which peg their own currency strictly to a foreign one. In the present paper, the focus will be on large monetary areas for which this approach is not an alternative. The paper thus focuses on the choice between (i) and (ii). The former solution was systematically adopted by central banks before 1914, and is standard again today. The latter was applied at least to some extent in the US, and deemed to be appropriate in academic circles during the age of RPD, i.e. in the period between around 1920 and around 1990.

With regard to interest rate targets, an important aspect is the *maturity* of the target rate. Today, the maturity of the targeted market interest rate seems to be most often the overnight rate, although it is probably not the overnight rate which is really most relevant in influencing decisions of key economic agents (consumers, investors, etc.). According to Borio (1997, p. 296), there were in his sample of 14 central banks of industrialised countries 11 with overnight interest rate target, one with a 30 days interest rate target, and 2 with 30-90 days interest rate targets. In the meantime, the three dissenting ones (Belgium, Netherlands, UK) all have also embraced the overnight maturity. The striking advantage of focussing on the overnight maturity is that fully anticipated changes of the operational target in its case do not lead to anomalies in the yield curve, but such anomalies arise whenever (i) the target is defined in terms of longer maturities, (ii) changes of the target are anticipated, and (iii) the target is indeed strictly implemented. Consider for example what needs to happen with the overnight rate around day T if on day T, a 90 days interest rate target changes in an anticipated way from 4% to 5% (see Bindseil, 2004, chapter 3). The fact that in the past, central banks had a 30 or 90 days target interest rate, probably meant that they did not implement changes in a strict way from one day to the next, or that they tried to avoid that changes were well anticipated. Both features would today be deemed to be sub-optimal, as they conflict with the aims of simplicity and transparency.

By controlling the overnight rate to a fair degree, and by making changes to the overnight rate target predictable within a well-known macroeconomic strategy of the central bank, medium and longer term rates, i.e. those judged to be most relevant for monetary policy transmission, will react in a predictable way to changes in short term rates. It has sometimes been argued that this implies that short run volatility of the overnight rate is not a problem per se, as it will not necessarily influence medium and longer-term rates. This is true, and indeed some central banks (e.g. the Bank of England) have operated with a significant degree of white noise in the overnight rate, without this causing problems in monetary policy transmission. Also the ECB has accepted some degree of volatility in overnight rates, although it could have reduced it through more frequent open market operations. Still, one could argue that, everything else unchanged, white noise in any price does not add value, but creates (maybe very small)

incentives for market players to invest into activities that exploit the variability of prices, which is, from a social point of view, a waste of resources. In any case, this is less of a monetary policy, than a market efficiency issue. Only if volatility of overnight rates is very different from white noise, in the sense that shocks to overnight are rather persistent, it becomes a nuisance for monetary policy as it will be transmitted to medium and longer term rates (see e.g Ayuso et al., 1997). This is certainly the case if the central bank aims at controlling strictly some quantity.

RPD generally denied that the central bank bears responsibility for short term rates, and in its different variants suggested instead the following operational targets (the list tries to order the different quantitative concepts from broad to narrow, which is however not obvious in all cases):

- The monetary base, which is the sum of reserves of banks with the central bank and currency. This tended to be the preferred concept of monetarists, which did not want to go to the details of day-to-day monetary policy implementation and the implied need to split up further the monetary base into sub-elements.
- Reserves of banks. As mentioned, this operational target is currently applied by the Bank of Japan and was also occasionally advocated by academics.
- The total volume of open market operations (Friedman, 1982).
- Non-borrowed reserves, i.e. reserves minus borrowed reserves, applied by the Fed from 1979 to 1982.
- Excess reserves, i.e. reserves in excess of required reserves (for critical reviews see e.g. Dow, 2001, or Bindseil et al. 2004).
- Free reserves, i.e. excess reserves minus the reserves the banks have borrowed at a borrowing facility (in the US case: at the discount window); This concept was applied, at least in theory, by the Fed during the period 1954 to 1970 (see e.g. Meigs, 1962).
- Borrowed reserves, applied by the Fed from 1982 to 1990.

The different quantitative operational targets will be detailed in sections 9 and 10. The following table summarises the possible categorisation of different historical and present specifications of operational targets.

*Table 1: Examples of operational target specifications*

| | *Explicit (X) or not* | *Quantified (X) or not* | *Immediately published (X) or not* | *Unique (X) or not* | *Short term interest rate (SID) vs. Reserve concept (RPD)* |
|---|---|---|---|---|---|
| *US, 1994-2004* | X | X | X | X | *SID* |
| *US, 1990-1993* | X | X | | X | *SID* |
| *US, 1983-1990* | | | | | *RPD/SID* |
| *US, 1979-82* | | | | | *RPD/SID* |
| *US, 1974-1979* | X | X | | X | *SID* |
| *US, 1920-1974* | | | | | *RPD/SID* |
| *Bank of Japan, 2001-2004* | X | X | X | *two with hierarchy* | *SID/RPD* |
| *Bank of England since 19th century* | | X | X | X | *SID* |
| *European Central Bank, 1999-2004* | | X | X | X | *SID* |

### 3. The operational target of monetary policy in the pre-1914 world

First, pre-1914 theoretical work on the subject is reviewed, and then the operations of the Bank of England are briefly discussed as an example of pre-1914 practice. Already Thornton (1802, p. 254), who is today praised as the most advanced monetary policy theorist preceding the 20th century (e.g. Meltzer, 2003)[6], views central bank policy as "Bank rate" (discount facility rate) policy, and analyses how Bank rate policy should be conducted. The idea further elaborated by Wicksell that Bank rate needs to follow the real rate of capital in order to allow controlling the expansion of money and hence inflation was probably first spelled out by him (emphasis added):

> *"In order to ascertain how far the desire of obtaining loans at the bank (the Bank of England) may be expected at any time to be carried, we must inquire into the subject of the quantum of profit likely to be derived from borrowing there under the existing circumstances... We may, therefore, consider this question as turning principally on a comparison of the rate of interest taken at the bank with the current rate of mercantile profit.*
> *The bank is prohibited, by the state of (usury) law, from demanding, even in time of war, an interest of more than five per cent, which is the same rate at which it discounts in a period of profound peace. It might, undoubtedly, at all seasons, sufficiently <u>limit its paper by means of the price at which it lends</u>, if the legislature did not interpose an obstacle to the constant adoption of this principle of restriction."*

The idea that the central bank should "limit its paper by means of the price at which it lends" seems to anticipate precisely monetary control techniques applied for instance from 1974-79 in the US. A key point of Thornton is that Bank rate is *always* an adequate and sufficient tool of central bank policy to prevent over-issuance of money and hence inflation (except if the central bank is not permitted to use this tool). Thornton's concept of a "rate of mercantile profit" indeed looks much like the better known concept of the "natural rate" of interest described in 1898 by Wicksell (1936, p. 102) as follows:

> *"There is a certain rate of interest on loans which is neutral in respect to commodity prices, and tends neither to raise nor to lower them. This is necessarily the same as the rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods. It comes to much the same thing to describe it as the current value of the natural rate of interest on capital."*

That under stable prices, the rate of interest on money has to correspond to the real rate of interest, which can be thought to be independent of the "monetary sphere" of the economy, is indeed implied by simple arbitrage logic (e.g. Bindseil, 2004, chapter 1). If a central bank would manage, so the 19th century authors (at least Thornton and Wicksell as examples), to always keep the money rate at the level of the real rate (which admittedly is moving), then price stability can be ensured. While this view was clearly dominant in the second half of the 19th century (see King, 1936), it was admittedly less during the first half (see e.g. Wood, 1939). Today, neo-Wicksellians as e.g. Woodford (2003) again incorporate the Thornton-Wicksell insight as key building block in their macroeconomic models. Although the natural rate of interest is in a sense a macro-economic concept, accepting its relevance and the implied key role of interest rates in the transmission mechanism, implies that the central bank's operational target should normally be the (short term) interest rate.

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[6] He had the advantage, from today's perspective, to have written during a period of a paper standard in the UK (1797-1821).

Many other 19th century findings on central banking are associated with Bagehot (1873). One crucial point highlighted by Bagehot (1873, p. 58), which is of particular relevance in the context of this paper, is the *inherent instability of the money market when left alone by the central bank*. It results from the combination of the volatility of the (price inelastic) supply of central bank reserves with the extremely low short-term interest rate elasticity of the demand for reserves in the money market. It is a sufficient argument for choosing rates, and not quantities, as operational targets. According to Bagehot (emphasis added):

> *"But though the value of money is not settled in an exceptional way, there is nevertheless a peculiarity about it, as there is about many articles. It is a commodity subject to <u>great fluctuations of value and those fluctuations are easily produced by a slight excess or a slight deficiency of quantity</u>. Up to a certain point money is a necessity. If a merchant has acceptances to meet tomorrow, money he must and will find today at some price or other. And it is this urgent need of the whole body of merchants which runs up the value of money so wildly and to such a height in a great panic. On the other hand, money easily becomes a 'drug', as the phrase is, and there is soon too much of it."*

Today, exactly like in Bagehot's time, the money market (or market for reserves) is constantly hit by short-term transitory demand and supply shocks. Typical day-to-day *supply* shocks are the changes in the so-called autonomous liquidity factors, such as the Banknotes in circulation, the deposits of the Treasury with the central bank, or the float created by the payment system (see e.g. Meulendyke, 1998). *Demand* for reserves in an efficient money market is only very limitedly price-elastic, and the demand for working balances also varies strongly from one day to the next depending e.g. on the day's payment system *activity*, payment *uncertainties*, etc. What is important to note is that all of these short term demand and supply shocks in the market for reserves have nothing or very little to do with macroeconomic developments, and it is thus wrong to view the "rates versus quantity", decision on the operational target like Poole (1970), as one depending on macroeconomic relationships, such as the interest rate elasticity of money demand, or the relative importance of real and monetary shocks in the macro-economy. Bagehot's insight into the inherent instability of the money market implies that any serious setting of a quantitative operational target means extreme noise in short term interest rate. Since this noise is unlikely to be white, it also means noise in medium and longer-term rates – i.e. noise in all rates that are crucial for economic decisions. Such interest rate noise is unlikely to be compatible with a sensible control of prices and stable economic conditions in general.

Turning now to practice of the Bank of England, a first key question was whether the Bank was able to control short-term market interest rates. King (1936) reports various debates in the London financial market on that question. Often, the Bank of England tended to deny such responsibility, like the Fed did over decades in the 20th century, while the market tended to take the opposite view. Denying full responsibility for the short-term interest rates has mainly two key implications for central banks: first, it allows central banks to deny responsibility for all effects of the level of short interest rate developments, like direct financial implications on groups of economic agents ("borrowers" and "lenders") and the economic imbalances that may be created from an inadequate level of interest rates. Secondly, it will lead the central bank to focus to a higher degree on quantities, since the central bank needs to admit to be in control of something. Control of quantities through other means than the price was typically done in 19th century central banking by loosening or tightening eligibility criteria for bills accepted for discounting. Also other means, like restrictions of the counterparts admitted to discount, or moral suasion were used at some time (again, reported in detail in King, 1936). Once more, the Fed would come back to such techniques in the 20th century.

The technique used by the Bank of England in the last decades before WWI to set Bank rate and to steer short-term market rates at a level somewhat *below* Bank rate is described in detail in King (1936) and Sayers (1976)[7]. In fact the Bank of England aimed at achieving only a limited recourse to its discount facility, this being ensured through what would be called later open market operations. In fact, the Bank of England maintained normally a spread between the Bank rate and market rates of around 1% (see the tables in King, 1936, pp. 300, 312) – similar to what the Fed has adopted in 2003 after the reform of its discount window, and what many other central banks had adopted in the course of the second half of the 20th century. Other central banks, as e.g. the Reichsbank, instead accepted a permanent large recourse to their discount window and thus that market rates and the discount rate were in principle equal (see e.g. Reichsbank, 1910). In any case, before 1914, all central banks quoted at almost any time at least one official discount rate at which they were prepared to discount eligible paper (see e.g. Bloomfield, 1959).

One may conclude that in 1914, there was no doubt, neither on the theoretical side, nor on the side of central bank practice, that central bank policy was interest rate policy, mainly in the form of setting the rate of the discount facility.[8]

## 4. Today's model of steering short-term interest rates

To further clarify the nature of day-to-day monetary policy implementation, and to show how monetary policy instruments impact on reserve quantities and short term interest rate, this section presents a brief model which may be called SID model. Three early more or less explicit references to it need to be acknowledged: Bagehot (1873) was, as described in the previous section, the first to highlight the inherent instability of the money market, which makes it crucial that the central bank offers standing facilities as a liquidity device (and/or conducts frequent open market operations). The Radcliffe (1959) report was the first to spell out a stochastic concept of the central bank's control of short term interest rates, including the role of standing facilities (see below). Finally, Poole (1968), building up on the work of Orr and Mellon (1961), was the first to provide a corresponding model. It is an interesting irony that Poole (1968) proposed a model which central bank monetary policy implementation experts would probably unanimously praise as fundamental, while Poole (1970), having been more influential amongst academics (e.g. Walsh, 2003, and even Woodford, 2003, do not even quote Poole, 1968) can be considered as having contributed to prolong over decades the confusion with regard to the appropriate choice of the operational target of monetary policy.[9]

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[7] See also Fetter (1965).

[8] It is sometimes argued that operating procedures under the gold standard anyway cannot be compared with operating procedures in the paper standard, as in the gold standard, central banks would primarily have gold convertibility in mind. However, as central banks in the gold standard normally did not operate closely to the constraint of convertibility, and since macroeconomic dynamics, triggered by inappropriate interest rate policy, could indeed lead to convertibility problems, monetary policy implementation in practice had most of the time macro-economic dynamics in mind, and could thus follow most of the time the same logic as it does today (see also Goodfriend, 1988).

[9] Although both papers seem to treat the same topic, the academic literature, starting with Poole himself, has treated them as having little to do with each other. Indeed, academic literature refers either to one or the other (actually much more often to Poole, 1970), and no paper, to my knowledge, ever tried to establish the link between the two. Still today, Poole (1968) is not a standard reference. The influence on actual central banking of the two papers may have been proportional to their influence on academic work: As Bagehot (1873) and Radcliffe (1959) suggest, (at least UK) central banking in practice had been based on the Poole (1968) model for a long time. Furthermore, there is no specific evidence that Poole (1968), with its focus on interest rates, had much of an influence in the return of central banks to explicit interest rate control during the 1990s. Poole (1970), in contrast, may well have contributed to make the 1979-82 episode happen, as probably many academics interacting with the Fed and academically inspired central bankers had this model in mind at that time.

Assume the following notation for our simple version of the model:

| | |
|---|---|
| $M$ | Outstanding volume of open market operations, netted as a central bank balance sheet *asset* |
| $A$ | Autonomous liquidity factors, netted as a central bank balance sheet *liability* (in fact all central bank balance sheet items other than M, B, D, R) |
| $B,D$ | Recourse to borrowing and deposit facility, respectively. |
| $R$ | Reserve holdings of banks with the central bank |
| $RR$ | Required reserves |
| $\overline{X}$ | For any central bank balance sheet quantity X, the average over a reserve maintenance period with T days. |
| $i_t$ | Overnight interbank interest rate on day t of the reserve maintenance period, with $t = 1...T$ |
| $i_B$ | Rate of the borrowing facility (e.g. discount facility) at the end of the reserve maintenance period. |
| $i_D$ | Rate of the deposit facility at the end of the reserve maintenance period ($i_D < i_B$). Absence of a deposit facility is equivalent to a deposit facility rate of zero, $i_D = 0$. |

The central bank's balance sheet identity ("Assets = Liabilities") can be expressed in terms of the above-defined balance sheet items as $M + B = A + D + R$. Assume for a moment that there is *no uncertainty* regarding autonomous factors or regarding the liquidity supply through open market operations in the remainder of the reserve maintenance period, and thus that no news would emerge in its course on any of the factors relevant for the overnight interest rate. Assume also, for the sake of simplicity, that interbank markets are perfect. Then, the central bank balance sheet identity over the reserve maintenance period, together with the assumption that there is no demand for working balances ($\overline{R} = \overline{RR}$), implies that $\overline{B} - \overline{D} = \overline{RR} - \overline{M} + \overline{A}$, with either $\overline{B} > 0, \overline{D} = 0$, or $\overline{D} > 0, \overline{B} = 0$, i.e. there will normally be an aggregate recourse to either one or the other of the two standing facility. A deterministic aggregate recourse to one standing facility at the end of the reserve maintenance period however implies that the competitive price in the market should correspond to the respective standing facility rate, since this rate represents the marginal value of reserves at the end of the maintenance period. The property that market rates will correspond in the entire reserve maintenance period to one or the other standing facility rate may then be expressed as follows:

$$\overline{M} > \overline{A} + \overline{RR} \Rightarrow (\overline{B} = 0; \ \overline{D} = \overline{M} - \overline{A} - \overline{RR}; \ i_1 = i_2 = ...i_T = i_D)$$
$$\overline{M} < \overline{A} + \overline{RR} \Rightarrow (\overline{B} = \overline{A} + \overline{RR} - \overline{M}; \ \overline{D} = 0; \ i_1 = i_2 = ...i_T = i_B)$$
(1)

The result that overnight interest rates are constant within the reserve maintenance period, which implies the so-called martingale property[10], also follows from the fact that holding reserves on any day of the maintenance period contributes equally to fulfil reserve requirements. Therefore, in the hypothetical case of anticipated differences between overnight rates within the reserve maintenance period, an arbitrage opportunity would arise, which is not compatible with a competitive equilibrium in the money market.

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[10] A time series $x$ follows a martingale if and only if $E(x_{t+1} | I_t) = x_t$. See e.g. Hamilton (1996).

Now, one may consider the more interesting and relevant case in which the liquidity supply and the rates of the standing facilities are subject to *uncertainty*. It was the Radcliffe report (1959, p. 121), which, around ten years before Poole (1968), was the first to explicitly mention a lucid *probabilistic* concept of the reserve balance as determining the short term level of interest rates:

> *"The level of rates of interest in the money market therefore depends on the current level of the rate being charged by the Bank for loans from the Discount Office, and on the market's expectations as to the trend of the [discount] rate and as to the extent to which they are likely to be obliged to borrow from the Bank at this rate."*

It is assumed that the money market participants have a homogenous information set $I_t$ at the time of each market session t = 1…T. The basic relationship between quantities and prices (overnight rates) under the assumptions made above (especially the one of perfect inter-bank markets and averaging) is then described by the following equation, in which $f_{(\overline{M}-\overline{A}-\overline{RR}|It)}$ is the probability density function the money market participants assign during the trading session *t* to the random variable $\overline{M} - \overline{A} - \overline{RR}$:

$$\forall t = 1...T : i_t = E[i_B \mid I_t]P(\overline{M} - \overline{A} - \overline{RR} < 0 \mid I_t) + E[i_D \mid I_t]P(\overline{M} - \overline{A} - \overline{RR} > 0 \mid I_t)$$

$$= E[i_B \mid I_t] \int_{-\infty}^{0} f_{(\overline{M}-\overline{A}-\overline{RR}|It)}(x)dx + E[i_D \mid I_t]\left( 1 - \int_{-\infty}^{0} f_{(\overline{M}-\overline{A}-\overline{RR}|It)}(x)dx \right) \quad (2)$$

In words: the overnight rate on any day will correspond to the weighted expected rate of the two standing facilities, the weights being the respective probabilities that the market will be "short" or "long" of reserves at the end of the maintenance period before having recourse to standing facilities. This expression may be considered as *the fundamental equation* of monetary policy implementation. It should be noted that also in the case of uncertainty, the banks' possibility to average reserve fulfilment implies the *martingale property* of the overnight interest rate, i.e. that the overnight rate on any day corresponds to the expected overnight rates on the following days of the same reserve maintenance period. However, in the case of uncertainty, news will constantly emerge in the course of the maintenance period with regard to the factors determining the overnight rate, and thus the overnight rate will normally *not* be constant from an ex post perspective. It should also be highlighted that the martingale property holds only under the assumptions of the frictionless model outlined above.

The SID model as presented above is of course a simplification of reality – in practice, interbank markets are not perfect, and thus also individual liquidity shocks and changes in the demand for working balances play an important role in day-to-day monetary policy implementation. Also in practice, some deviations from the martingale property are common (see e.g. Hamilton, 1996). For instance Woodford (2001), (2003) proposes a variant of the model which focuses also on individual shocks, but assumes the absence of reserve requirements and averaging. Gaspar et al (2004) develop a model which combines the two features.

In a SID model containing market frictions, it is also possible to represent all concepts of RPD like free reserves, borrowed reserves, non-borrowed reserves, etc. For a given set of parameter values of the model, it is thus normally possible to translate an interest rate target into e.g. a borrowed reserves target. One might thus want to argue that setting an interest rate target is equivalent to setting a borrowed reserves target. This may be true when looking at the allotment decision *in a single open market operation* of a central bank, focussing *on a single market day*. But it is fundamentally wrong when we consider the policy decisions by a body like the US

FOMC. It does not make sense for such a body to decide that "In the inter-meeting period, borrowed reserves should be on average 300 million" (and actually the FOMC never said such a thing). First, this does not tell anything to the borrowers and lenders in the economy, who care in their decisions about interest rates, and which would need to translate the borrowed reserves target into an interest rate, or just would need to wait for the money market outcome. Secondly, it does not make sense to fix a borrowed reserve target over e.g. 8 weeks, since, as argued above, the factors affecting the reserve market, like autonomous liquidity factors, payment volumes, uncertainty, perceptions of the market on liquidity conditions, and range of participants, change every day, and a certain borrowed reserves target would thus mean substantial non-white noise in short term interest rates. Day-to-day monetary policy implementation *means maintaining some level of short term interest rates by permanently adjusting quantities with regard to high frequency, partially transitory shocks, which are not or only marginally related to macroeconomic developments*. Thus, addressing these short run shocks can be left to the central bank implementation experts, who know in detail the working of the reserves market, but can be completely ignorant on macroeconomic analysis. Of course, the technical experts will, in their day-to-day work, care a lot about the relationship between reserve quantities and short term interest rates, but these relationships are just ever-changing and, again, have no significant relation to the macroeconomic state of the economy.

Once this is admitted, it becomes clear that RPD in fact cannot be applied seriously in practice, i.e. reserve quantity concepts can never be operational targets in the sense of being the variable that is announced by the central bank decision making body to be targeted by the central bank implementation experts in day-to-day practice in an inter-meeting period of one or two months. Thus, RPD appears either to be a simple misunderstanding, or as a smokescreen used to disguise the responsibility of the central bank for short term interest rates, and the implied responsibility for the fortunes of savers, investors, speculators, entrepreneurs, employees, etc.

Finally, note one important implication of the SID model on the causality between the recourse to standing facility and the spread between the standing facility(ies) rate(s) and the market rate. In the SID, model, one would view the causality as running from the expected recourse to the facilities to the spread (as spelled out clearly in the Radcliffe report). In contrast, US literature has for the last 80 years tended to assume a reversed causation, e.g. that the lower the spread between the discount rate and the market rate, the lower will be the cost of taking recourse, and thus the higher will be the recourse. Even an RPD-critical author like Goodhart (1989, p. 326), explains that "the demand for borrowed reserves is a function of the margin between market interest rates and the discount rate". Reversed causation statements can be found in the US literature consistently from Fed Governor McDougal in 1921 ("the discount rate policy should be one which should hold those rates at high or slightly higher than the prevailing rates in the commercial centres", see Meltzer, 2003) to Mishkin in 2004 ("a higher discount rate raises the costs of borrowing from the Fed, so banks will take out fewer discount loans.") The origins of this reversed causation perspective are clearly related to RPD, and its associated denial of responsibility of the central bank for short term market interest rates (see Bindseil, 2004, chapter 4, for a more detailed discussion of the "reversed causation fallacy").

## 5. The rise of RPD in the US: 1914-1930

As has been well-documented (e.g. Friedman and Schwartz, 1963, Meltzer, 2003), the organisational set-up of the Federal Reserve System in 1914 suffered from a series of shortcomings. Already Warburg (1930, II, p. 843, which is the reprint of an interview from 1923) summarised:

> "Two dangers gravely menace the future of the Federal Reserve System. The greater of these dangers is the growing political pressure on the Reserve Board, tending to wrench the Reserve System away from sound banking and economic practice... The second is excessive decentralisation, which has produced a serious lack of cohesion in the System..."

In fact not only the post-1923 future, but also the first ten years of the Fed had suffered from these two issues, and in addition, from a lack of experience, a too high influence of commercial banks, and the confrontation to a major challenge, namely the Government's wish to finance WWI at low interest rates. As again Warburg (1930, II, p. 296) puts it: "In the life and death struggle of war, sound economic precepts have to give way to the dictates of self-preservation."

All issues together caused a failure of the Fed to raise interest rates as it would have been required to maintain price stability. The economic impact of the too loose monetary policy of the Fed in its first years was substantial: while the wholesale price index increased from 1914 to 1920 by 150%, it declined in the following phase of restrictive policy (beginning in November 1919) again within two years by around 35%, the latter development being associated with a decline in real GDP of more than 20% (see e.g. Metzler, 2003).

What makes the episode extraordinary in the case of the Fed and distinguishes it from other national monetary histories of WWI and the early 1920s, was the ex post rationalization given to it, namely that the reasons for the inflation in the first six years of the Fed had not been the failure of the monetary authorities to hike short term interest rates, *but excessive borrowing by the banks through the discount window, i.e. not rates were the problem, but quantities*. This switch of paradigm seems to take place rather precisely around 1920, with discussion after this date highlighting consistently the quantity dimension. Two main events seem to explain the switch exactly in 1920 namely (i) the above-mentioned start of the tightening of monetary policy in November 1919 and its substantial impact on economic activity, and (ii) an academic event, namely the invention of the money multiplier by the American C.A. Philipps (1920).

Even Friedman and Schwartz (1963, 250), who are otherwise definitely not in the camp of SID, are astonished by the fact that e.g. in the 1921 annual reports of the Board of Governors, explicit discussion of the Fed's aggressive hiking of interest rates after November 1919 and the implied deflation and recession is avoided:

> "It is hard to escape the conclusion that... this ... is designed to turn aside criticism without either meeting them or making explicit misstatements... For example, in the whole nine-page section, neither the words "discount rate" nor any synonyms occurs... As implied by the absence of the words discount rate, nothing at all is said in the discussion of fundamental principles about the criteria for discount rates or about the effect of the level of discount rates on the total level of Federal reserve Credit... It is natural human tendency to take credit for good outcomes and seek to avoid the blame for bad."

Also Goodfriend (2003) suggests a similar interpretation: "It is no exaggeration to say that the Fed was traumatized by its first use of interest rate policy… After its unhappy experience managing transparent discount rate policy geared to the gold standard in the early 1920s, the Fed set out to rethink its operating procedures…" and borrowed reserves targeting was invented. Again, according to Goodfriend (2003):

> *"Borrowed reserves targeting allowed the Fed to manage short-term interest rates much as before, but less visibly. It appeared to loosen the link between market rates and the discount rate and enabled the Fed to talk about interest rate policy in terms of borrowed reserves rather than short-term interest rates."*

After this denial of previously undisputed monetary policy logic, the Fed for some reason did not manage to really return to normality with regard to its operational target for 70 years. In the early 1920s, we find Fed officials more and more rationalizing why interest rates are secondary, and quantities are more relevant as operational target. An early statement of the new paradigm, RPD, is by Paul Warburg in an interview in 1923 (Warburg, 1930, II, p. 851):[11]

> *"Interviewer: As a check to unhealthy business developments, is a change in the discount rate more, or less effective than open-market operations by the Reserve Banks?*
> *Warburg: Changing the discount rate has the wider influence on sentiment, but its immediate actual effect may at times be slower and less definitive... Open market operations by the reserve banks, on the contrary, have more immediate and definitive effects. By increasing or decreasing its open-market investments, the Federal Reserve System can on its own initiative exercise a strong regulatory effect... When the Federal Reserve System increases or decreases its aggregate of investments, it thereby expands, contracts, or re-establishes the reserves of member banks. It therefore commands very far-reaching effects, because by its open market operations it may lengthen or shorten the reserve base which supports and controls the size of the inverted pyramid of bank loans that rests upon it."*

Open market operations thus had become the key official monetary policy instrument. Open market operations, by injecting free bank reserves, were supposed to trigger credit and monetary expansion via the money multiplier. An inherent element of RPD was right from the beginning the view that recourse to discount borrowing was potentially evil, as the inflation until 1919 had been attributed to excessive recourse to the discount window. To rationalize the failure to hike rates during WWI, it was necessary to argue that raising the level of the discount rate would not have been sufficient to limit monetary expansion, and that therefore, non-price disincentives – mainly moral suasion – were necessary to discourage use of the discount facility. This new approach went so far that discount rates were from then onwards kept below market rates, such as to make clear that moral suasion and burdensome administrative procedures indeed became *necessary* to prevent banks from making use of the facility.

It was of course too obvious that this technique was quite different from the one that the Bank of England had established on the basis of its rich 19th century experience, and Bank officials thus saw a need to defend the change of paradigm in half-official publications. For instance Goldenweiser (1925, p. 46) argues that (rather unspecific) financial and institutional differences would have required a different approach:

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[11] In a speech delivered in 1924, Warburg (1930, II, p. 861) also speaks of "the fallacy of the contention that it is practicable through discount rates to regulate the movement in prices." Warburg had been a member of the Federal Reserve Board from 1914 to 1918.

*"Bank rate in England has traditionally been above the open market rate, and this relationship has been considered as an essential part of credit administration by a central institution. This rate relationship is based on the principle that the central bank must not be resorted by the market, except at times of real necessity and at some expense to the borrower, who must pay more for money obtained from the central bank than he receives from his customers on his own loan...The conclusion... is, that while there are many analogies between banking conditions and practices in this country and in England, there are sufficient differences in the nature of the money market and in the character of services rendered by the Bank of England and the Federal reserve banks, to make it impossible to follow British precedents in American banking practice."*

One may conclude that within the few first years of the 1920s, through a surprising rationalization of the war inflation, and certainly inspired by the appearance of he money-multiplier in 1920, RPD was born, with all its elements that would persist until the end of the 20th century and which until today populate monetary economics textbooks. Still, if we look at some other, less official publications of staff members of the Fed, like Burgess (1927), and Riefler (1930), one feels that debate is still there, and that the new paradigm is not yet taken for granted against the classical techniques of the Bank of England.[12] Nevertheless, it appears that RPD was consolidating more and more, as also being documented by the replacement, in 1930, of the OMIC (Open market investment committee) by the OMPC (Open market *policy* committee), which itself is replaced in 1935 by the FOMC. Thus, monetary policy is supposed to have become open market operations policy, i.e. policy of controlling the amount of reserves through open market operations. The FOMC has maintained its name until today, even if there is no doubt that the FOMC has (again) adopted SID.

The interpretation of the early Fed experience provided here is broadly in line with Goodfriend (2003), but somewhat in contradiction to Meltzer's (2003) and Humphrey's (2001). For instance Humprey (2001, 66) argues that

*"... the Fed deliberately shunned the best empirical policy framework that mainstream monetary science had to offer. Developed by Irving Fisher and other U.S. quantity theorists, this framework was the outcome of an evolution in numerical measurement that had been occurring in monetary economics since the early years of the 1900s.... Here was a framework the Fed could use to conduct policy and to stabilize the economy. Yet the Fed refused to have anything to do with this framework and its components. Instead of concentrating on the money stock, the price level, and other indicators featured in the quantity theory, the Fed focused on such measures as the level of market interest rates,*

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[12] Meltzer (2003) calls the operational doctrine developed by the Fed during the 1920s the "Riefler-Burgess doctrine". In his review of Meltzer's book, Laidler (2003) summarises this doctrine as follows: "The Riefler-Burgess doctrine started from the observation that member banks tended to reduce their borrowing from the Fed when it made open market purchases of securities, and decreased them in the wake of open market sales. This "scissors effect" was explained by postulating that the banks were always reluctant to be in debt to the Fed, and it was argued that, as a result, their level of indeptedness could be used as an indicator of the stance of policy. Open market purchases thus gave the banks the funds needed to reduce their discounts and eased policy, while sales forced them to borrow, and tightened it." One may find that this supposed doctrine should be split up into two elements. The first one is the relationship between open market operations and the recourse to standing facilities, which was part of the "orthodox doctrine" of the Bank of England (see e.g. Keynes, 1930), and which is nothing more than a reflection of the central bank balance sheet identity. It is therefore doubtful whether one should attribute this insight to Burgess and Riefler. The second point within the supposed Burgess-Riefler doctrine is the claim that indebtedness, i.e. a quantity, is an appropriate measure of the monetary policy stance. Obviously, we would deny this from an SID perspective, and argue that making indebtedness an indicator of the stance, without focussing on the impact on short term money market rates, was just an early statement of RPD, namely in its "borrowed reserves" variant. Actually, both Burgess and Riefler do not, compared to official Fed statements of that time, appear to be strong supporters of such an approach. At the contrary, the analysis in their respective books seems rather differentiated, still being influenced by the Bank of England's orthodox view (i.e. by SID).

*the volume of member bank borrowing, and the type and amount of commercial paper eligible for rediscount at the central bank."*

Humphrey, maybe in the tradition of Poole (1970), does not seem to distinguish sufficiently between concepts of monetary policy *implementation*, and concepts of *macroeconomic monetary analysis*. Maybe Humphrey is right to argue that the Fed should have relied more on Irving Fisher's quantity theory as macro-theoretical basis to guide the setting of its operational target across time. But this does not imply that in its day-to-day operations, it should not have looked in particular at short term market rates (as operational target), at the use of standing facilities and at the types of eligible papers (both being important practical parameters of day-to-day implementation). All central banks presently do so, independently of what role they attribute to the quantity theory of money, and it is thus not obvious to criticise the Fed for having done so in its early years. If any critique is appropriate (apart from the one that the Fed maybe did not have an adequate macro-theory), then it is the one that also the Fed mixed up the two things, and by leaning towards borrowed reserves targeting, inappropriately applied quantity-oriented thinking to day-to-day monetary policy implementation, instead of replicating the implementation techniques used e.g. by European central banks and the Bank of England in particular.

## 6. RPD according to Keynes

From the early 1930s until the early 1950s, monetary policy had, in the US and many other countries, a break in the sense that short term interest rates were anyway at or close to zero, and that the main danger was deflation, not inflation. RPD emerged in the US with consolidated dominance after this break. It is plausible that one reason for this was the enthusiastic support to RPD by Keynes, mainly in the second volume of his Treaties on Money of 1930. This support seems surprising today, the more as Keynes' argumentation appears to have obvious weaknesses. Maybe two psychological factors may help to understand what went on in Keynes' mind when he provided such transatlantic help to RPD. First, Keynes of course liked modern, affirmative approaches, and RPD, having emerged in the 1920s from scratch, was exactly such a theory. Secondly, RPD was, as will be described below, systematically ignored by the Bank of England, and Keynes had more and more during the 1920s become a general arch-critic of the "orthodoxy" of the Bank of England. Praising RPD was thus also an additional way for Keynes to attack the Bank of England's supposed refusal to accept modern thinking.

Nevertheless, Keynes' (1930, p. 226) defense of RPD is very interesting, because it more explicitly addresses a number of related key issues than any other author of his time, and thus guides us today most easily to the weaknesses of RPD:

> *"The first and direct effect of an increase in the Bank of England's investments is to cause an increase in the reserves of the joint stock banks and a corresponding increase in their loans and advances on the basis of this. This may react on market rates of discount and bring the latter a little lower than they would otherwise have been. But it will often, though not always, be possible for the joint stock banks to increase their loans and advances without a material weakening in the rates of interest charged".*

Today, and that should have been valid also in the 1920s, one would argue that the money market rates obviously always react faster than the loan and investment policy of commercial banks, i.e. it is precarious to assume that "the first and direct effect" of excess reserves are additional loans. As is well known to anybody who had been in direct contacts to money markets at least since Bagehot (1873), small excesses or deficits in the money market are sufficient to push interest rates to zero or to very high levels, respectively (or to the levels of

central bank standing facilities). In addition, whoever has worked in the credit department of a commercial bank, will confirm that the decision to grant a loan is never done on the basis of the bank's current level of excess reserves. Excess reserves can be traded in the money market, and what matters is their opportunity cost[13]. Seeing perhaps the flaw in his argument, Keynes (1930, p. 227) takes recourse to more sophisticated reasoning:

> *"I fancy that a considerable part of the value of open market operations delicately handled by the central bank may lie in its tacit influence on the member banks to move in step in the desired direction. For example, at any given moment a particular bank may find itself with a small surplus reserve on the basis of which it would in the ordinary course purchase some additional assets, which purchase would have the effect of slightly improving the reserve positions of the other central banks, and so on. If at this moment the central bank snips off the small surplus by selling some asset in the open market, the member bank will not obstinately persist in its proposed additional purchase by recalling funds from the money market for the purpose; it will just not make the purchase... In this way a progressive series of small deflationary open-market sales by the central bank can induce the banks progressively to diminish little by little the scale of their operations... In this way, much can be achieved without changing the bank rate."*

But again, the assumptions taken appear too arbitrary and to lack micro-foundation. What one finds today least convincing is that the whole argument seems to rely on a lack of willingness of the banks to arbitrage, which is not even well explained. In fact, Keynes (1930) himself recognizes that his enthusiasm for open market operations goes beyond the one of many central bankers of the 1920s, including Benjamin Strong.

Finally, it is worth noting that Keynes also promoted the idea to actively use *changes* of reserve requirements for the control of excess reserves of banks, and thus, via the money multiplier, of credit and monetary expansion. Keynes (1930, pp. 65-68) introduces the case by an example from the UK, in which no reserve requirements were imposed at that time:

> *"The Midland Bank had... maintained for some years past a reserve proportion a good deal higher that those of its competitors... beginning in the latter part of 1926, a gradual downward movement became apparent in the Midland Bank's proportion from about 14.5% in 1926 to about 11.5% in 1929... this... in fact enabled the banks as a whole to increase their deposits (and their advances) by about GBP 100 million without any new increase in their aggregate reserves... Now, as it happened, this relaxation of credit was in the particular circumstances greatly in the public interest...*
> *Nevertheless, such an expansion of the resources of the member banks should not, in any sound modern system, depend on the action of an individual member bank... For we ought to be able to assume that the central bank will be at least as intelligent as a member bank and more to be relied on to act in the general interest. I conclude therefore, that the American system of regulating by law the amount of the member bank reserves is preferable to the English system of depending on an ill-defined and somewhat precarious convention."*

Keynes (1930, p. 68) then proposes a concrete specification of a reserve requirement system, to conclude enthusiastically on its power: "These regulations would greatly strengthen the power of control in the hands of the Bank of England – placing, indeed, in its hands an almost complete control over the total volume of bank money – without in any way hampering the legitimate operations of the joint stock banks." This argumentation was taken up by central

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[13] In addition, several other considerations, not relating to excess reserves, are key to the decision of granting a loan, like in particular the credit risk assessment.

banks, and for instance the Board of Governors (1954), (1964), (1974) lists the three main instruments of monetary policy implementation as follows: "Discount operations, Open market operations, *Changes* in reserve requirements" (emphasis added), i.e. reserve requirements were a relevant tool especially in so far as they could be changed. Indeed, both the Fed and e.g. the Deutsche Bundesbank frequently changed reserve ratios from the 1950s to the 1970s, giving evidence that RPD also determined their understanding of this instrument of monetary policy. As one example of the countless changes of reserve requirements in the US during that period, and how directly they were apparently motivated by RPD, consider the following Fed policy action of August 1960 (from Annual report, Digest of principal federal reserve policy actions; similar changes were implemented again in November of the same year):

> *"Authorized member banks to count about $500 million of their vault cash as required reserves, effective for country banks August 25 and for central reserve and reserve city banks September 1.*
> *Reduced reserve requirements against net demand deposits at central reserve city banks from 18 to 17 ½ per cent, effective September 1, thereby releasing about $125 million of reserves".*

## 7. RPD according to monetarism

Generally, monetarists, who liked quantities, but tended to dislike the idea of central bank control of (short term) interest rates, broadly supported RPD, although they were often not so keen on being bothered with a need to split up their most cherished concept for monetary policy implementation, the monetary base, into petty-minded technical concepts like excess reserves, free reserves, borrowed reserves, etc. It seems likely that popular monetarists like especially Friedman played an important role to prevent RPD from being silently buried already in the late 1960s.

The maybe most detailed discussion of monetarist theory applied to monetary policy implementation is Friedman (1960). Friedman (1960, pp. 50-51) argues that open market operations alone are a sufficient tool for monetary policy implementation, and that standing facilities (e.g. the US discount facility) and *changing* of reserve requirements could thus be abolished:

> *"The elimination of discounting and of variable reserve requirements would leave open market operations as the instrument of monetary policy proper. This is by all odds the most efficient instrument and has few of the defects of the others... The amount of purchases and sales can be at the option of the Federal Reserve System and hence the amount of high-powered money to be created thereby determined precisely. Of course, the ultimate effect of the purchases or sales on the final stock of money involves several additional links... But the difficulty of predicting these links would be much less... The suggested reforms would therefore render the connection between Federal Reserve action and the changes in the money supply more direct and more predictable and eliminate extraneous influences on Reserve policy."*

What may be most striking in Friedman's (1960) analysis is his silence on the role of short term interest rates and in particular about the fact that his proposals would imply a high volatility at least of short and medium term rates. Similarly, Friedman and Schwartz (1963) in their critique of the Fed policy in the 1930s, show little curiosity for interest rates, but argue again and again in a strict multiplier framework. They follow the historical development of the monetary base and monetary aggregates to argue within the multiplier model that open market operations could

have increased the monetary base and hence the money stock, preventing or at least attenuating the crisis of the 1930s (p. 393):

> "If the deposit ratios had behaved as in fact they did, the change from a decline in high powered money of 2 ½ per cent to a rise of 6 ½ per cent... would have changed the monetary situation drastically, so drastically that such an operation was almost surely decidedly larger than was required to convert the decline in the stock of money into an appreciable rise."

The probably most extreme statements of monetarist views on monetary policy implementation can be found in Friedman (1982). Friedman (1982, p. 101) summarizes what he regarded as the predominant opinion on monetary policy implementation at that time, and what could not be more different from today's homogenous view of central bankers (or the pre-1914 view, etc.):

> "Experience has demonstrated that it is simply not feasible for the monetary authority to use interest rates as either a target or as an effective instrument... Hence, there is now wide agreement that the appropriate short-run tactics are to express a target in terms of monetary aggregates, and to use control of the base, or components of the base, as an instrument to achieve the target".

He then elaborates a rather concrete proposal regarding open market operations:

> "Set a target path for several years ahead for a single aggregate – for example M2 or the base. … Estimate the change over an extended period, say three or six months, in the Fed's holdings of securities that would be necessary to approximate the target path over that period. Divide that estimate by 13 or 26. Let the Fed purchase precisely that amount every week in addition to the amount needed to replace maturing securities. Eliminate all repurchase agreements and similar short-term transactions."

This proposal is in fact neither a reserves, nor a monetary base target, but an "open market operations quantity" target, and thus an additional variant of an RPD inspired operational target of monetary policy. It is again too difficult to imagine how this proposal would work in practice, and why it should make sense if we accept the realities of the money market as first described by Bagehot.

Despite the trend of the last 20 years back towards SID, monetarists have insisted on their views on monetary policy implementation until very recently. In a Wall Street Journal article of 20 August 2003, Friedman again advocates his approach as described for instance in 1960 and 1982. Meltzer (2003) also reviews the Fed's early history largely from a RPD perspective, and argues, without a reference to interest rates, that (pp. 62-63) a "complete theory of the monetary system" requires studying all aspects of the monetary base (and its components).

Although today's central bankers are likely to reject the monetarist approach to the choice of the operational target of monetary policy as just one more, and even particularly reality-distant, variant of RPD, Friedman needs to be praised for having always insisted on the point that a target that is not quantified (i.e. for which no concrete figure is given), cannot be a serious target, and leaves in the dark what the central bank is actually aiming at. This includes the operational target, which the Fed did not want to specify since 1920. By insisting that the Fed should concretely quantify its supposed quantitative targets, he eventually contributed to push it into the 1979-82 episode, which then revealed so easily the non-practicability of RPD. It is the more astonishing that Friedman has remained an un-compromised supporter of RPD until today.

### 8. "Dogs may bark, but the caravan moves on"[14]: RPD's failure to conquer the Bank of England

Although the UK had gone through an as bad inflation as the US during the war, and both went through deflation in the 1920s to restore the pre-war gold standard, the two central banks in 1920 could not have been more different. The Bank of England had a well-elaborated money market technique in 1920, derived from a century of experience. It had a fair degree of independence from the Government, and was not decentralised as the Fed (see e.g. Sayers, 1976). Also, it completely lacked the transparency to which the Fed was committed since its very start, implying that it did not need to rationalise anything through theory, i.e. it also did not need to rationalise failure through fallacious theory, as the Fed was tempted to do in the early 1920s. In this respect, it is amusing to consider the following excerpt from the MacMillan Committee minutes of 1929, which is also an example for the relationship between Keynes (who was member of this Committee) and the Bank (Sayers, 1976, Vol. III, p. 154-156; Governor Norman had shown so little interest in these hearings that he sent his deputy Harvey to most of them):

> Committee member Gregory: "I should like to ask you, Sir Ernest, whether you have ever considered the possibility of the Bank issuing an Annual Report on the lines of the Annual Report of the Federal Reserve Board, for instance?"
> Deputy Governor Harvey: "I confess I am sometimes nervous at the thought of publication unless it is historical. The question is whether, when it is merely historical it is of any particular value, or whether from the fact that it is issued from the central bank undue importance may be attributed to certain things that are stated, more importance than perhaps they merit."
> Committee member Keynes: "Arising from Professor Gregory's questions, is it a practice of the Bank of England never to explain what its policy is?"
> Harvey: "Well, I think it has been our practice to leave our actions to explain our policy."
> Keynes: "Or the reasons for its policy?"
> Harvey: "It is a dangerous thing to start to give reasons."
> Keynes: "Or to defend itself against criticism?"
> Harvey: "As regards criticism, I am afraid, through the Committee may not all agree, we do not admit there is need for defence; to defend ourselves is somewhat akin to a lady starting to defend her virtue."

Also the personality of Governor Montagu Norman (1919-1944) was probably relevant to keep RPD outside the Bank. Himself being an experienced banker and financial markets expert, and the ideal-type of the conservative, independent central banker, he had little sympathies for academic ideas as RPD and their intellectual promoters as Keynes. According to Boyle (1967, 160), Montage Norman looked already in the early 1920s "askanced at Keynes as a clever dilettante with an even greater potential for public mischief…" And Boyle even sees

> "… an unnecessary tragedy: Norman, in his petulance, resolved to keep at arm's length a man he regarded as a brilliant but irresponsible individualist, forgetting that responsibility comes when the most uncooperative of individualists can be brought into line by being offered a constructive task... The reaction was human enough; but it gradually deepened into secretive, wholly irrational mistrust of Keynes and all he stood for".

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[14] In a speech delivered in 1938, Bank of England Governor Montagu Norman made reference to this Arab proverb, which caused renewed criticism of his supposedly arrogant attitude, "the stereotyped villain of the thirties…, the sinister, hard-faced banker" – see Boyle, (1967, 288-290).

The described antagonism may eventually explain more why Keynes in 1930 so enthusiastically supported RPD, than why Norman was against: Norman would have been against it without Keynes, but maybe Keynes was only so much in favour because the Bank of England ignored the new paradigm.

After Governor Norman quitted in 1944, and the Bank of England was nationalised after WWII, it is still hard to find any references to RPD in the few publication of the Bank of England. Also the Radcliffe (1959) report seems to be, in terms of implementation technique, quite still in the logic of the "orthodox doctrine" of the pre 1914 Bank of England.

From the early 1970s onwards, the growing academic influence of monetarism again put the Bank under pressure to adopt quantitative concepts. In 1972, a first episode of changes in operational procedures occurred "… to obfuscate the fact that short-term interest rates were set by the monetary authorities", however more under the Government's than under monetarists' pressure (Goodhart, 2004). In 1980, the Bank published a note on "Methods of monetary control", which again argued for disguising the interest rate target, this time clearly from a monetarist perspective. In 1982, the Bank of England announced officially some changes of operational procedures in 1982 (Bank of England, 1982), which was however, according to Goodhart (2004), not more than a "consolation price" to monetary base control advocates. The changes aimed at allowing to reduce somewhat the control of short-term interest rates, and reflected the idea shared by many monetarists that if one wishes to control monetary aggregates, one cannot continue controlling short term rates in the money market. The Bank's *"aim would be to keep very short-term interest rates within an unpublished band, set by the authorities by reference to the general monetary situation… Behind these proposals lay the desire to introduce a system which, while preserving the Bank's ability to influence short-term rates, would generally permit market forces a greater role in determining their structure. To allow such play for market forces, the system of pre-determined dealing rates had to be abandoned."* However the Bank of England was apparently not willing to follow also *in practice* the US. It insisted that the changes of the money market procedures provided only "a framework within which it might be possible to operate some form of monetary base control, although it is not currently being used so" (p. 94). Eventually, the Bank of England (1982) again explicitly defended interest rate control, clarifying that selecting the short term interest rate as operational target does not contradict that monetary aggregates may be an intermediate target, or an important indicator variable (such as Thornton had already assumed in 1802):

> *"The Bank cannot avoid involvement in money market operations, and so, either explicitly or implicitly in the determination of interest rates. The authorities have in fact chosen to continue to exercise substantial influence over very short-term interest rates as a positive element of economic policy. Nevertheless, the operations may be designed to influence the stock of money indirectly, through their effect on interest rates. Indeed, the desire to retain a fairly direct influence over interest rates rests on the view that these may have a significant effect on, for example, the demand for money, the demand for credit, and the exchange rate, with consequences for the development of the economy more generally."*

Once the Fed had given up non-borrowed reserves targeting procedures in 1982, pressure on the Bank of England to adopt RPD faded away (Goodhart, 1989 and 2004), and the Bank of England thus eventually had a very narrow escape from applying RPD at any moment during the 20th century.

### 9. RPD in the Fed's pre-Volckerian practice: 1920-1979

While it is easy to find out how the Fed officially presented RPD (e.g. Annual Reports, Board of Governors booklets), it is less evident to describe what elements of RPD were really put into practice. As argued above, RPD is not really suitable for practice, as the central bank cannot escape controlling short term interest rates, and as it is the short term interest rate which matters as very starting point of the transmission mechanism. Indeed, RPD in pre-Volckerian Fed practice always remained fuzzy. Still, one can identify three practical features of the Fed's monetary policy in the period 1920-1974 (and 1979-82), which are definitely reflecting RPD:

- Between 1920 and 2002, the Fed restricted recourse to the discount window through moral suasion and administrative burden. Recourse to the discount window is considered evil under RPD because it is supposed to imply that the banking system itself exerts influence on reserves. Monetary aggregates, which depend on reserves via the money multiplier, would thus be out of CB control.
- Denying responsibility for short-term interest rates was translated in practice into avoiding any operations, which would suggest such responsibility. Both a discount window being regulated uniquely by the price mechanism, and Bank of England – style open market operations specified as fixed rate tender thus needed to be avoided. Indeed, the Fed has always conducted its open market operations through variable rate tenders.
- Not specifying exactly the operational target. In contrast to short-term interest rates, which can be controlled at any degree of precision wished by the central bank, the Fed never insisted to indeed steer any reserve quantity with exactitude. Thus, the Fed never committed to a precise level of its operational target (maybe with the exception of the 1979-82 episode), and one could thus argue that there was never any precise operational target at all in the Fed's practice from 1920 to 1974.

Apart from these features of RPD, which are general for the Fed in the period considered, different phases of applied RPD can be distinguished (see Meulendyke, 1998, or Strongin, 1995, for a more detailed description).

The period **1920-1930** appears to be characterised by a relatively un-dogmatic application of RPD. After the refusal to discuss the level of the discount rate in the early 1920's Annual reports, this ban is soon lifted and open market operations and discount rate setting are presented in the Annual reports jointly as main policy measures. Still, no explicit responsibility for short term rates is taken, and changes of discount rates are often presented as *following* changes in market rates.

**1931-1952**: During this period, the Fed tended to leave the market with substantial excess reserves, such that money market rates were mostly close to zero (and reflected to a significant degree credit risk). According to Friedman and Schwartz (1963), the Fed would have been too restrictive in its excess reserves policy during the 1930s which would have contributed to shrink monetary aggregates, i.e. they criticise that the Fed would not have acted in the light of RPD and the assumption of a stable money multiplier.

**1952-1970**: The official approach of the Fed during this period was "free reserves targeting", i.e. targeting of excess reserves minus borrowed reserves. The practical approach was eclectic both with regard to the measurement of the monetary conditions (as suggested by the above-mentioned quote of Anderson, 1969), and with regard to the use of instruments. Annual reports provide evidence that changes of reserve requirements, open market operations, and changes of the discount rate were all actively used, whereby the latter was again normally presented as following market rates, instead of guiding them. Taking in addition into account the frequent

changes with regard to "direct measures of monetary control", like margin requirements or deposit rate ceilings, one gets the impression that monetary policy was overly complex, and that the effects of all the policy measures and their interaction cannot really have been well controlled.

**1970-1974**. Towards the end of the 1960s, the federal funds rate was becoming more important as an indicator of monetary policy. However, in 1972, another quantitative operational target was defined, namely *reserves on private deposits* (a subset of total required reserves). According to Meulendyke, 1998, the FOMC set two months growth rates for this quantity, consistent with the desired M1 growth and instructed the Fed New York trading desk to alter reserve provision in a way to achieve the targets. However, fearing that this would raise the fed funds volatility, the FOMC also constrained the fed funds rate. In fact, the relatively narrow fed funds rate limits eventually dominated, and the reserves targets were often missed. In 1973, reserves on private deposits were redefined from an operational to an intermediate target, taking its place with M1. It was dropped as an indicator in 1976.

In the period 1974-1979, the Fed implicitly targeted a federal funds rate level, intervening in the market whenever the fed funds rate moved out of a very narrow band (see e.g. Cook and Hahn, 1989).

## 10. Volckerian RPD (1979-82)

The Fed's monetary policy in the 20th century took twice a strong des-inflationary stance causing economic recession and unemployment: in 1919-1921, and in 1979-82. The first period witnessed the birth of RPD, while the second witnessed the only real attempt of its application. In October 1979, Paul Volcker became chairman of the Board of Governors and felt that inflation, which had two-digit levels during most of the 1970s needed eventually to be stopped. The Fed concluded that the time was ripe for taking a monetarist approach also serious in day-to-day monetary policy implementation, by substituting interest rate targeting by an RPD target, which this time was defined as *non-borrowed reserves*, i.e. reserves held by banks minus borrowed reserves, the recourse to the discount window.

Although Axilrod and Lindsey (1981) provided an official scientific motivation for the 1979-82 approach, it seems difficult today to reconstruct what was exactly done. According to Strongin (1995, p. 475):

> *"Non-borrowed reserves targeting was the most complicated of the reserves operating procedures that the Federal Reserve has ever used and it lasted the shortest length of time.... Considerable debate within the Federal Reserve system about how these procedures actually worked is still going on."*

Following Meulendyke, 1998[15], the Fed began to target reserve measures derived from desired three months growth rates of M1. For the federal funds rate, a target corridor of around 5 per cent was set. In practice the FOMC first chose the M1 target for the calendar quarter and asked staff to estimate consistent levels of total reserves, which was challenging due to the various different reserve ratios on different types of deposits. From the total reserve target, the trading desk derived the non-borrowed reserve target by subtracting a level of borrowed reserves that had been indicated by the FOMC. The Board of Governors staff made estimates of consistent combinations of borrowed reserves and money growth for the given discount rate. Since lagged reserves accounting prevailed at that time, the reserves in fact could not be controlled

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[15] Another account is Goodhart (1989). A detailed modelling attempt is provided by Goodfriend (1983).

immediately. An increase of money above the target meant with some lag, reserves beyond target, and, in case the Desk was unwilling to provide the non-borrowed reserves, an increase of discount window lending (and hence of the fed funds rate). The domestic policy directive formulated by the FOMC and effective on 1 January 1980 for instance specified:

> *"...the FOMC seeks to foster monetary and financial conditions that will resist inflationary pressures while encouraging moderate economic expansion... The Committee agreed that these objectives would be furthered by growth of M-1, M-2, and M-3 within ranges of 1 ½ to 4 ½ %, 5-8%, and 6-9%, respectively...In the short run, the Committee seeks to restrain expansion of reserve aggregates to a pace consistent with decelerating in growth of M-1, M-2 and M-3 to rates that would hold growth of these monetary aggregates ... within the Committee's longer run ranges, provided that in the period before the next regular meeting the weekly average federal funds rate remains within a range of 11 ½ to 15 1/2 %."*

It is noteworthy that even at that time, the Fed felt unable to quantify its quantitative operational target (although it could quantify the intermediate monetary targets), but complemented the correspondingly vague quantitative operational targets with a concrete and explicit corridor for the federal funds rate. One is thus tempted to conclude that the idea of a quantitative operational target remained a spectre even under the hardest attempt ever to give substance to it.

Furthermore, discretion was eventually never eliminated, and the FOMC often changed the mechanism and gave leeway to the Desk to make adjustments[16]. To reduce over-weighting of weekly developments, the targets were formulated as averages for the inter-meeting periods (the FOMC started to meet in a rhythm of 8 weeks in 1981), which had the draw-back that towards the end of this period, very large adjustments would often have been needed. Again, discretion finally prevailed to avoid that taking quantitative operational rules too seriously would create excessive volatility of short-term rates. Market participants of course closely observed the behavior of M1 in order to anticipate future moves of the fed funds rate. Although the procedure was expected to create more interest rate volatility, the actual result surprised everybody negatively, especially since it not only increased the fed funds volatility, but apparently even the one of monetary aggregates. In 1980, the Monetary control act with its changes to the reserve requirement system and subsequent deregulatory measures triggered further changes in the evolution of M1 and M2, and possibly contributed in 1982/83 to a weakening of the relationship between these monetary aggregates and economic activity / prices. This was taken as a good excuse to change again operating procedures in 1983.

Today's views on the Volcker episode are split. Some, as 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 or 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, reveal 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). Although this "political economy" explanation is plausible to some extent, and is also in line with the interpretation given to the sudden rise of RPD in the Fed's discourse at the beginning of the 1920s, one should probably also agree that Volcker and his FOMC colleagues were at least

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[16] For instance Cook (1989, 4) concludes that "while some of the movements in the funds rate over this period resulted from the automatic adjustment, most of the movement – roughly two-thirds – was due to judgemental actions of the Federal Reserve".

partially convinced by RPD. Also the transcripts of the FOMC meetings of that period, which can be found on the Board of Governor's website, suggest that serious discussion on the non-borrowed reserves targeting approach took place, and that this was *not* only play-acting in the anticipation of a public release of transcripts many years after (this future release was not known at the time of the meetings). These transcripts also illustrate one further reason why eventually the Volckerian approach had to be abandoned: it was overly complex in its formulation of various operational and intermediate targets. For instance in the transcript of the meeting of 31 March 1981, which is the oldest one made available on the Board's website, Volcker needs to admit on four occasions that he is "confused" or "lost", and also FOMC members Solomon, Corrigan, Black and Ford admit at some stage being "confused" about what they are really doing. Such remains the reader of these transcripts.

As the early 1920s saw the birth of RPD, the early 1980s could be regarded as its climax – but also as the beginning of its decline. In 1980, the BIS had edited a volume dedicated uniquely to the "monetary base approach" to monetary policy implementation, although most central bank practitioners writing in that volume expressed reservations (BIS, 1980). The US Monetary Control Act, prescribing RPD based features such as contemporaneous reserve accounting[17], came ironically into force in 1983, just after non-borrowed reserve targeting had been given up due to its impracticalities. From 1983 onwards, RPD has been in steady decline, i.e. both the rhetoric of central banks and monetary policy implementation technique has, piece by piece, eliminated elements motivated by RPD. Also academic work started to turn away from RPD, although the related process does not seem to be over.

## 11. The decline of RPD

The following will briefly review the gradual loss of influence of RPD, and the still ongoing process of adjusting monetary policy implementation technique and textbooks towards SID. The focus will be on the US, but various other countries, which went at least far beyond the UK in adopting elements of RPD, have moved away from it in parallel to the US Fed. The first sub-section will summarise again one more time why RPD is wrong, which is probably the fundamental reason why RPD eventually fell apart, even if that only happened after 60-80 years. The second sub-section reviews the main steps of RPD's decline.

### 11.1 Why RPD is flawed
Before describing the decline of RPD, one should briefly summarise why RPD was bound to fail as being a fallacious doctrine, at least if understood as a doctrine supposed to be useful in practice. For this, one may distinguish between the monetary base approach, and alternative quantitative approaches, which were developed in view of the problems with direct monetary base targeting.

*The monetary base approach.* *First*, the monetary base is a heterogeneous composite quantity since it consists of banknotes and reserves (which are themselves subdivided into *required* and *excess* reserves). Only under extremely strong assumptions, changes in these three very different components would be equivalent. *Secondly*, and this is related, there are doubts about the predictability and stability of the money multiplier, especially in case one whishes to base policy actions on it (see e.g. Garfinkel and Thornton, 1991; the monetarist view advocating a sufficient degree of stability of the multiplier is found e.g. in Johannes and Rasche, 1979). In particular, the multiplier is unlikely to remain stable when interest rates move towards zero,

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[17] As argued for instance in Friedman (1982), contemporaneous reserve accounting, i.e. an overlap between the calculation of the reserve base and the reserve maintenance period, would be key to the RPD approach to monetary policy implementation.

since banks then no longer care about holding excess reserves. In so far, when monetary growth is deemed insufficient and excess reserves are injected to make the banks expand credit, the result will be first, in an efficient market, that short term inter-bank interest rates drop to zero (if there is no deposit facility). The fact that interest rates have dropped to zero is of course relevant, and if judged to be permanent for a longer period of time, also medium and longer term rates will drop and economic decisions will be affected. However, once interbank rates have fallen to zero and the central bank continues to increase excess reserves through open market operations at zero interest rates, not much more should happen, i.e. the money multiplier should fall with every further reserves injection. It is insofar difficult to really construct a story where an injection of reserves by the central bank through open market operations sets into motion monetary expansion independently from the interest rate channel. *Third*, any attempt to control in the short run the monetary base leads to extreme volatility of interest rates since the market will, due to the stochastic and seasonal fluctuations of the demand for base money, permanently either be short or long of reserves, as already observed by Bagehot (1873) and illustrated by pre-Fed US experience. One of the core ideas of central banking is to provide an "elastic currency", i.e. one in which the important transitory fluctuations in base money demand no longer need to disturb via interest rate effects economic conditions. What matters for the key economic decisions, namely to save or consume, to borrow and invest, are interest rates mainly of medium and longer maturity. With an extreme (and non-white noise) volatility of short-term rates, volatility of longer-term rates will also increase. Such volatility will create noise in economic decisions, and hence lead the economy away from equilibrium. Therefore, a necessary condition for promoting monetary base targeting seems to be that interest rates do not matter at all.

*Alternative quantitative concepts as operational targets.* Being confronted to the conceptual problems of strict monetary base targeting, while still aiming at a framework in which monetary policy transmission could be defined only in terms of quantities from the very start, alternative quantitative targets were soon developed by the Fed and academics (total, free, non-borrowed, borrowed reserves, etc.). By focussing on specific reserves concepts, these approaches eliminated the defect of monetary base targeting to put three fundamentally different things, namely banknotes, required reserves, and excess reserves, into one basket. Also, controlling these quantities in the very short run was clearly easier than controlling the monetary base. However, these approaches were correspondingly less directly linked to the money multiplier story, and therefore needed additional more complex theoretical justification. Although some justifications were given, one would deny today that they were clear. The non-borrowed reserves target applied in the US from 1979 to 1982 was not only complex to derive (see above), but also created volatility of both longer-term interest rates and of monetary aggregates. The free and borrowed reserves targets in contrast seem to be rather close to an interest rate target: their theoretical justification beyond being substitutes for short term rates appear so weak, and their use was in practice so little transparent, that it seems that they were always smokescreens for short term interest rate targeting (see e.g. Goodfriend, 2003). A key assumption to make sense of most alternative quantitative concepts seems to be that it matters for a bank whether reserves are obtained through the borrowing facility or not. However, this assumption ignores the fact that there is (and there has been since the times of Bagehot at least) a highly efficient interbank market for reserves. When lending and borrowing, be it towards other banks or the central bank, banks behave as optimizing agents focusing normally on cost, opportunity cost and return, i.e. on interest rates. Ignoring the optimization behavior of banks in this market and the resulting price formation is hard to justify for economists. Furthermore, today's systematic use of *reverse* open market operations makes even less convincing to base monetary policy implementation on a differentiation between "borrowed" and "non-borrowed" reserves.

***Is the right choice of the operation target an empirical question?*** Although not being in the RPD camp, for instance B. Friedman argued in 1990 that the "modern literature on the subject dates from the formalization of Poole (1970)" (p. 1189) and that "the Poole analysis in this general form has proved highly useful", with "a key part of its contribution has been to establish the *inescapably empirical nature*" of the issue (p. 1192, emphasis added). This view has been re-iterated in much of the modern literature in the Poole (1970) tradition. Although certainly not wrong in a logical sense, from a practical central banker's point of view, insisting that the choice of the operational target is an empirical question is not of serious interest in the sense that the parameter values under which a case for a quantitative operational target could be constructed is beyond what the practitioner conceives to be the relevant set of possible parameter values.

Finally, it is worth coming back to one pro-RPD argument that has been mentioned on occasions ever since Friedman (1960) first alluded to it, namely that banks could *adapt* to a strict quantitative approach to monetary policy implementation, i.e. that if done properly, banks would find ways to avoid that such an approach would imply excess volatility of interest rates. First, one may argue that especially pre-1914 US history of money argues exactly against this, i.e. before the Fed contributed to an "elastic currency", i.e. one in which money was made accessible at a stable interest rate (through the discount window, or through "defensive" open market operations), the banking system was not able to find devices to avoid extreme short term fluctuations of interest rates, with all of its problematic implications. For instance Burgess (1927, pp. 278-279) quotes a report by the Senate Banking and Currency Committee of November 1913 which gives evidence of the incredible volatility of interest rates before the setting up of the Fed: "…during the year 1907 the range of interest for money was from 2 to 45% in January, from 3 to 25% in March, from 5 to 125% in October, from 3 to 75% in November, and from 2 to 25% in December." (This is also in line with Bagehot's analysis of the London money market provided in section 3). Secondly, one could argue that the 1979-82 experiment clearly argues for the inability of banks to cope well with quantitative operational targets, especially since even monetary quantities became more volatile than usual under this regime. Of course, one may always argue that RPD was not implemented the right way by the Fed, and that if it would have been, banks would also have quickly adapted to it (and this is indeed how Friedman, 1982 argued).

## 11.2 Steps in RPD's decline
Now, consider the following changes in monetary policy implementation technique that took place in the US from the 1980s onwards, and that document the gradual decline of RPD's practical influence:
- Already starting during the 1970s, *changes* of reserve requirements are no longer used as a frequent tool to provide or absorb excess reserves of banks. This could however be regarded as reflection not of the general decline of RPD, but of the fact that the monetarist version of RPD, as advocated by Friedman (1960), eventually gained over some elements promoted by Keynes (1930).
- Again, already in the 1970s, reverse open market operations (repos) become the predominant tool of central banks to steer reserve market conditions, questioning the strict distinction in the US RPD literature between "borrowed" and "non-borrowed" reserves, as well as the praising of open market operations and the condemnation of discount window borrowing. Indeed, considering the leeway in specifying reverse open market operations, the distinction between the two instruments is far less clear than RPD suggests (e.g. a reverse open market operation at a fixed tender rate and pre-announced full allotment is quasi-equivalent to a borrowing facility).

- The 1983-1990 period of borrowed reserves targeting (see Meulendyke, 1998) is most likely an attempt to retreat from RPD without needing to admit it too openly. It probably means in practice focussing again quite unambiguously on rates. Attempts made by the Fed to justify borrowed reserves targeting within a coherent RPD framework indeed seem to be missing.
- In 1994, the gradual move to federal funds rate targeting is completed by announcing, after each FOMC meeting, the decision with regard to the fed funds target rate. This had not even been practice in the 1974-79s episode of interest rate targeting.
- In 1998, for the first time, the "Domestic Policy Directive", which is part of the minutes of the FOMC, contains again a reference to the fed funds target rate, instead of a reference to the vague concept of "reserve pressure". For instance, the domestic policy directive in effect on 1 January 1997 still contains the formula: "in the implementation of policy for the immediate future, the Committee seeks to maintain the existing degree of pressure on reserve position", while the one in effect on 1 January 1998, reads "in the implementation of policy for the immediate future, the Committee seeks conditions in reserve markets consisting with maintaining the federal funds rate at an average of around 5 ½ %". The same formulation is still used at present.
- In 1998, contemporaneous reserve accounting is substituted again by lagged reserves accounting, which facilitates life of both banks and the Fed (as both now again know the level of required reserves before the start of the reserve maintenance period; contemporaneous reserve accounting had been advocated by Friedman as supposed key RPD element since 1960).
- In 2003, the Fed implemented a reform to its discount window, setting the discount rate systematically 100 basis points above the federal funds target rate and thus ending, after more than 80 years, the setting of the discount rate below market rates. The 100 basis points spread between the targeted market rate and the discount rate corresponds in principle to the pre-1914 approach of the Bank of England.

It may appear that the move away from RPD concepts accelerated in 1987, when Greenspan took over from Volcker as Chairman of the Board of Governors. Greenspan was not committed to the 1979-82 RPD experiment, and thus had probably less problems to re-design the Fed's monetary policy operating technique. Greenspan came from Wall Street, he was a recognised financial markets expert, and a personality that would soon dominate the Fed and be regarded by the public as a guru. Maybe somewhat similarly to Montagu Norman 60 years earlier in the UK, his dominance and market knowledge may have helped to keep the implementation rhetoric and practice of his central bank free of fallacious doctrine, even if such doctrine was promoted by many academic economists.

Turning to the official self-description of the Fed's policy, it is worth observing the changes in the 1994 booklet on "The Federal reserve system – Purposes and Functions" relative to its predecessors. There are still some left-overs from RPD: for instance, the idea from the 1979-1982 period that an increase in monetary aggregates and hence in required reserves can set into force self-correcting pressures is repeated. On the other side, the description of the starting point of the transmission mechanism already seems to be half way between RPD and SID: "...*monetary policy works through the market for reserves and involves the federal funds rate. A change in the reserves market will trigger a chain of events that affect other short-term interest rates, foreign exchange rates, long-term interest rates, the amount of money and credit in the economy, and levels of employment, output, and prices.*" In contrast, there is no willingness on the side of the Fed to accept that the 1979-82 episode was discontinued on the basis of disappointing results and the revealed general impracticability of RPD. Instead, the Fed argues that optimal operating procedures depend on macroeconomic circumstances and strategies, as well as on financial market features (Board of Governors, 1994, 35):

*"In general, no one approach to implementing monetary policy is likely to be satisfactory under all economic and financial circumstances. The actual approach has been adapted at various times in light of different considerations, such as the need to combat inflation, the desire to encourage sustainable economic growth, uncertainties related to institutional change, and evident shifts in the public's attitudes toward the use of money. When economic and financial conditions warrant close control of a monetary aggregate, more emphasis may be placed on guiding open market operations by a fairly strict targeting of reserves. In other circumstances, a more flexible approach to managing reserves may be required."*

This relativist interpretation, which seems to be inspired by Poole (1970), could be questioned on the basis of the general arguments against the practicability of RPD.

The decreasing influence of RPD *in monetary economics* can be measured by the constantly increasing number of recognised authors that view it again as natural to either model monetary policy implementation as a steering of interest rates (e.g. Hamilton, 1996; Bartolini et al., 2002; Woodford, 2001; Ayuso and Repullo; 2003), or to incorporate in macroeconomic models the assumption that the transmission mechanism starts with the central bank's steering of short term interest rates (e.g. Taylor, 1993; Clarida, Galí and Gertler (1999); Woodford, 2003). Although, as will be discussed in the next section, RPD is still persisting in academic literature, the recent vague of publications taking an SID perspective suggests that the trend in monetary economics away from RPD will gain further momentum.

## 12. RPD's operational legacy and post-modern academic RPD

In the present monetary policy implementation of the FED, one still finds a few minor left-overs from RPD, of which the following three could be mentioned. First, The monetary policy making committee has still the name given to it in 1935, FOMC, although it is today undisputed that its decisions are on the federal funds target level. Second, vault cash is still eligible to fulfil reserve requirements, a specification which had been promoted e.g. by Friedman (1960) on the basis of RPD considerations. As the Fed no longer assigns to reserve requirements any RPD related functions, the eligibility of vault cash does not appear to have a clear purpose any longer (but it of course lowers effective reserve requirements). Third, the discount rate is still set formally by the Board of Governors, and not by the FOMC, suggesting that the two concepts (standing facility rates, target rates) can be viewed separately.

Still, all central banks would view today their task, as central banks did before 1914, and as the Bank of England did consistently throughout the 20th century, in line with SID as a steering of short term interest rates in the money market subject to various high frequency shocks unrelated to macroeconomic developments. The Fed even took a kind of lead role in this respect by publishing an explicit target rate, which is circumvented e.g. by the Bank of England and the European Central Bank by an implicit commitment to steer market rates in the form of the announced operations rates of monetary policy instruments. With regard to the ECB, one may more generally feel that it had the blessing of being created when RPD had sufficiently lost influence, such that it could be given easily an RPD free framework, as illustrated for instance by its decision to adopt fully remunerated reserve requirements. One could thus interpret the RPD-less implementation technique of the ECB as giving evidence that in central banking, all remaining RPD features are merely inherited from the past, and that newly designed elements are purely derived from SID logic.

Far more relevant than the above-mentioned residuals of the past in the Fed's monetary policy implementation are the recourses to RPD elements in recent textbook and academic literature.

Consider briefly two best selling under- and graduate textbooks on monetary policy in the US, namely Mishkin (2004) and Walsh (2003).[18] Woodford (2003), as mentioned earlier, appears to take a rather clear SID perspective.

For instance Mishkin (2004, 423-24) criticises, taking up positions of Milton Friedman, that the Fed paid *too much* attention to the federal funds rate from the 1950s and 1970s, and that this would have lead to a pro-cyclical monetary policy.

> *"As we learned... a rise of national income leads to a rise in market rates. With the rise in interest rates, the Fed would purchase bonds to bid their price up and lower rates to their target level. The resulting increase in the monetary base caused the money supply to rise... A further problem with using interest rates as the primary operating target is that they may encourage an inflationary spiral to get out of control..."*

This reasoning seems to contain two critical simplifications well-known from RPD literature: The first consists in not distinguishing interest rates of different maturities, which leads to a confusing chain of causality and the presentation of interest rates as being primarily exogenous. Second, Mishkin's critique seems to confuse possible mistakes of the Fed regarding its monetary policy stance with mistakes in the choice of the appropriate operational target variable. When the economy is at its capacity limits, a more restrictive policy in the form of a higher target short-term interest rate may of course be required. Therefore, the suggested pro-cyclical character of the Fed's policy had nothing to do with the choice of its target, but with the way it mapped its information on the state of the economy into the level of its operational target variable. Mishkin (p. 424) similarly criticizes the use of the fed funds rate as operational target in the 1970s, arguing in addition that it is "peculiar" to control monetary aggregates through short term interest rates. In fact, already Thornton (1802) assumed such an approach, and the fact that most central banks followed it during the 1970s and 1980s, some of them having been successful with it in controlling inflation, also suggests that there is nothing wrong with it (particularly Japan and Germany – see Goodhart, 1989, p. 326). Mishkin (2004) also dedicates 40 pages to derive the money multiplier and the associated monetary transmission channel from open market operations via excess reserves to monetary aggregates, and four pages (571-574) are dedicated to Poole (1970). In sum, it appears that Mishkin (2004), amongst many other textbook authors, is in fact still assuming the relevance of RPD inspired monetary policy implementation.

Walsh (2003) takes a more eclectic approach by surveying rather comprehensively academic literature in the domain of monetary policy, including what he calls "operating procedures". In general, RPD and SID approaches are presented as alternatives, which can be distinguished through a few model parameters, without taking a position for or against one or the other. Literature in the Poole (1970) tradition, such as e.g. Christiano and Eichenbaum (1992), or Strongin (1995), is extensively reviewed. From the point of view of today's central banker, this literature, which may be called "post-modern" RPD literature (as it seems to re-iterate a subject after its age has come to an end) has the following weaknesses. First, as Poole (1970), it does not distinguish clearly between operational targets (which can be controlled on a day-by-day basis, like the short-term interest rate) and intermediate targets (like a monetary aggregate). Also, often, short and long-term interest rates are not distinguished. Second, it is often assumed that the central bank has direct influence on monetary aggregates via open market operations. Much of the literature is inspired by the search for the "liquidity effect", i.e. how central bank action, which is expressed in a change of monetary aggregates via open market operations, affects in a second step interest rates (see D.L.Thornton, 2001, for a critical assessment). Third,

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[18] Another textbook classics which takes RPD for granted is Mankiw (2002), and there are many others.

shocks affecting the day-to-day demand for working balances in the money market (e.g. short-term changes of payment system uncertainty) are not distinguished from shocks in the "money demand". Bagehot's (1873) insight of the inherent short-term instability of the demand and supply conditions in the money market is thus ignored. Finally, the fact that concrete interest rate targets have been and are announced by central banks as monetary policy decision, but supposed reserve quantity targets were never, does not raise the distrust of the authors towards RPD.

The review of modern textbook and journal literature leaves the central bank practitioner somewhat scared that RPD may continue a reality-detached existence in academic circles, and eventually has its revival also in practice in times that new generations of central bankers with strong academic background feel the need to apply "new" concepts. Hope may however come from the observation that most of the post-modern RPD literature has been launched before 1994, i.e. before the FOMC started to publish openly the federal funds target rate after its meeting, obliging everybody to take note of the fact that the short term interest rate is the Fed's one and only operational target. Also, with Woodford (2003), SID seems to have got back to the centre of recognised research in monetary economics.

## 13. The lessons from the rise and fall of RPD

From today's perspective, the rise and endurance of RPD, a fallacious doctrine on a key concept of monetary policy (the operational target), and its continued popularity in textbooks and some more recent academic work, are rather astonishing. This paper tried to explain the phenomenon of RPD.

*Academics* developed theories detached from reality, without resenting or even admitting this detachment. Economic variables of very different nature were mixed up and precision in the use of the different concepts (e.g. operational versus intermediate targets, short-term vs. long-term interest rates, reserve market quantities vs. monetary aggregates, reserve market shocks vs. shocks in the money demand, etc.) was often too low to allow obtaining applicable results. The dynamics of academic research and the underlying incentive mechanisms seem to have lacked a permanent pressure on monetary economists to investigate the realities of day-to-day work of central banks. From today's perspective, one could feel that academic economists unconsciously colluded in their distaste for re-questioning the applicability of macro-economic models on day-to-day implementation of monetary policy, and their lack of willingness to study the actual features of money markets and monetary policy operations. As Goodhart (2001) puts it: "large parts of macro-economics are insufficiently empirical; assumptions are not tested against facts. Otherwise, how could economists have gone on believing that central banks set H [the monetary base] and not i? In so far as the relevant empirical underpinnings of macro-economics are ignored, undervalued or relatively costly to study, it leaves theory too much at the grasp of fashion, with mathematical elegance and intellectual cleverness being prized above practical relevance." Unfortunately, it needs to be admitted that the list of RPD inspired papers that contain empirical (econometric) analysis is long. Indeed, most of the more recent papers in the Poole-1970 tradition, as reviewed by Walsh, 2003, fall into this category. Also, a major work in terms of supporting the return to SID, namely Woodford (2003), is primarily of theoretical nature. One may therefore want to conclude that the decline of RPD suggests that empirical analysis (at least in the sense of econometric analysis) is neither sufficient, nor necessary, to correct mistaken avenues in economics.

*Central bankers* failed to resist the reality-detached theories of academics, or even promoted them as they got convinced or as the theories served their aim to mask their responsibility for short term interest rate and thus for economic developments. It is an interesting, but difficult

question to disentangle in how far exactly the adoption of RPD as official Fed doctrine on monetary policy implementation was deliberate "play-acting" to mask responsibility, and in how far it was just reflecting convictions. Goodfriend (2003) argues that the denial of responsibility was the dominating factor in the 1920s, and for instance Goodhart (2001) and Mishkin (2004) argue so for the 1979-82 episode. At the same time, there are arguments speaking in favour of the theory that many senior central bank officials believed sincerely into RPD. Originally non-public documents, such as FOMC transcripts of the 1979-82 episode, suggest this interpretation. Also statements as the one reported above from Warburg (1930), who, no longer being in service, was outspoken on the weaknesses of the Fed, while at the same time advocating RPD, seem to support the hypothesis that Fed officials believed at least partially in RPD. More importantly, one needs to admit that the majority of US monetary economists (and e.g. Keynes) were convinced of RPD, without any political economy explanation for that, and if academics were, why should central bank senior officials not have been as well? Of course, central bankers are more directly confronted to reality, but academics could have and often indeed looked at money markets and central bank procedures as well (again, Keynes is an example). If we can imagine academic economists to have been honestly convinced by some theory we believe today to be wrong, the same should probably not be denied to central bankers. In sum, it appears difficult to estimate the general degree of conscious play-acting by central bankers in their supposed RPD practice, probably also since it varied considerably across individuals and time.

It seems also noteworthy that both groups, academic economists and central bankers, showed little interest in studying well-documented historical experience (e.g. Bagehot, 1873, King, 1936, Sayers, 1976). 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, partially since they 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).

If one wants to find out how the detour via RPD could have been avoided, it may appear natural to compare again the Fed and the Bank of England in the early 1920s, as the latter easily resisted, but the former did not. While one would probably not want to praise today and wish back the lack of transparency and accountability of the old Bank of England, it seems clear that major weaknesses of the Fed relative to the Bank of England, that we would still name weaknesses today, were its lack of independence, excess decentralisation, and lack of experience. Once the Fed had fallen into the trap of RPD (including a below-market rate discount rate), the experience that it would accumulate was rather opaque, and the likelihood that Bank of England experience would be considered declined more and more as the Fed developed its own traditions. As we want central banks to be accountable and transparent, the main conclusion we have to draw maybe, one more time, the need of central bank independence. If the Fed would have been fully independent from the US Government at least directly after WW1, it would probably have had far less incentives to deny the validity of well-established central bank technique, namely that short term interest rates are the operational target of monetary policy.

With the return of central banks to explicit interest rate control, and the success of compatible academic work like e.g. Taylor (1993) and Woodford (2003), there is, despite the continued textbook and academic journal presence of RPD, a good chance that this episode in monetary economics will in the future be regarded as a 20th century debate only. One may conclude in a slightly provocative way that RPD is a bit like *communism*: it was first supposed to be practised around 1920, its failure became obvious during the 1980s, but still today some intellectuals believe that it could be the better approach - if only done properly.

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