



Federal Reserve Bank of Cleveland Working Paper Series

**Federal Reserve Structure and the Production of
Monetary Policy Ideas**

Michael D. Bordo and Edward S. Prescott

Working Paper No. 23-29

November 2023

Suggested citation: Bordo, Michael D. and Edward S. Prescott. 2023. "Federal Reserve Structure and the Production of Monetary Policy Ideas." Working Paper No. 23-29. Federal Reserve Bank of Cleveland. <https://doi.org/10.26509/frbc-wp-202329>.

Federal Reserve Bank of Cleveland Working Paper Series

ISSN: 2573-7953

Working papers of the Federal Reserve Bank of Cleveland are preliminary materials circulated to stimulate discussion and critical comment on research in progress. They may not have been subject to the formal editorial review accorded official Federal Reserve Bank of Cleveland publications.

See more working papers at: www.clevelandfed.org/research. Subscribe to email alerts to be notified when a new working paper is posted at: <https://www.clevelandfed.org/subscriptions>.

Federal Reserve Structure and the Production of Monetary Policy Ideas

Michael D. Bordo*

Rutgers University

Edward S. Prescott

Federal Reserve Bank of Cleveland

November 13, 2023

Abstract

We evaluate the decentralized structure of the Federal Reserve System as a mechanism for generating and processing new ideas on monetary policy over the 1960 - 2000 period. We document the introduction of monetarism, rational expectations, credibility, transparency, and other monetary policy ideas by Reserve Banks into the Federal Reserve System. We argue that the Reserve Banks were willing to support and develop new ideas due to internal reforms to the FOMC that Chairman William McChesney Martin implemented in the 1950s and the increased ties with academia that developed in this period. Furthermore, the Reserve Banks were able to succeed at this because of their private-public governance structure. We illustrate this with a time-consistency model in which a decentralized organization is better at producing new ideas than a centralized one. We argue that this role of the Reserve Banks is an important benefit of the Federal Reserve's decentralized structure by allowing for more competition in formulating ideas and by reducing groupthink.

JEL Classification: B0, E58, G28, H1

Keywords: Federal Reserve System, monetary policy, governance, time consistency

*We would like to thank Jordan Manes and Humberto Martinez for excellent research assistance. We would also like to thank Al Broaddus, Doug Evanoff, Owen Humpage, Tom Humphrey, Ravi Kumar, Loretta Mester, Chris Phelan, Ed Prescott, Jan-Peter Siedlarek, Ellis Tallman, David Wheelock, and Peter Zimmerman for helpful comments. This paper is based on our earlier working paper Bordo and Prescott (2019). The views expressed in this essay are those of the authors and not necessarily those of the Federal Reserve Bank of Cleveland or the Federal Reserve System.

1 Introduction

This paper analyzes the role that the institutional structure of the Federal Reserve has played in the production of knowledge useful for central bank monetary policy since the Treasury-Fed Accord of 1951. It argues that a combination of internal reforms to the operation of the Federal Open Market Committee (FOMC) by Chairman Martin in the 1950s, the increased prominence of economists in the System in the 1960s, and the semi-independence of the Reserve Banks created conditions that allowed Federal Reserve Banks to innovate in the shepherding and production of ideas for monetary policy.

More narrowly, the paper provides two case studies of the development and generation of monetary policy ideas by Reserve Banks that later became important to the operation of monetary policy by the Federal Reserve and other central banks. First, it documents how the St. Louis Fed served as a conduit for the introduction and propagation of monetarist ideas in the System throughout the 1960s and 1970s. Second, it documents how the Minneapolis Fed built on the St. Louis Fed model by partnering with the University of Minnesota to not only introduce ideas, such as rational expectations and dynamic general equilibrium models, but also to actively produce these ideas starting in the 1970s.

We take the view, held by others such as Meltzer (2002), that ideas matter in determining central bank policy. We also take the view that the problems faced by monetary policymakers change over time, so a central bank needs to be able to learn new ideas. For example, in its early years the Federal Reserve had to learn to deal with gold convertibility and how to provide an elastic currency. Since World War II, it has had to learn how to operate first under the Bretton Woods system and then under a fiat money system.

For this reason, we believe that understanding how ideas develop and are introduced into the operations of a central bank is valuable. Our thesis is that for a central bank, the industrial organization of knowledge production and the internal organization of the research function within a central bank affect its ability to learn and produce new ideas.

We will argue that there were significant improvements in the Federal Reserve's ability to absorb external ideas in the 1960s. It was during this period that the research function became increasingly professionalized and economists assumed more leadership positions in the System. The developments we discuss are analogous to Arrow's (1974) analysis of or-

ganizations in which he emphasized the importance of making investments in being able to send and receive information and establishing communication channels.

However, there is more to developing knowledge than absorbing ideas from external sources. Producing knowledge is also valuable. One dimension to the production of knowledge is to what extent should an institution undertake research activities internally versus receiving the knowledge externally. This dimension is reminiscent of the important question raised by Coase (1937) about what activities are best done within a firm and which are best done through market transactions. As we will discuss later, even though communication channels between the Federal Reserve and academia were greatly strengthened starting in the 1960s, there are good reasons for an organization to also produce knowledge itself.

A second dimension to the organization of knowledge production, and much of the focus of this paper, is how to organize it within an institution. As the voluminous literature on the theory of the firm has pointed out, incentives and governance are important to the organization of production.

The Federal Reserve System is unusual in that it has a structure in which Reserve Banks operate relatively independently in the production of knowledge. They can do so because the System was designed as a decentralized one, with a mix of public and private oversight. Beginning in the 1960s, due to their semi-independent structure, several Reserve Banks innovated in the production of monetary policy ideas and they were able to support these ideas over time, despite the tension these ideas created with the Board of Governors in Washington. These tensions were particularly evident in the 1970s when, partly due to the personality of Chairman Burns and partly to protect the institution from political attacks, the Board attempted to limit some of these activities.

As we will argue, these ideas led to better monetary policy in the longer run and thus benefited the Federal Reserve in the long run. The tensions during this period reflect a time-consistency problem in the production of new knowledge, a problem that we argue was reduced due to the Federal Reserve's decentralized structure. To formalize this idea, the paper includes a time-consistency model of a central bank with a semi-independent research division whose institutional structure affects the extent to which new ideas are produced and disseminated.

2 Federal Reserve Structure

To understand the present corporate structure of the Reserve Banks and the structure of the FOMC, it is necessary to understand their origins. The history of central banking in the United States is characterized by a debate over whether there should even be a central bank because of concerns that it would act in the interests of Wall Street or of politicians. In 1913, when the Federal Reserve was created, these concerns resulted in a highly decentralized system in which the Reserve Banks were created to represent 12 different regions and were organized as corporations rather than as bureaus of a federal agency, but with some oversight from the Federal Reserve Board in Washington.¹

From 1913 until 1934, there were conflicts over the responsibility for monetary policy and over conceptions about the conduct of monetary policy (Bordo (2016)). These conflicts contributed to coordination failures during the Great Contraction of 1929-1933 (Wheelock (1991) and Eichengreen (1992)). These failures led to changes in the governance of the Federal Reserve System with passage of the Banking Act of 1935. This law centralized many powers in the Board of Governors.² It created the Federal Open Market Committee (FOMC) and gave a majority of votes on it to the Governors.³

Despite the centralization of powers, the Depression-era reforms left the corporate structure of the Reserve Banks relatively unchanged. Furthermore, the reforms retained a role for the Reserve Banks in setting monetary policy by giving them, on a rotating basis, five of the twelve seats on the FOMC.

¹See Lowenstein (2015) for a description of the political forces behind the creation of the Federal Reserve Act.

²Prior to the Banking Act of 1935, the heads of Reserve Banks were called governors, while the entity in Washington DC was called the Federal Reserve Board. The head of the Federal Reserve Board was also referred to as a governor, while a second member was referred to as the vice-governor. The other members were simply referred to as members in the Federal Reserve Act. The Banking Act changed the titles of the heads of the Reserve Banks to presidents and changed the title of all the members to governors. The idea behind the change was that governor was a more prestigious title; so with the centralization, it should be applied exclusively to Board members. Furthermore, to reflect this change, the title of the Board was changed to the Board of Governors of the Federal Reserve System. The change in names reflects which entity within the Federal Reserve System has the most influence over controlling, that is, governing, the supply of money

³The Banking Act of 1935 attempted to insulate the Board of Governors from political pressures by removing the Treasury Secretary and the Comptroller of the Currency from the Board – they were ex officio members in the original act – and creating a seven-member board on which the governors would serve overlapping 14-year terms. Over time, however, the latter part of this reform has become less relevant because the average duration of time served by a Governor has declined.

2.1 Reserve Bank Governance

In both periods, the corporate structure of the Reserve Banks was basically the same. From the beginning, the Reserve Banks were an unusual partnership of public and private interests. The origin of the private portion of the Reserve Banks lies in the structure of the banking industry during the National Banking era. The Federal Reserve was set up to prevent the periodic financial panics that occurred in that era, and the Reserve Banks were modeled after the private clearinghouses in reserve cities that not only cleared checks, but also often took a leading role in preventing or managing financial panics.⁴

The private component of Reserve Bank governance comes from its membership. Membership in the Federal Reserve is voluntary for state-chartered banks, but it is mandatory for national banks. The Reserve Banks are capitalized by its members contributing 3 percent of their own capital. In addition, the Reserve Banks can call on another 3 percent of the member banks' capital if the Reserve Banks suffer losses.

While this capitalization gives member banks ownership of stock in a Federal Reserve Bank, the stock comes with limited financial and voting rights. Financially, owners of the stock are not residual claimants to profits. Instead, they receive dividends at a rate set by law.⁵ Profits in excess of the dividend are paid to the federal government.⁶ Unlike the stock of a private corporation, Federal Reserve stock cannot be hypothecated, pledged, or sold and gives no rights to the proceeds of a Reserve Bank if it is liquidated. Instead, it is closer to preferred stock than common stock.⁷

Voting rights are also more limited than in a private corporation. Owners of Federal Reserve stock cannot vote on any corporate policies or decisions. Instead, they only elect

⁴See Timberlake (1984), Gorton (1985), Moen and Tallman (2015), and Gorton and Tallman (2018).

⁵The Federal Reserve Act set the dividend rate at 6 percent. It remained at that level until the FAST Act of 2015, which changed it to the 10-year Treasury rate for banks with over \$10 billion in assets, a threshold indexed to inflation. Presently, that rate is substantially than 6 percent, but during the 1970s, the 6 percent rate was lower than market rates and was a factor in banks deciding whether to be Federal Reserve members.

⁶How profits accrued to the Treasury has changed over time. Originally, there was an excess profits tax that was applied once the Reserve Banks built up their capital surplus. Later, Reserve Bank earnings after expenses and contributions to its capital surplus account were distributed to the Treasury. The FAST Act of 2015 changed the Federal Reserve's capital surplus account by taking funds from it on a one-time basis and then capping it at \$10 billion. In 2018, Congress reduced the cap first to \$7.5 billion and then later to \$6.785 billion.

⁷Until the Monetary Control Act of 1980, however, membership provided several other benefits, including check clearing services, a reserve account, and access to the discount window.

six of the nine directors of a Reserve Bank.⁸

The public aspect of the governance comes via the Board of Governors. They choose the remaining three directors to represent the public interest, and the Board of Governors chooses the chair and vice chair from this latter group. Furthermore, while the directors choose the president and first vice president, the Board of Governors must approve the choices. Finally, while the directors approve a Reserve Bank's budget, so must the Governors and they can fire any officer of a Reserve Bank. In practice, the primary power of the board of directors comes from their ability to choose the president, first vice president, and other officers of the organization, but with significant checks from the Governors.⁹

3 The Role of Ideas and Federal Reserve Structure: Before the Banking Act of 1935

The decentralized structure of the Federal Reserve was developed under the influence of the real bills doctrine (Meltzer (2002)). Central banks were to lend against eligible paper, which, under the Federal Reserve Act, would be brought to the central bank by member banks. Under the doctrine, as long as the collateral for the loans was based on real bills — that is, safe, self-liquidating short-term loans — the central bank would create the appropriate amount of money. Under the Federal Reserve Act, the Reserve Banks were to follow this principle and set their own discount rates consistent with local money market and business conditions. The purpose of the Federal Reserve Board in Washington was to oversee the Reserve Banks and coordinate monetary policy across the System. In a sense, the Federal Reserve's provision of money was meant to be virtually automatic, and it was believed that if these policies were followed, there would be no need for a lender of last resort.

While the 1920s were an economically successful decade, the difficulty of coordinating

⁸Like other features of Federal Reserve governance, the election procedure for the six elected directors is unusual, but designed to balance various interests, in this case that of classes of banks, i.e., the city and country banks. Voting by banks for directors is not one vote per share, but instead one vote per member bank. Furthermore, banks within each Federal Reserve District are split into three size categories: small, medium, and large. Member banks within each category elect one Class A director, who must be from their corresponding size class, and one Class B director; so each class of banks elects two directors each. The Class A directors are bankers, but the Class B ones cannot be.

⁹The Dodd-Frank Act of 2010 removed the Class A directors from the selection process for Reserve Bank presidents.

between the Reserve Banks and conflicts between the Banks and between the Banks and the Board affected the Federal Reserve's response to the boom of the late 1920s and the response to the Great Contraction that started in 1929. For the purposes of this paper, the details of these conflicts are not important, but what is important is the belief that the Federal Reserve would perform better if it was more centralized and the ensuing centralization, along with the retained historical decentralized characteristics of the Federal Reserve, created a role for Reserve Banks in the production of economic knowledge.

4 The Role of Ideas and Federal Reserve Structure in Monetary Policy: After the Banking Act of 1935

While the Banking Act of 1935 centralized monetary policy operations through the FOMC, during the Great Depression and during World War II the Federal Reserve was, in practice, subservient to the Treasury Department (Meltzer (2002)). Beginning in the mid-1930s and then during World War II – as it did during World War I – the Federal Reserve's primary role was to help finance the government's large expenditures, first those associated with the New Deal and then those associated with the war. It did this by pegging interest rates at low levels to help the financing of government debt. Under these conditions, the Federal Reserve structure was relatively unimportant for monetary policy. Other than the New York Fed, because of its special role in dealing with Wall Street and international markets, the Reserve Banks primarily focused on providing banking services such as check clearing, dealing with regional banking problems, and collecting regional economic data. It was not until the 1950s that conditions would change such that the Reserve Banks could develop a role in generating monetary policy ideas.

4.1 The 1950s and Early 1960s

In this period, the main development for the Federal Reserve was political in that it gained its independence from the Treasury via the Treasury-Fed Accord of 1951. This agreement was the result of a dispute between the FOMC and President Truman and the Treasury, in which Truman and the Treasury wanted the Fed to continue to peg interest rates and the FOMC wanted to discontinue the peg because they believed the peg and its associated money

creation were inflationary.¹⁰ The result of the agreement was that Thomas B. McCabe was replaced as Chairman by William McChesney Martin from the Treasury and the Fed would soon stop supporting the peg (Hetzel and Leach (2001a, 2001b) and Meltzer (2009a)).

During this period, there was little connection between academic ideas and monetary policy. Chairman Martin was a strong advocate for price stability, but he did not rely on economic analysis (Hetzel (2008), Meltzer (2009b), p. 1222). He based his policy on using the money markets and short-term interest rates as signals to judge whether the Federal Reserve was being sufficiently accommodative. He believed that government deficits were inflationary (Meltzer (2009a)). He generally followed a policy of leaning against the wind, that is, reacting to current economic conditions.¹¹

While Chairman Martin was not a believer in economic theory, he did institute changes to the FOMC that, while they reduced the influence of the New York Fed, they also had long-lasting consequences for the role of the Reserve Banks and the influence of economic ideas on the Federal Reserve. Shortly after Martin became Chairman, an ad hoc subcommittee of the FOMC was created in 1952 to review the FOMC's operating procedures. This study was part of a battle for control between the Board and New York for supremacy over monetary policy, but it was also a debate about the appropriateness of different monetary policy operating procedures.

New York, under the leadership of the formidable Allan Sproul, believed that monetary policy required that the FOMC target the entire yield curve and doing this required active involvement in all parts of the Treasury market by the New York Fed's Markets Desk.¹² In contrast, Martin and Board staff believed that a bills-only policy in which the FOMC targeted only the short-term rate was sufficient and that financial markets would be able to determine the yield curve without Fed intervention.

In pushing for this change, Martin also changed how the FOMC operated. Previously, the FOMC delegated decisions to an executive committee. The executive committee consisted of the Chairman, two Governors, the president of the New York Fed, and the president of

¹⁰Year-over-year inflation in the CPI was nearly 5.8 percent in December of 1950 and peaked at 9.6 percent in April of 1951 before rapidly declining soon after the March 1951 agreement.

¹¹In recent years, the term "leaning against the wind" has become associated with monetary policy acting counter to large increases in asset prices. That is not, what Martin meant by the term. He meant something more akin to what might be called "data dependence" today.

¹²The Desk conducts open market operations for the FOMC.

one other Reserve Bank.¹³ The committee was basically run by the Chairman and the New York Fed president. New York's influence came from being so integrated into the money markets that often the committee would defer to New York due to its superior knowledge.

Martin succeeded in this effort and the executive committee was abolished in 1955. With Martin's changes, the entire FOMC became more involved with the open market decisions and had to form and express opinions on these matters. Furthermore, by changing the focus of monetary policy to a bills-only policy, the FOMC could focus on a single, easy-to-measure rate to guide open market operations.¹⁴

The immediate effect of the change was that the Board asserted supremacy over New York on monetary policy, and, indeed, Allan Sproul resigned shortly after the change and was replaced by Alfred Hayes, a community banker with little experience with the Federal Reserve.¹⁵ However, the change to the FOMC also contributed to some longer-term and more subtle changes in how the FOMC, the System, and the non-New York Reserve Banks operated.¹⁶

First, the FOMC began to meet more often. Previously, it had met only four times a year, but after the changes, it met seven times a year (Meltzer (2009a)) and all the Governors and all 12 Reserve Bank presidents attended the meeting (Whittlesey (1963)).¹⁷ As a result, Reserve Bank presidents and their staff came into frequent contact with the rest of the System, and the meetings turned into an educational forum in which monetary policy ideas could be discussed (Whittlesey (1963)).

Second, the expansion of decision-making authority from the executive committee to

¹³Often, the other Reserve Bank was Philadelphia or Richmond because they were both close to Washington DC, and given the travel times of that era, it was much easier for their presidents to get there than it was for other presidents.

¹⁴This is not quite right. At the time, bank net free reserves were viewed as an important signal about the appropriateness of monetary policy as well (Bordo (2018a)). Reserve requirements were set by the Board and not the FOMC.

¹⁵The view that appointing Hayes symbolized the Board asserting supremacy can be found in *The Economist* (1956).

¹⁶Part of Martin's motivation for the reforms may be that he believed that the System was a trustee of the money stock and that all the elements of the Federal Reserve should act in the System's best interests. However, he was also certainly cognizant of the political economy benefits of strengthening the Reserve Banks (see Hetzel (1995)). It should not be forgotten that Martin undertook these reforms shortly after the Fed regained its independence from the Treasury under the 1951 accord, and it was by no means certain that the Fed would not lose it again.

¹⁷Today, the FOMC meets eight times a year.

the entire FOMC forced the rest of the Reserve Banks to focus more attention on monetary policy. The effects of this change can be seen in a 1956 article in a news weekly that described the activities of the Federal Reserve Bank of Cleveland (*Business Week* (1956)):

“[Federal Reserve Bank of Cleveland President Wilbur] Fulton disclaims any desire to be known as a leader in the System. But he is a prime example of the type of policymaker now being developed.

Until the 1951 accord, most Fed bank presidents, with the exception of Allan Sproul in New York, spent most of their time overseeing technical operations and ironing out regional banking problems. Although Fulton was trained as a practical banker rather than a student of monetary policy, he had managed to learn the ropes of central banking. . . . His own experience has taught him that there is a pressing need to develop personnel who can grapple with the complicated problems of monetary policy.”

This focus on monetary policy likely shifted leadership in top management at the Reserve Banks toward personnel trained as economists (Whittlesey (1963), p. 38).¹⁸ Whittlesey writes:

“The most striking, though not necessarily the most significant, manifestation of the rise of economists has been their appointment to topmost administrative positions. By 1961, the presidents of six of the twelve Federal Reserve Banks were professional economists, all but one of them holders of the Ph.D. degree. Trained economists were also conspicuous at the vice-presidential level. As far as the Federal Reserve is concerned, a background in economics now seems to provide better credentials than experience in law or banking for the responsibilities of a central banker.”

Whittlesey’s observation can be seen during this time period in the leadership of the Federal Reserve Bank of Cleveland. President Fulton’s background was in banking, but

¹⁸Other than at the New York Fed, professionally trained economists had a much smaller role in Reserve Banks in the 1940s. In a study on research at the Reserve Banks, the agricultural economist T.W. Schultz found that the Research departments were typically underused and poorly managed. He recommended several organizational changes, such as increasing the professionalization of researchers (Schultz (1943)). Similarly, Bach (1950) says that only the Board and the New York Fed had large staffs devoted to research.

his research director, Merle Hostetler, and his first vice president, Donald Thompson, were economists. Furthermore, his successor, W. Braddock Hickman, who was appointed in 1963, was a Ph.D. economist, the first one to serve in the role of president at the Cleveland Fed.

4.2 Economists, Organizational Theory, and the Federal Reserve

The increased role of economists in the System and the Reserve Banks was important for several reasons. First, it allowed for an improved flow of information and ideas within the System and with economists outside the System. Second, the Federal Reserve's structure allowed Reserve Banks, with their semi-independent corporate structure, to develop and support new and sometimes dissenting views without being viewed as expressing disloyalty.

One thing any organization must do well in order to succeed is to efficiently process information.¹⁹ Within the System, Reserve Banks are usually viewed as processing information by using their deep ties to the local business community to collect regional information that they filter and report, ultimately, to the FOMC. This particular role of the Reserve Banks in processing information is important, but the Reserve Banks have also excelled at the important job of processing monetary and banking policy ideas.²⁰

Transmitting complicated technical information requires that both the sender and the receiver speak a common language. In the System, the common language has become economics. It is an expensive language to learn; the usual way someone learns it is through the time-consuming ordeal of earning a Ph.D. However, it is a necessary language, given the technical nature of setting monetary and banking policy.

These communication channels were created, often slowly, in the System by the increased professionalization of researchers and leaders of the various Federal Reserve organizations. Our view is that this process created numerous communication channels that helped improve the flow of ideas within the System, as suggested by Whittlesey, but also with economists outside the System, both those in academia and those in private markets.²¹ However, what is unique about the Federal Reserve, at least compared with other entities created by the

¹⁹For a discussion of organizations in these terms, see Arrow (1974).

²⁰This idea is also found in Goodfriend (1999) and Wheelock (2000).

²¹One internal communication channel that developed as early as the 1960s was "System Committee" meetings, which were workshops where System economists and analysts presented their work on research and policy. Before electronic communications, these were an effective way for System economists to keep apprised of what other researchers in the System were working on.

federal government, is that the Reserve Banks' semi-independent corporate structure allowed for new and sometimes dissenting views to develop and gestate within the Federal Reserve, without being viewed as an expression of disloyalty that undermines the organization as a whole, as would be more likely within a government bureau. This latter development started to develop in the 1960s, though not always smoothly, as we will see in the following analysis.

4.3 The Mid-1960s: The Beginnings of the Great Inflation

In the first part of the Martin era, through the early 1960s, the Federal Reserve was most concerned with maintaining a low inflation rate and managing the balance of payments to preserve the Bretton Woods system. The Governors' backgrounds were in banking and business, not academia. Martin was not interested in using economic theory to guide monetary policy (Meltzer (2009a), p. 35); he tended to look at money market conditions and bank reserves to guide monetary policy.

In contrast, by the 1960s, the prevailing economic view in academia had become Keynesianism, which emphasized the importance of coordinating fiscal and monetary policy and believed that the Phillips curve could be exploited to keep unemployment down. Furthermore, there were important methodological developments in academia, particularly, the development of large-scale macroeconometric models by Lawrence Klein, which were based on Hicks' IS-LM formulation of some of Keynes' ideas. Despite Martin's not being a believer in Keynesianism and economic theory, these ideas entered the System through other means, particularly through the appointment of Governors and the hiring of economists within the Federal Reserve System.

The force behind bringing in Governors with Keynesian ideas was Walter Heller, who was chairman of the Council of Economic Advisers under Presidents Kennedy and Johnson. For Kennedy's first appointment to the Board, Heller wanted a trained economist who would be a "liberal expansionary influence" (Bremner (2004), p. 160). Along these lines, Kennedy appointed George Mitchell, who was the chief economist of the Chicago Fed. Later, Johnson appointed two more economists with Keynesian views: Sherman Maisel in 1965 and Andrew Brimmer in 1966.²²

²²Kennedy's second appointment was Dewey Daane, who was also an economist, but not a Keynesian. Heller wanted to appoint Seymour Harris, who was a Keynesian economist and a liberal. For this appointment, Martin outmaneuvered Heller by working with Secretary of the Treasury C. Douglas Dillon to push

The Governors were not the only way in which Keynesian ideas entered the Federal Reserve. The ideas also entered through the staff (Hetzl (2008), pg. 70, Meltzer (2009a), p. 37). The hiring of young economists out of graduate school led to the introduction of econometric forecasting and modern economic models into the policy process at the Board (Meltzer (2009a), p. 498). One illustration of this flow of ideas is the development of a large-scale econometric model of the Lawrence Klein variety. In this period, these models were the state-of-the-art technique in macroeconomics. Work at the Board on one of these models first started in 1966 as a joint project between academic economists and members of the Board's Division of Research and Statistics. The academics who led the project were Franco Modigliani of MIT and Albert Ando of the University of Pennsylvania. This project became the Board's well-known MPS model. Later, in the 1970s, with the end of the Bretton Woods system, the Board's International Finance Division developed a multi-country model to use for policy analysis that was also a large-scale econometric model.²³

In practice, under the influence of Keynesian ideas and under pressure from the Johnson Administration to follow expansionary monetary policy to ease the Treasury's financing of the Vietnam War and the Great Society, the FOMC tried to exploit the Phillips curve to lower unemployment and the Board followed "even keel" policies to accommodate Treasury operations.²⁴ The consequence of these expansionary policies was a buildup in inflation (Meltzer (2009a)).

4.4 The Federal Reserve Bank of St. Louis and Monetarism

We identified two changes in the environment in the 1950s and 1960s. First, Martin's reforms to the FOMC created a demand on the part of the non-New York Reserve Bank presidents to develop and formulate ideas about monetary policy. Second, the increased professionalization of economists in the Federal Reserve System improved communication channels with the economics profession and eased the flow of ideas into and within the Federal Reserve.²⁵

for Daane and convince Kennedy to choose him.

²³For a history of models at the Board, see Brayton, et al. (1997).

²⁴For analysis of how "even keel" policies, which were monetary operations designed to reduce short-term fluctuations in interest rates when the Treasury sold debt, contributed to monetary expansion, see Meltzer (2009a) and Consolvo, Humpage, and Mukherjee (2019).

²⁵The number of Ph.D.s granted in economics dramatically grew in the 1960s, from roughly 300 a year to 700 a year (Scott and Anstine (1997)), which is indicative of broad increase in demand for economists during this period.

The first Reserve Bank to innovate in this new environment was the Federal Reserve Bank of St. Louis. At the same time that Keynesian influences were becoming stronger among the governors, the Board staff, and the staffs of many of the Reserve Banks, a different view about monetary policy was developing at the St. Louis Fed. The catalyst for St. Louis' different view was that President D.C. Johns felt that the Board of Governors was ignoring his opinions, as well as those of the other Reserve Bank presidents, and he responded by hiring Homer Jones as research director in 1958 (Melzer (1989)).

Jones had taught Milton Friedman and had been closely associated with Clark Warburton at the Federal Deposit Insurance Corporation, who had advocated for monetary control since the 1920s (Bordo and Schwartz (1979), Melzer (1989)). Under Jones and a succession of presidents, such as President Darryl Francis, the St. Louis Fed adopted Friedman's quantity theory views and emphasized monetarist signals for evaluating policy. Andersen and Carlson (1974) report that the St. Louis framework developed in the early 1960s was at first mainly implemented by looking at charts but, in the late 1960s, was implemented using regression analysis.

As an example of what the decentralized Federal Reserve structure could support in terms of ideas, the St. Louis example is illuminating. St. Louis adopted an alternative view and that institution maintained its monetarist views for a long time. Furthermore, the St. Louis Fed developed a research staff that worked on these issues through the 2000s. This would not have been possible in an institution in which there was regular turnover in leadership by political appointment. Some other members of the FOMC held monetarist views during the 1950s and early 1960s, particularly, President Malcolm Bryan of the Atlanta Fed (Hafer (1999), Wheelock (2000)), but at Atlanta, these ideas arose with him and disappeared when he retired. St. Louis avoided this route not only because a succession of presidents held monetarist views, but also because the Research Department, with its close ties to leading academic monetarists such as Karl Brunner, Milton Friedman, Allan Meltzer, and Anna Schwartz, gave continuity to this line of thinking within that Bank.

While monetary debates of the 1970s were often construed as a debate between Keynesians and monetarists, St. Louis' criticism of Federal Reserve monetary policy in the early 1960s was initially aimed at the prevailing view of the Board and Martin, which was based on targeting "net free reserves" (excess reserves less borrowings) and short-term interest rates to

Authors and Year	Title	Google Scholar	SSCI
Andersen and Jordan (1968)	Monetary and Fiscal Actions: A Test of their Relative Importance in Economic Stabilization	943	39
Andersen and Carlson (1970)	A Monetarist Model for Economic Stabilization	485	49
Carlson and Spencer (1975)	Crowding Out and Its Critics	281	50
Keran (1971)	Expectations, Money, and the Stock Market	244	21
Spencer and Yohe (1970)	The “Crowding Out” of Private Expenditures by Fiscal Policy Actions	200	26

Table 1: The five most cited Federal Reserve Bank of St. Louis *Review* articles written by economists with St. Louis Fed affiliations from 1975 and before. Google Scholar citation count are as of 10/3/23. Note that Google Scholar coverage is broader than SSCI, sometimes counts multiple versions of the same citing paper, and changes over time.

control the “tone and feel of the money market.” The monetarists viewed these measures as providing misleading signals about the accommodativeness of monetary policy (Brunner and Meltzer (1964)). Brunner and Meltzer (1964) especially wanted the Fed to base its operating framework on the monetary base and the money multiplier (Bordo (2018b)). Researchers at St. Louis presented evidence against the free reserves doctrine (Meigs (1976)).²⁶ Along these lines, they also made a theoretical and empirical case for the Fed to focus on targeting monetary aggregates and total reserves.

St. Louis’ strategy was not to argue for monetarist ideas just within the System, but also to disseminate these ideas to the wider public and to actively produce research on monetary policy, and they had some influence in that respect. Table 1 reports the five most cited papers that appeared in the St. Louis Fed’s *Review*. The most cited paper is Andersen and Jordan (1968), which provided empirical evidence supporting claims that monetary actions had a larger and faster effect on economic activity than fiscal policy. This paper attracted a lot of attention and numerous responses (Batten and Thornton (1986)).²⁷

Interest in monetarism attracted attention within the System and St. Louis contributed to that. Along these lines, we reviewed papers that appeared in Board’s working paper series

²⁶A successor to the Burgess-Riefler-Strong doctrine (Brunner and Meltzer (1964) and Calomiris and Wheelock (1998)).

²⁷St. Louis’ academic publications from the 1960s and 1970s were also read and studied in the profession, but based on our citation analysis less so than their *Review* articles. Google Scholar counts and SSCI counts are substantially lower for their top cited papers.

Board Working Paper Series	Time Period	Number related to monetarism	Total number of papers
Staff Economic Studies (1965-present)	1965-1969	14	55
“	1970-1979	4	45
Special Studies (1970-1987)	1970-1979	11	137
IFDP (1971-present)	1970-1979	17	152

Table 2: The number of Federal Reserve Board working papers that are connected to monetarist ideas, including those that did not support monetarist methods. See text for definition. Source: Authors’ calculations.

during the 1960s and 1970s that were connected to monetarist ideas.²⁸ We identified these papers by counting ones that mentioned the quantity theory, cited Friedman or Meltzer, or studied money demand. These papers were not necessarily monetarist in their perspective. Some of them were responses to or criticisms of monetarism. But our measure is designed to identify interest and debate about monetarist-related questions.

Table 2 reports the results of our counts. Not many working papers were published in the 1960s. The *Staff Economic Studies* series was started in 1965 and through 1969, there were 55 papers published in it.²⁹ This series drew from economists throughout the System. Fourteen of the papers were related to monetarist topics, as we defined the term above, which is a large fraction of the papers. Two of them were written by Leonall Andersen who was economist at the St. Louis Fed. Some of these articles were summarized in the *Federal Reserve Bulletin*, which was the Board of Governors publication for the public that recorded its actions and discussed policy issues and was published over 1915-2022.³⁰

There seems to be proportionally less interest in monetarist topics in the 1970s, at least by this measure. The Staff Economic Studies series had 45 papers, of which 4 were related to

²⁸We excluded the series titled Working Paper because it contained only six papers in the 1970s, none of which were connected to monetarism. We also excluded the series titled Research Papers in Banking and Financial Economics and Working Papers in Banking, Finance & Microeconomics because they were not concerned with macroeconomics.

²⁹In 1977, this series became known as the *Staff Studies*. A list of titles from this series is available at www.federalreserve.gov/econres/staff-studies.htm.

³⁰The two papers by Leonall Andersen were “A Study of Factors Affecting the Money Stock,” no. 4, 1965 and “Liquidity Considerations and Monetary Management,” no. 21, 1966.

monetarist topics. A second series was started in 1970 called Special Studies. In that series, 11 of 137 papers are related to monetarist topics. The International Finance division started its own series called International Finance Discussion Papers (IFDP) in 1971 and during the 1970s published 152 papers. Seventeen of these were related to monetarist questions and, not surprisingly, many of those were concerned with balance of payments issues. While the percentages are lower in the 1970s than the 1960s, some caution needs to be exhibited in viewing the percentage as a measure of interest. The number of working papers written by Board staff grows a lot in this period, likely an outgrowth of the ongoing professionalization of economists in the System that started in the 1950s and 1960s, and Board staff papers covers topics that are not directly related to monetary policy. For example, the series above in these periods include numerous papers on bank structure, housing, and economic methods. Our interpretation of these numbers is that they provide evidence that when it came to thinking about monetary policy, monetarist ideas were being examined and analyzed at the time by Board economists.

While economists were studying monetarism, the impact on the FOMC was minimal in the 1960s. Keynesian views began to dominate the Federal Reserve in the mid-to-late 1960s, while St. Louis argued that if the Fed controlled the money supply, it could reduce inflation. Presidents Francis' advocacy did not sway the FOMC in the 1960s. Furthermore, the differences in opinion led to some tensions with Washington. Indeed, some governors and Board staff wanted to stifle dissent and have the entire System speak with one voice, but Martin believed in tolerating dissent. In an article about the St. Louis Fed's maverick reputation, *Business Week* (1967) reported:

“[Martin] prides himself on tolerating dissent within the Fed system. ‘He has resisted all efforts to clamp down on Homer [Jones],’ says one of his aides.”

Martin's successor, Arthur Burns, was less tolerant of dissent, which sometimes created tensions between the Board and the Reserve Banks. For example, *Business Week* (1979) reported on disagreements between Philadelphia Fed researchers and Board staff over measures of the money supply and pointed out that the Board started reviewing Reserve Bank publications under Burns.³¹ Part of the motivation was Burns' personality; he was known

³¹This later ended in the 1990s.

for wanting complete control over monetary policy. However, another factor in this period was that the Federal Reserve was under political attack from powerful members of Congress, such as Wright Patman, and the Board was rightfully concerned that public disagreements between the Board and the Reserve Banks would be used to weaken the System. Despite these pressures, in St. Louis, President Francis supported his Research Department, and with the support of St. Louis' board of directors, he was able to resist pressures to conform.³² Still, St. Louis' monetarist ideas had little short-term effect on policy. Instead, the St. Louis Fed's alternative view was valuable in the long run because it helped build an intellectual case within the System and outside it for ideas that eventually culminated in Chairman Paul Volcker's actions to stop inflation.

5 The 1970s: The Great Inflation

The 1970s were characterized by stagflation, that is, high inflation rates and high unemployment rates. At the time, high inflation was attributed to supply shocks and, in particular, the OPEC-driven increases in oil prices in 1973 and 1979. This view that supply shocks cause inflation is often called the cost-push theory of inflation. At the time, Arthur Burns, who was Chairman of the Fed from 1970 to 1978, subscribed to the cost-push ideas as did prominent academics such as Robert Solow and Paul Samuelson (Hetzel (2008), Blinder and Rudd (2013)). The second and more modern interpretation of high inflation is that the FOMC was unwilling to raise short-term interest rates and reduce monetary growth in order to reduce inflation because the Committee and the various administrations were worried about the social and political costs of high unemployment (Bordo (2018a), Meltzer (2009b)).

Despite the focus on the Phillips curve and cost-push ideas of inflation, monetarist ideas did begin to get attention within the System and had some influence on the Fed's unsuccessful attempt to reduce inflation. At this time, Milton Friedman's natural rate hypothesis (Friedman (1968)) was being accepted within the Nixon Administration and the Board. The belief was that the Fed could gradually reduce money growth and lower inflation while only temporarily raising unemployment. Research staff at the Board, following St. Louis' lead, began to present data on monetary aggregates, and the Humphrey–Hawkins Full Employ-

³²See the Rasche and Wheelock (2012) interview with Jerry Jordan, who was an economist at the St. Louis Fed during this period and later president of the Cleveland Fed.

ment Act of 1978 required that the Fed present successively lower target ranges of money growth to gradually reduce inflation and to justify significant departures from the targets.

The Federal Reserve also began to target money growth in the 1970s, but its method was operationally flawed. The Board staff estimated a short-run model of money demand for M1 based on Chow (1966) to back out the short-term interest rate that would be required to hit the Fed's money growth targets. The Fed believed that money growth could only be controlled by short-term interest rates rather than by directly operating on the monetary base. Their procedure assumed that short-run money demand was stable, which turned out not to be the case. Financial innovation as a response to inflation and regulations led to instability in the money demand function (Goldfeld (1973), Laidler (1993)). Consequently, monetary targets were regularly missed. Similar issues arose in other countries, such as Canada and the United Kingdom, that adopted a monetary targeting framework (Bordo, Choudhri, and Schwartz (1990)).

The second problem with the Fed's strategy to reduce inflation was its gradual approach. This approach was originally Milton Friedman's idea and came into the System through Friedman's communication with Burns. Gradualism began in 1969 and lasted until 1979-1980. The result of this approach was a pattern in which inflation ratcheted up over time. In particular, as inflation would rise, the Fed would tighten, a recession would occur, and under political pressure, the Fed would re-inflate, causing inflation to rise to a higher level. As mentioned above, the Fed feared tightening sufficiently to completely roll back inflation because of the political consequences of disinflation creating high unemployment (Meltzer (2009), Bordo (2018a)). This gradual approach, combined with flawed operational procedures in which monetary targets were regularly missed, made the public doubt that the Fed would reduce inflation and the Fed lost credibility over time.³³

The alternative to gradualism was to go cold turkey, that is, to take forceful, strong actions that indicated the Fed was serious about controlling inflation (Bordo, et al. (2017)). This is exactly what Paul Volcker did when he became Chairman of the Fed. He went cold turkey in October 1979. He relied on monetarism in the sense that he announced that he

³³There are other interpretations of this era. For example, Cogley and Sargent (2002) argue that the statistical pattern of the data is consistent with a story in which policymakers are misled by the patterns to try and exploit the Phillips curve, which leads to higher inflation. Orphanides (2003) argues that mismeasurement of full employment using real-time data led to monetary policy that was too expansionary.

would target the money supply and let short-term interest rates go to wherever they would go, which was as high as 21 percent in 1981. This put the United States into a very severe recession in which unemployment reached 10.8 percent in 1982, but the recovery was quick and inflation declined substantially. The success of his strategy can be interpreted in terms of the concepts of rational expectations and credibility in that the public came to believe that he would stick with his strategy because he took forceful actions and had the backing of President Ronald Reagan to bear the short-term costs of the recession (Meltzer (2009b)).

The importance of expectations and the credibility of the central bank in controlling inflation is also tied to ideas developed at a Reserve Bank, albeit a different one than St. Louis. While the increased emphasis on monetary aggregates in the 1970s can be tied back to ideas associated with the St. Louis Fed in the 1960s, the increased emphasis on expectations and credibility in the 1980s can be tied to the ideas associated with the Federal Reserve Bank of Minneapolis starting in the 1970s. These latter ideas explain why Friedman's gradualism strategy did not work. It was not credible. The public did not believe that the Fed would stick with the strategy, and in the 1970s, the public was correct.

6 Great Moderation: 1980s, 1990s, and Early 2000s

After Chairman Volcker substantially had reduced inflation by 1983, inflation rates gradually trended further down, GDP exhibited less variability, the recessions of the early 1990s and early 2000s were milder than previous ones, and this period came to be known as the Great Moderation. Still, during this period, the Fed's credibility in fighting inflation was still in some doubt. There were inflation scares in 1983, 1987, and 1994 in which the Fed raised the fed funds rate out of fear that inflation would rise again (Goodfriend (1993, 2007)). These moves cemented the Fed's credibility that it would aggressively react to perceived increases in the inflation rate.

6.1 The Federal Reserve Bank of Minneapolis: Rational Expectations, Credibility, and Macroeconomic Methodology

Analogous to how the monetarist influences on Federal Reserve policy can be tied to the introduction of monetarism into the Federal Reserve via the St. Louis Fed in the 1960s, the

importance of expectations and credibility was introduced into the Federal Reserve primarily via the Minneapolis Fed in the 1970s and 1980s. This Reserve Bank became closely associated with and was a major contributor to the rational expectations revolution in macroeconomics that started with Robert Lucas (1972). The role of the Minneapolis Fed in influencing central banking is even stronger than that of the St. Louis Fed because not only did it directly influence policy, but it also changed how the profession did macroeconomics and thus the tools used at most central banks. It was directly involved in the methodological development of dynamic general equilibrium models of the macroeconomy, which became the standard methodology for macroeconomics.

The Minneapolis Fed's connection to rational expectations started in 1970 when John Kareken, a professor of economics at the University of Minnesota and an adviser to the Minneapolis Fed, formed a group to build an econometric model in which to derive optimal policy rules.³⁴ The group consisted of John Kareken, Neil Wallace, Thomas Muench, and Thomas Sargent. After starting the project, they read a draft of Lucas' 1972 paper and realized that it implies that past behavior couldn't be used to predict future behavior under different policies because the new policies would change people's expectations and behavior, so the conceptual basis of their project was flawed.³⁵

The implications of Lucas' work for central bank policies were enormous. First, it meant that the statistical Phillips curve relationship between inflation and unemployment would not necessarily hold if the FOMC changed its behavior to try to exploit these relationships. This result undercut Keynesian macroeconomic policies. Second, it meant that credibility about future policy behavior was important in how the public formed expectations about inflation.³⁶

As with St. Louis' monetarist views in the late 1960s, the short-term effects of these insights on the FOMC were minimal. Presidents Bruce MacLaury and Mark Willes of the Minneapolis Fed raised these issues at the FOMC in the 1970s (Clement (2000)), but as we

³⁴Ironically, the person who connected Kareken with the Minneapolis Fed was Walter Heller, who, as we described earlier, placed Keynesian Governors on the Board in the early 1960s. Heller was a professor at the University of Minnesota and knew Hugh Galusha, the president of the Minneapolis Fed (personal communication with Art Rolnick).

³⁵For more details, see Clement (2000).

³⁶More technically, the analysis said that the ability to do policy analysis with the Board's econometric models was limited because the parameters in the models were not structural.

discussed, FOMC behavior did not dramatically change until Volcker became Chairman.

In contrast, the long-term effects of these insights on the FOMC and the profession were dramatic. The failure of stagflationary policies in the 1970s and the success of Volcker's cold turkey strategy raised the prominence of rational expectations-based theories of monetary policy within central banks. Where the rational expectations insights became influential was in the successive implications for including expectations in monetary policy strategy as well as setting the stage for how to design central bank policies and institutions to create credibility while keeping inflation down. The importance of credibility is very much illustrated by the ratcheting up of inflation over the 1970s. The public did not believe that the Federal Reserve had the will to defeat inflation, and this belief was not borne out until Volcker, with President Reagan's support, decisively took actions to reduce inflation in the early 1980s. The economic idea that illustrated this was the time inconsistency of economic policy, which was developed by Kydland and Prescott (1977) in a broad context and applied to monetary policy by Barro and Gordon (1983).

Time consistency treats the interaction between policymakers and the public as a dynamic game in which policymakers cannot commit to future policies. Instead, policymakers re-optimize each period when deciding what to do. What Kydland and Prescott showed was that even if the policymakers were perfectly benevolent — that is, they maximized the public's welfare — they would still not follow the optimal long-run policy. Instead, when they re-optimized, they would not incorporate how their behavior today affected past expectations of the public. The public knew this, formed expectations, and behaved accordingly, which led to suboptimal outcomes.

The time-consistency logic illustrated the importance of commitment in implementing a good long-term policy, even if that policy was costly in the short run. More generally, it led to an emphasis on the importance of rules versus discretion as well as an understanding that the institutional structure mattered for the central bank's ability to commit to a rule. This was an insight that the founders of the Federal Reserve understood, but which the then-dominant Keynesian view did not subscribe to and had not been previously formalized in the language of modern economics. The use of discretion and a lack of commitment were good descriptions of monetary policy in the 1970s, when the Federal Reserve would back down on fighting inflation once unemployment became high because the Fed thought the

social costs were too high to bear politically.^{37,38}

The Minneapolis Fed’s connection to this work was both direct and indirect. Thomas Sargent and Neil Wallace were advisers to the Minneapolis Fed in the 1970s, where they worked out many of the implications of rational expectations for monetary policy. Later, Edward C. Prescott became an adviser in 1981 and Christopher Sims in the mid-1980s.³⁹ All were at the University of Minnesota, and the tight interactions between these two institutions generated a mutually beneficial flow of ideas between the central bank and the group of macroeconomists who worked on rational expectations models and time series analysis, of which the University of Minnesota was one of the primary centers. Furthermore, the macroeconomic methodology of using dynamic general equilibrium models with rational expectations was developed partly at the Minneapolis Fed and the University of Minnesota.⁴⁰

The impact on the profession was huge. Table 3 reports the five most cited articles from the Minneapolis Fed’s *Quarterly Review*. The citation counts are very high for these articles. The most cited article is Sargent and Wallace’s “Some Unpleasant Monetarist Arithmetic.” This article showed how fiscal policy interacted with monetary policy in determining inflation. The fifth most cited article is Lucas and Sargent’s “After Keynesian Economics,” which clearly lays out the logical problems with the Keynesian approach and shows just how much of a change in methods the rational expectations approach heralded.

Table 4 reports citation counts for papers published in 1990 or before in an academic journal by researchers with an explicit Minneapolis Fed affiliation listed on the paper. These

³⁷There is a subtle difference in objective functions between the time inconsistency of Kydland and Prescott’s policymakers and the analysis of policymaker behavior in the 1970s. In Kydland and Prescott, the policymakers are maximizing the public’s welfare. One criticism of policymakers in the late 1960s and 1970s was that the Federal Reserve chose monetary policy to satisfy the political goals of the party in power at the expense of inflation. This was the case with President Johnson’s pressure on Martin and President Nixon’s pressure on Burns. (See Meltzer (2009b), Chapter 6.) What made the Kydland and Prescott argument so powerful is that they showed that the short-term focus of policy was not just a matter of who was in charge but could also come from benign motivations.

³⁸Another argument put forward by Milton Friedman (1986), following Buchanan and Tullock (1962) and Niskanen (1971), was based on public choice. According to this view, the Fed should be viewed as a government bureau whose objective function was to maximize its revenue and power, and expansionary monetary policy would achieve this result.

³⁹Kydland and Prescott’s (1982) work on business cycles had the implication that the business cycle was caused by technological shocks — hence, the name “real business cycles”— rather than monetary policy shocks as emphasized by the monetarists. This has strong implications for the validity of using monetary policy for stabilization policy.

⁴⁰Other universities at the time that were closely associated with this development were Carnegie-Mellon, Chicago, and Rochester.

Authors and Year	Title	Google Scholar	SSCI
Sargent and Wallace (1981)	Some Unpleasant Monetarist Arithmetic	3628	463
Prescott (1986)	Theory Ahead of Business Cycle Measurement	2822	597
Sims (1986)	Are Forecasting Models Usable for Policy Analysis?	1996	363
Kydland and Prescott (1990)	Business Cycles: Real Facts and a Monetary Myth	1623	323
Lucas and Sargent (1979)	After Keynesian Economics	1287	140

Table 3: The five most cited Federal Reserve Bank of Minneapolis *Quarterly Review* articles written by economists with Minneapolis Fed affiliations prior to 1991. Google Scholar citation counts are as of 10/3/23. The Lucas and Sargent (1979) SSCI count includes citations of reprints of the article. Note that Google Scholar coverage is broader than SSCI, sometimes counts multiple versions of the same citing paper, and changes over time.

numbers are very high.

Table 4 does not list seminal pre-1990 papers associated with economists who later became associated with the Minneapolis Fed. These papers include the time-consistency paper by Kydland and Prescott that we already discussed, but also their paper on real business cycles; they earned their Nobel Prize for their work on these two topics. Another two papers not listed by Christopher Sims are examples of important advances in econometric methods (Sims (1972, 1980)).

The Sims work developed vector autoregression models (VAR) and is connected with Sargent in the sense that they both developed econometric methods for macroeconomics and monetary economics. Sargent incorporated rational expectations restrictions into estimating econometric models (Sargent (1973, 1976, 1978)). While both developments were major intellectual discoveries (Sargent and Sims won Nobel prizes in 2011 for their work), they were also serious attacks on prevailing monetary policy practices. Both approaches, though for different reasons, implied that the primary Keynesian econometric model, which was used at the Board, was vulnerable to rational expectations and identification critiques. Furthermore, the implications of these models were put into practice for monetary policy deliberations at the Minneapolis Fed. Robert Litterman, who was at the Minneapolis Fed, used the VAR methods that Sims developed to forecast and showed that Bayesian VARs using the

Authors and Year	Title	Google Scholar	SSCI
Greenwood and Jovanovic (1990)	Financial Development, Growth, and the Distribution of Income	6397	1166
Sargent and Wallace (1975)	“Rational Expectations,” the Optimal Monetary Instrument and the Optimal Monetary Supply Rule	3402	867
Sargent and Wallace (1976)	Rational Expectations and the Theory of Economic Policy	1262	256
Sargent (1978)	Estimation of Dynamic Labor Demand Schedules under Rational Expectations	932	318
Sargent (1976)	A Classical Macroeconometric Model for the United States	901	328

Table 4: The five most cited academic papers published prior to 1991 and which listed a Minneapolis Fed affiliation for at least one of the authors. Google Scholar citation count are as of 10/3/23. SSCI as of 10/3/23. Note that Google Scholar coverage is broader than SSCI, sometimes counts multiple versions of the same citing paper, and changes over time.

“Minnesota” prior were excellent at forecasting (Litterman (1986)).

The influence was not just on academia. Figure 1 reports the percentage of Board working papers that cite Lucas, Prescott, Sargent, Sims, or Wallace.⁴¹ The percentage gradually increases in the 1970s, then shoots up, and settles around 20-25 percent through the mid-1990s. Again, these series include many papers not directly related to macroeconomics or monetary policy, so the percentages are likely understating the effect.

Several important ideas about monetary policy and macroeconomics came directly from the rational expectations and time-consistency insights of the 1970s that were associated with the rational expectations, econometric, and methodological innovations associated with Minneapolis. Several, though not all, were developed or initially supported at a Reserve Bank and only later became part of the thinking among the System as a whole. The other feature of this period is that the development of ideas became an activity in which Fed economists, both Board and Reserve Bank staff, increasingly participated, often through interaction with academics.

⁴¹The series we consider are *Staff Economic Studies* (later called *Staff Studies*), *Special Studies Papers*, *Special Studies*, the *Working Paper* series, *Finance and Economic Discussion Series* (which starts in 1987) and *IFDP*. As with the St. Louis analysis, we leave out the two working paper series focused on banking, finance, and microeconomics.

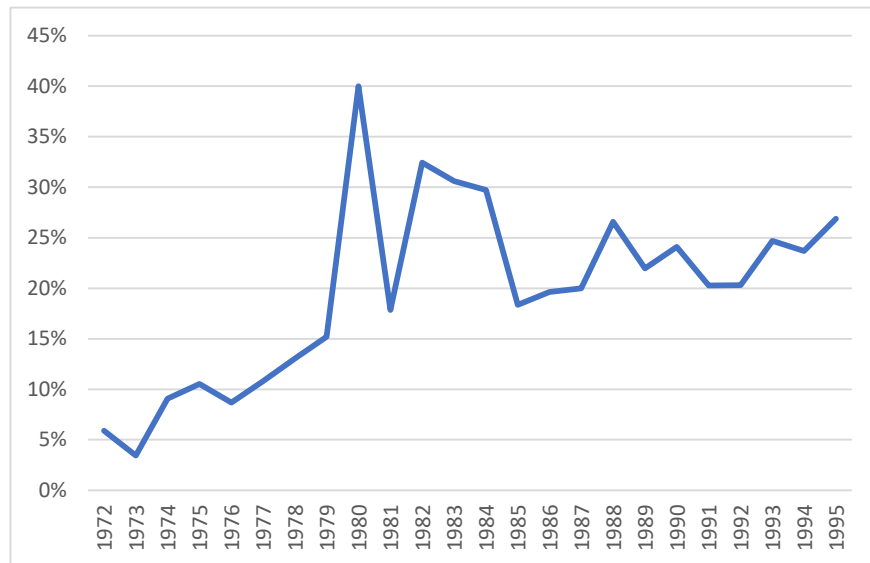


Figure 1: Percentage of Board working papers that cite Lucas, Prescott, Sargent, Sims, or Wallace from 1972-1995. For list of working paper series considered, see the text.

6.1.1 Institutions: Independent Central Banks

One idea descended from the dynamic general equilibrium models with rational expectations was that the institutional design of a central bank was important for initiating rule-like monetary policy and reducing discretion. This led to considerable work examining the value of an independent central bank by authors such as Cukierman (1992), Persson and Tabellini (1993), and Rogoff (1985). Empirically, Alesina and Summers (1993) showed that better macroeconomic outcomes were correlated with independent central bank institutions.

Here, unlike in Friedman and Schwarz's (1963) view of the Federal Reserve in the 1930s, the structure of the Reserve Banks played a valuable role. The modern Federal Reserve, as created by Chairman Martin, had a built-in force for independence with the Reserve Banks. As was discussed earlier, the founders of the Federal Reserve System well understood the value of a decentralized system with checks and balances, but the predominant intellectual

line of thought of the 1960s and 1970s emphasized coordination of fiscal and monetary policy, which pushed for a more centralized and less independent central bank. When thinking changed from this coordination perspective toward an appreciation for credibility and commitment to a rule, the semi-independent Reserve Banks served as a device for helping the FOMC commit.

The Reserve Banks also played another useful role in the effort to reduce inflation. One line of research into how to design a more independent central bank found that hiring a conservative central banker – not in the political sense, but in the sense of wanting to keep inflation low – would help with outcomes (Rogoff (1985)). Again, this tied into the history of the Reserve Banks, where historically, at least in the 1970s and 1980s, their presidents had more aversion to high inflation than the average Governor (Belden (1989), Bordo and Istrefi (2023)).

6.1.2 Taylor Rule

A second descendant idea was John Taylor’s empirical work on the advantage of monetary policy rules over discretion (Taylor (1993)). Taylor was influenced by the work of Bryant, Hooper, and Mann (1993) – all staff economists at the Board – who examined a number of large multi-country econometric models incorporating rational expectations and found that instrument rules based on policy interest rates would give the best performance. In particular, the policy interest rate would react to deviations from expected inflation and the output gap, which are connected to the Federal Reserve’s dual mandate of keeping inflation and unemployment low. These rules performed better than target rules like Friedman’s constant money growth rate and outperformed rules using monetary aggregates.

The Taylor rule can also be used to ascertain the extent to which central banks are following rule-like behavior by comparing the actual policy rate to the rate predicted by the Taylor rule. Taylor (2012) and Nikolsko-Rzhevskyy, Papell, and Prodan (2014) find that the federal funds rate was closest to the Taylor rule during the Great Moderation era from 1983 to 2003, when Paul Volcker and Alan Greenspan were Chairmen of the Federal Reserve. Deviations from rule-like behavior were considerable during the Great Inflation period in the 1970s, a regime characterized by Meltzer (2009b) and Taylor (2012) as discretionary. Now, the Taylor rule, even if it is not necessarily followed, is often used as a simple benchmark by

the FOMC.

6.1.3 Transparency

Prior to the early 1990s, the FOMC's monetary policy decisions were not revealed to the public. The FOMC would give instructions to the Desk at the New York Fed and the Desk would operate in the fed funds market to implement the instructions. As a consequence, there was a large industry of Fed watchers who would try to discern the FOMC's instructions based on what they observed in the money markets. Through the 1980s, the Board preferred this arrangement, as shown by its long legal fight against a Freedom of Information Act request in 1975 for the FOMC to reveal its minutes (Goodfriend (1986)).

On this issue, the Richmond Fed, where Marvin Goodfriend worked, took a dissenting position. Starting in the 1980s, the Richmond Fed maintained that the arguments for FOMC secrecy were not that strong (Goodfriend (1986)). Goodfriend's (1986) arguments were based on equilibrium models with rational expectations that were developed in academia, thus again illustrating the importance of the flow of ideas between academia and central banks as well as the importance of rational expectations. In the face of considerable disapproval from the Board (Broaddus (2022)), Richmond stood behind Goodfriend and the paper was made public. Later, as the FOMC started announcing its policy decisions in 1994, there was little ill effect on markets, and the transparency view became accepted within the System and became part of a strategy of supporting inflation targeting and helping the Federal Reserve to be accountable (Blinder (1996), Woodford (2005), Svensson (2010)).

6.1.4 Inflation Targeting

Inflation targeting is a central bank strategy that has a fixed inflation rate or, in some versions, price stability, as its primary goal. The idea is for a central bank to announce a numerical inflation target, an implementation of monetary policy that focuses on the inflation forecast, and transparency and accountability (Svensson (2010)). An inflation-targeting regime was controversial in the 1980s, but was advocated by several Reserve Banks, particularly the Cleveland Fed under President Lee Hoskins (1987-1991). For example, the Cleveland Fed's 1989 and 1991 Annual Reports contained essays advocating for price stability (Federal Reserve Bank of Cleveland (1989, 1991)). As with earlier ideas pushed by Reserve

Banks, the FOMC did not immediately accept inflation targeting. Instead, the idea was first adopted by the Reserve Bank of New Zealand in 1990, then by the central banks of Australia, Canada, Sweden, and the United Kingdom, followed later by the FOMC in 2012, when it set an inflation target of 2 percent for the price stability portion of its mandate.

7 A Model

One theme in the St. Louis and Minneapolis examples, as well as Richmond on transparency and Cleveland on inflation targeting, is that new ideas on monetary policy came out of or through Reserve Banks even when there could be considerable opposition from the Board at the time. The Philadelphia Fed example in 1979 is particularly illuminating. The reasons for the opposition were varying. Under Chairman Burns some of it was his personality, but during the 1960, 1970s, and 1980s there was also considerable political opposition to the Federal Reserve, particularly when it was raising interest rates (Meltzer (2009b), Hetzel (2022)). Several members of Congress regularly attacked Federal Reserve policies and structure.

Under conditions like this, it is natural to worry that internal disagreements would be used against the institution (Broaddus (2022)) and because the Board has to deal with political attacks and pressures, it is natural that the Board would worry the most about where to draw the line about the extent to which internal differences of opinion could be made public.

This section develops a model that illustrates part of the story that we are telling above. It is most relevant for the 1960s, 1970s, and 1980s, when the differences in opinion on monetary policy were the strongest, inflation was high, and the Federal Reserve was under enormous political scrutiny.

The model consists of headquarters (the Board in this period) and a single division (a Reserve Bank or a Reserve Bank researcher). The headquarters protects the interests of the organization and supervises the division, which produces research that helps the organization do its job. Each period, the division chooses how much effort e to apply to research at a cost of c per unit of effort. For simplicity, the results of research are either successful or not, with 1 representing success and 0 not. The probability of success depends on effort according to the probability function $p(e)$, where p is concave and increasing.

The individual running the division, or the division for short, receives utility $u > 0$ from the research if it is successful *and* if the results of its research are made public. If the successful results are not made public or if it is unsuccessful, it receives utility 0 from the research. The utility from disclosure is designed to capture the idea that research incentives are stronger if the researcher receives professional and public recognition. For an individual researcher, Schultz (1943) argued that public recognition was necessary for proper incentives. For a Reserve Bank, we think there are similar incentives at work. We also assume that the division is run by a sequence of individuals, so the division solves a static problem each period. However, each period the new individual running the division knows the history of actions undertaken by previous individuals as well as by headquarters.

Headquarters also receives utility from successful research if it is disclosed. The idea is that research will improve the quality of policymaking at some point either through direct effects or via a general increase in knowledge. If the information remained internal then the value of it would be less, which for simplicity we assume makes it valueless. The headquarters receives utility of $v > 0$ if the research is successful and disclosed and 0 if the research is unsuccessful or if it is successful, but not disclosed. Unlike the division, headquarters does not pay a cost to produce research. However, in any period t , there is probability h that disclosure of the successful research will cost headquarters $z > 0$. Otherwise, disclosure is costless to headquarters. Whether the economy is in the costly-disclosure state is not known until after the research is done by the division and the results of the research are known by the headquarters.

If the economy is in the costly-disclosure state and the research is successful, then headquarters can decide whether to disclose or not. As implied above, if it discloses, headquarters receives utility $v - z$. However, if the headquarters chooses to not disclose, it pays a fixed cost $\alpha > 0$ and receives utility $0 - \alpha$. Headquarters cannot commit to not disclosing. Headquarters lives forever, which we model by having it discount at rate $0 < \beta < 1$ per period. Finally, we restrict headquarters to pure strategies in the disclosure decision, though these strategies can depend in complicated ways on the history.

The idea behind the costly-disclosure state is that it represents potential political and other pressures on headquarters due to ideas being made public. For example, if research ideas contradict existing policies, then it would be easier for outsiders to attack the organi-

zation for the policies it was implementing. Not all ideas have this effect – probably most do not – so we capture that by assuming new ideas are costly only a fraction of the time. In terms of Federal Reserve history, the political environment that the Fed operates under would be represented by z with the z being higher in the 1970s than in some other eras.

The idea behind the cost of not disclosing successful information is that the leader of any organization will bear costs from clamping down on the activities of its subordinates. Some of these costs are as simple as the effect on morale, but the cost we have in mind is the use of political or organizational capital to overrule a person or group of people who are powerful. The size of these costs will depend on how the organization is structured and its internal governance. In terms of Federal Reserve structure and governance, we view the structure of the Reserve Banks with their corporate structure and their own board of directors as giving them significantly more autonomy than a division in a centralized organization like a government agency. In terms of the model, the Reserve Banks would have a much higher value of α than a division of a centralized organization.

Each period, the division solves a static maximization problem. If it thinks headquarters will disclose in the costly-disclosure state, then it solves

$$\max_e p(e)u - ce$$

and the solution under disclosure, e_d , satisfies

$$up'(e_d) = c. \tag{1}$$

If it thinks headquarters will not disclose in the costly-disclosure state, then it solves

$$\max_e p(e)(1 - h)u - ce$$

and the solution under no disclosure, e_n , satisfies

$$(1 - h)up'(e_n) = c. \tag{2}$$

Because $p(e)$ is concave, $e_d > e_n$. Not disclosing research results in the costly-disclosure state acts like a tax on research production, which is consistent with the Schulz (1943) observation that the lack of professional recognition was an impediment to researcher incentives in the System in the 1940s.

Headquarters faces the problem of deciding whether to allow information to be disclosed in the costly-disclosure state. Unlike the division, it cares about the future and takes into account the effect of its disclosure decision on the expectations of future divisions. However, it cannot commit to future disclosure decisions.

For our analysis, we assume that $v - z < 0 - \alpha$. This assumption says that in the costly-disclosure state, the within-period utility from not disclosing is higher than that from disclosing. This assumption creates a short-term benefit of not disclosing and, combined with the lack of commitment, creates the time-consistency problem.

In the static model, headquarters will never disclose in the costly-disclosure state. However, in a dynamic problem it may be able to resist these short-term incentives and develop credibility for allowing disclosure. To assess this possibility, we use the sustainable plans concept of Chari and Kehoe (1990).

To find if disclosure is sustainable, we need to calculate headquarters' utility if it always discloses and if it never discloses in the costly-disclosure state. If headquarters always discloses, its utility is

$$\begin{aligned} W_d &= \sum_{t=0}^{\infty} \beta^t p(e_d) (h(v - z) + (1 - h)v) \\ &= \sum_{t=0}^{\infty} \beta^t p(e_d) v - \sum_{t=0}^{\infty} \beta^t p(e_d) h z \\ &= \frac{1}{1 - \beta} p(e_d) v - \frac{1}{1 - \beta} h p(e_d) z. \end{aligned}$$

Again, z is the cost to headquarters of the information being disclosed.

If headquarters never discloses in the costly-disclosure state, then its utility is

$$\begin{aligned} W_n &= \sum_{t=0}^{\infty} \beta^t p(e_n) (h(-\alpha) + (1 - h)v) \\ &= \frac{1}{1 - \beta} p(e_n) h(-\alpha) + \frac{1}{1 - \beta} p(e_n) (1 - h)v. \end{aligned}$$

where α is a fixed cost paid by headquarters to prevent disclosure of the information.

7.1 No Disclosure Subgame Perfect Equilibrium

To see what allocations are sustainable, the strategy is to first find the worst subgame perfect equilibrium (SPE). Then, we see if a desired allocation can be supported as part of

an SPE where deviations switch the economy to the worst SPE. The worst SPE serves as the punishment as part of a trigger strategy that makes deviating less appealing. In problems where $W_d > W_n$, that is, the headquarters prefers a disclosure allocation, the worst SPE will be the one where headquarters never discloses in the costly-disclosure state.

First, we show that never disclosing is an SPE. If headquarters doesn't disclose, then e_n is chosen by the division because it satisfies (2). Now, to show that headquarters has no incentive to deviate, consider headquarters' utility if it does disclose in a costly-disclosure state. Its utility would be $v - z + \beta W_n$. Headquarters would only do this if its utility is higher than not disclosing, that is, only if

$$v - z + \beta W_n \geq -\alpha + \beta W_n$$

or

$$v - z \geq -\alpha.$$

However, earlier we assumed that

$$v - z < -\alpha$$

so this isn't possible. Therefore, headquarters has no incentive to deviate from not disclosing.

Never disclosing is also the worst SPE when $W_d > W_n$. To see this, note that when $W_d > W_n$, the within-period utility of disclosing has to be higher than the within-period utility of not disclosing at each t . Any other SPE will consist of a history-contingent strategy in which the headquarters discloses in some states and does not disclose in others. In states where there is disclosure, within-period utility is higher than it would be if headquarters doesn't disclose. Consequently, never disclose is the worst SPE.

7.2 Supporting Disclosure

Disclosure is a sustainable plan if it can be supported as a SPE. To show what conditions allow this, the disclosure allocation needs to satisfy

$$v - z + \beta W_d \geq -\alpha + \beta W_n. \tag{3}$$

This equation says that if the utility headquarters receives from disclosing in the costly-disclosure state and continuing to disclose in the future is greater than the utility of not disclosing and reverting to the non-disclosure SPE, then e_d can be supported as a SPE.

7.2.1 Comparative Statics

To implement e_d requires that equation (3) holds. Comparative statics for z and α are simple.

$$\frac{\delta W_d}{\delta z} < 0, \text{ and } \frac{\delta W_n}{\delta z} = 0,$$

and

$$\frac{\delta W_d}{\delta \alpha} = 0, \text{ and } \frac{\delta W_n}{\delta \alpha} < 0.$$

So, increasing z – the cost to headquarters of disclosure – reduces the benefit of disclosure but doesn't affect the value of deviating. Consequently, as z increases, at some point e_d can no longer be supported. The internal cost to not disclosing information, α , works in the opposite way. It has no effect on utility if e_d is implemented. However, it lowers the utility of deviating, so it is easier to support e_d .

Comparative statics for h are not straightforward because h affects both sides of (3). However, the extremes are easy to analyze. At $h = 0$, $e_n = e_d$ because the costly state never happens. At the other extreme of $h = 1$,

$$\begin{aligned} W_d &= \frac{p(e_d)(v - z)}{1 - \beta} \\ W_n &= \frac{p(0)(-\alpha)}{1 - \beta}. \end{aligned}$$

Because we assumed that $-\alpha > v - z$, both W_d and W_n are negative. Furthermore, $p(0) < p(e_d)$, so $p(e_d)(v - z) < p(0)(-\alpha)$ and $W_d < W_n$. Consequently, HQ prefers to never disclose. As h is reduced from one, HQ will continue to prefer to never disclose in some neighborhood of $h = 1$.

7.2.2 Organizational Design

The results of the model illustrate that a high α , which in the case of the Federal Reserve comes from its decentralized structure, makes it easier for the organization to commit. In the 1960s through the 1990s, the narrative section of the paper demonstrated the large value of allowing reform ideas to develop. Not surprisingly, as z increases, the value from not disclosing goes up. In the 1970s, we believe that z was higher than it is in later years and

the Board acted accordingly. An interesting question is to ask what α is desirable as a function of z . For low values of z , where research results are uncontroversial, the value of α is irrelevant because there is little incentive to not disclose research results. For high values of z , headquarters will always want to prevent disclosure, and in this extreme case, a low α will be desirable just so headquarters does not have to pay that cost. Apparently, then, the benefit of commitment, as defined by the value of α , need not be monotonic in z .

8 Conclusion

This paper evaluated the Federal Reserve System as an organization for processing ideas. We documented that, starting in the 1960s, some Reserve Banks developed and advocated for new views on monetary policy, some of which were dissenting at the time. This was done through tight links to academia. In the case of the St. Louis Fed, it was done through ties to the monetarists and, in the case of the Minneapolis Fed, through ties to the rational expectations economists. The Board staff was also heavily influenced by academia, but starting in the 1960s, they were more influenced by what became, for a time, establishment Keynesian ideas. We showed how alternative reforming ideas of the 1970s that were tied to several of the Reserve Banks influenced policy and were successful at controlling inflation.

We argued that the decentralized elements that remained in the System after the centralization under the Banking Act of 1935, along with Chairman Martin's changes to the FOMC in the mid-1950s, created the conditions under which the Reserve Banks could become a means for new ideas to enter and gestate within the System. The Federal Reserve's decentralized, regionally based corporate structure, a holdover from the early days of the Fed, turned out to be a useful mechanism for supporting an organization that allowed enough independence for Reserve Banks to develop, support, and push ideas that sometimes differed from the view of the rest of the System and which, in the long run, contributed to Federal Reserve policymaking as a whole.⁴²

While we do not explore this in detail in the paper, we also think that that central bank employees can contribute more when they are involved in the development of ideas. This makes it much easier for an organization to process ideas that come from outside the

⁴²For views less favorable to the Federal Reserve's decentralized structure, see, for example, Conti-Brown (2016).

organization; in the communication channels language of Arrow, the specialized technical employees serve as receivers of ideas. However, equally important central bank employees can generate ideas that outsiders would be unable to generate. They do this by dealing with central bank business on a daily basis and developing the ability to receive and process signals from practitioners. The result is that central bank employees become exposed to questions that an outsider, such as an academic, might never be aware of. For example, understanding monetary policy operating procedures, wholesale payment risks, and other areas in banking requires significant institutional knowledge. The New York Fed, which plays a particularly important role in the money markets, has generated numerous ideas on these issues. Another example is research on payments, which started to develop in the System when the Monetary Control Act of 1980 forced the System to make decisions on how to price its payment services.

Ideas are important to other government entities, but we are unaware of any such entity in which public disagreement is tolerated to the extent that it is by the Federal Reserve. The short-term incentives for most agencies (as well as many other organizations) are to keep all debates internal and then present a united front to the public in order to prevent outsiders from using these divisions against the agency. Our analysis suggests that the long-term costs of that type of behavior for a central bank are significant. It leads to the filtering of information and groupthink and can make it difficult for an organization to learn.⁴³

While the conditions in the 1960s, 1970s, and 1980s were ideal for the Reserve Banks to be important nodes in a network of ideas, information networks are a lot denser now. There has been some convergence in macroeconomic thinking, and the connections between Reserve Banks, Board staff, academia, and even foreign central banks are much more diffuse and broad. Nevertheless, our analysis suggests that the Reserve Banks, with the competition in generating ideas they can provide, have been an important channel for preserving the flow of information and the generation of ideas within the System and with academia. In this way, the Reserve Banks have helped the Federal Reserve in potentially solving the changing problems it faces.

⁴³An interesting comparison to test this conjecture would be to examine the experience of other central banks. Along these lines, for an analysis of the Bank of England's experience, see Tucker (2018).

References

- [1] Alesina, Alberto, and Lawrence H. Summers. "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence." *Journal of Money, Credit and Banking*, 25, 1993,, pp. 151-162. <https://doi.org/10.2307/2077833>
- [2] Andersen, Leonall C., and Keith M. Carlson. "St. Louis Model Revisited." *International Economic Review*, 15 (2), June 1974, pp. 305-327. <https://doi.org/10.2307/2525863>
- [3] Andersen, Leonall C., and Keith M. Carlson. "A Monetarist Model for Economic Stabilization." Federal Reserve Bank of St. Louis *Review*, April 1970, pp. 7-25. <https://doi.org/10.20955/r.68.45-66.djw>
- [4] Andersen, Leonell C. and Jerry L. Jordan. "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization." Federal Reserve Bank of St. Louis *Review*, November 1968, pp. 11-24. <https://doi.org/10.20955/r.50.11-24.qox>
- [5] Arrow, Kenneth J. *The Limits of Organization*. New York: W.W. Norton & Company, 1974.
- [6] Bach, G. L. *Federal Reserve Policy-Making: A Study in Government Economic Policy Formation*. Alfred A. Knopf, New York, 1950. <https://doi.org/10.2307/1951305>
- [7] Barro, Robert J., and David B. Gordon. "A Positive Theory of Monetary Policy in a Natural Rate Model." *Journal of Political Economy*, 91 (4), 1983, pp. 589-610. <https://doi.org/10.1086/261167>
- [8] Batten, Daniel S. and Daniel L. Thornton, "The Monetary-Fiscal Policy Debate and the Andersen-Jordan Equation," Federal Reserve Bank of St. Louis *Review*, October 1986, pp. 9-17. <https://doi.org/10.20955/r.68.9-17.itk>
- [9] Belden, Susan. "Policy Preferences of FOMC Members as Revealed by Dissenting Votes." *Journal of Money, Credit and Banking*, 21 (4), November 1989, pp. 432-441. <https://doi.org/10.2307/1992351>
- [10] Blinder, Alan. "Central Banking in a Democracy." Federal Reserve Bank of Richmond *Economic Quarterly*, 82 (4), Fall 1996, pp. 1-14.

- [11] Blinder, Alan S., and Jeremy B. Rudd. "The Supply-Shock Explanation of the Great Stagflation Revisited." In *The Great Inflation: The Rebirth of Modern Central Banking* (Michael D. Bordo and Athanasios Orphanides, eds.), National Bureau of Economic Research, 2013, pp 119-175. <http://www.nber.org/chapters/c9160>
- [12] Bordo, Michael D. "Some Historical Reflections on the Governance of the Federal Reserve." In *Central Bank Governance and Oversight Reform* (John H. Cochrane and John B. Taylor eds.) Hoover Institution Press, 2016, pp. 221-238. https://www.hoover.org/sites/default/files/research/docs/cochranetaylor_centralbank_ch5_0.pdf
- [13] Bordo, Michael D. "The Imbalances of the Bretton Woods System 1965 to 1973: U.S. Inflation, the Elephant in the Room." NBER Working Paper No. 25409, December 2018. <https://doi.org/10.3386/w25409>
- [14] Bordo, Michael D. "Karl Brunner and Allan Meltzer: From Monetary Policy to Monetary History to Monetary Rules." Swiss National Bank Conference "Karl Brunner and Monetarism," Zurich, October, 2018b. <https://www.hoover.org/sites/default/files/research/docs/19104-bordo.pdf>
- [15] Bordo, Michael D., Ehsan U. Choudhri, and Anna J. Schwartz. "Money Stock Targeting, Base Drift and Price Level Predictability: Lessons from the U.K. Experience." *Journal of Monetary Economics*, 25, March 1990, pp. 253-272. [https://doi.org/10.1016/0304-3932\(90\)90015-V](https://doi.org/10.1016/0304-3932(90)90015-V)
- [16] Bordo, Michael D., Christopher Erceg, Andrew Levin and Ryan Michaels. "Policy Credibility and Alternative Approaches to Disinflation." *Research in Economics*, 71 (3), 2017, pp. 422-440. <https://doi.org/10.1016/j.rie.2017.05.007>
- [17] Bordo, Michael D., and Klodiana Istrefi. "Perceived FOMC: The Making of Hawks, Doves and Swingers." *Journal of Monetary Economics*, Vol. 136, 2023, pp 125-143. <https://doi.org/10.1016/j.jmoneco.2023.03.001>
- [18] Bordo, Michael D. and Edward S. Prescott. "Federal Reserve Structure, Economic Ideas, and Monetary and Financial Policy." NBER Working Paper No. 26098, July 2019. <https://doi.org/10.3386/w26098>

- [19] Bordo, Michael D., and Anna Schwartz. "Clark Warburton: Pioneer Monetarist." *Journal of Monetary Economics*, 5 (1), 1979, pp. 43-65. [https://doi.org/10.1016/0304-3932\(79\)90023-0](https://doi.org/10.1016/0304-3932(79)90023-0)
- [20] Bremner, Robert P. *Chairman of the Fed: William McChesney Martin Jr. and the Creation of the American Financial System*. Yale University Press, New Haven, 2004. <https://doi.org/10.12987/yale/9780300105087.001.0001>
- [21] Brayton, Flint, Andrew Levin, Ralph Tryon, and John C. Williams. "The Evolution of Macro Models at the Federal Reserve Board." *Carnegie-Rochester Conference Series on Public Policy*, 47, 1997, pp. 43-81. [https://doi.org/10.1016/S0167-2231\(98\)00004-9](https://doi.org/10.1016/S0167-2231(98)00004-9)
- [22] Broadus, Jr., J. Alfred 2022. "Marvin Goodfriend at the Richmond Fed: Recollections." In *Essays in Honor of Marvin Goodfriend: Economist and Central Banker*. (Eds., Robert G. King and Alexander L. Wolman). Federal Reserve Bank of Richmond, 2022, pp. 25-41.
- [23] Brunner, Karl, and Allan H. Meltzer. "Some General Features of the Federal Reserve's Approach to Policy: A Staff Analysis." Subcommittee on Banking and Currency, US House of Representatives, 86th Congress, 2nd session, 1964.
- [24] Bryant, Ralph C., Peter Hooper, and Catherine L. Mann "Evaluating Policy Regimes: New Research in Empirical Macroeconomics" Brookings Institution, 1993, Washington DC.
- [25] Buchanan, James M., and Gordon Tullock. *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. University of Michigan Press, Ann Arbor, 1962. <https://doi.org/10.3998/mpub.7687>
- [26] *Business Week*. "The Banker's Bank in Cleveland: A Leader's Role." March 17, 1956, pp. 187-196.
- [27] *Business Week*. "Maverick in the Fed System." November 18, 1967, pp. 128-134.
- [28] *Business Week*. "The Politicization of Research at the Fed." July 16, 1979, pp. 106-111.

- [29] Calomiris, Charles W., and David C. Wheelock. "Was the Great Depression a Watershed for American Monetary Policy?" In *The Defining Moment: The Great Depression and the American Economy in the Twentieth Century* (Michael D. Bordo, Claudia Goldin, and Eugene N. White, eds.), University of Chicago Press, Chicago, 1998, pp. 23-66.
- [30] Carlson, Keith M., and Roger W. Spencer. "Crowding Out and Its Critics." Federal Reserve Bank of St. Louis *Review*, December 1975, pp 2-17. <https://doi.org/10.20955/r.57.2-17.nkq>
- [31] Chari, V.V., and Patrick J. Kehoe. "Sustainable Plans." *Journal of Political Economy*, vol 98 (4), Aug. 1990, pp 783-802.
- [32] Chow, Gregory C. "On the Long-Run and Short-Run Demand for Money." *Journal of Political Economy*, 74 (2), April 1966, pp. 111-131. <https://doi.org/10.1086/259130>
- [33] Clement, Douglas. "Greater Than the Sum: The Minneapolis Fed and the University of Minnesota in a 30-year Partnership." Federal Reserve Bank of Minneapolis *The Region*, December 1, 2000.
- [34] Coase, Ronald. "The Nature of the Firm." *Economica*, 4 (16), November 1937, pp. 386-405.
- [35] Cogley, Timothy, and Thomas J. Sargent. "Evolving Post-World-War II U.S. Inflation Dynamics." *NBER Macroeconomics Annual 2001* (Ben S. Bernanke and Kenneth Rogoff, eds.), MIT Press, Cambridge, MA, 2002, pp. 331-373. <https://doi.org/10.1086/654451>
- [36] Consolvo, Victoria, Owen F. Humpage, and Sanchita Mukherjee. "Even Keel and the Great Inflation." Manuscript, March 2019.
- [37] Conti-Brown, Peter. *The Power and Independence of the Federal Reserve*. Princeton University Press, Princeton, 2016. <https://doi.org/10.1515/9781400873500>
- [38] Cukierman, Alex. *Central Bank Strategy, Credibility and Independence: Theory and Evidence*. MIT Press, Cambridge MA, 1992.

- [39] Eichengreen, Barry. *Golden Fetters: The Gold Standard and the Great Depression, 1919-1939*. Oxford University Press, New York, 1992.
- [40] Federal Reserve Bank of Cleveland *Annual Report*, 1989.
- [41] Federal Reserve Bank of Cleveland *Annual Report*, 1991.
- [42] Friedman, Milton. "Economists and Economic Policy." *Economic Inquiry*, 24, January 1986, pp. 1-10. <https://doi.org/10.1111/j.1465-7295.1986.tb01793.x>
- [43] Friedman, Milton. "The Role of Monetary Policy." *American Economic Review*, vol. 58 (1), Mar. 1968, pp. 1-17.
- [44] Friedman, Milton, and Anna J. Schwartz. *A Monetary History of the United States, 1867-1960*. Princeton University Press, Princeton, 1963. <https://doi.org/10.1515/9781400829330>
- [45] Goldfeld, Stephen M. "The Demand for Money Revisited." *Brookings Papers on Economic Activity*, 73 (3), 1973, pp. 577-646. <https://doi.org/10.2307/2534203>
- [46] Goodfriend, Marvin. "Monetary Mystique: Secrecy and Central Banking." *Journal of Monetary Economics*, 17 (1), January 1986, pp. 63-92. [https://doi.org/10.1016/0304-3932\(86\)90006-1](https://doi.org/10.1016/0304-3932(86)90006-1)
- [47] Goodfriend, Marvin. "Interest Rate Policy and the Inflation Scare Problem: 1979-1992." Federal Reserve Bank of Richmond *Economic Quarterly*, 79 (1), Winter 1993, pp. 1 – 23.
- [48] Goodfriend, Marvin. "The Role of a Regional Bank in a System of Central Banks." *Carnegie-Rochester Conference Series on Public Policy*, 51, 1999, pp. 51-71. [https://doi.org/10.1016/S0167-2231\(00\)00004-X](https://doi.org/10.1016/S0167-2231(00)00004-X)
- [49] Goodfriend, Marvin. "How the World Achieved Consensus on Monetary Policy." *Journal of Economic Perspectives*, 21 (4), Fall 2007, pp. 47 – 68. <https://doi.org/10.1257/jep.21.4.47>

- [50] Gorton, Gary. "Clearinghouses and the Origin of Central Banking." *Journal of Economic History*, June 1985, Vol. 45 (2), pp 277-283. <https://doi.org/10.1017/s0022050700033957>
- [51] Gorton, Gary and Ellis W. Tallman. *Fighting Financial Crises*. University of Chicago Press, Chicago. 2018. <https://doi.org/10.7208/chicago/9780226479651.001.0001>
- [52] Green, Edward J. "A Review of *Interest and Prices: Foundations of a Theory of Monetary Policy*, by Michael Woodford." *Journal of Economic Literature*, vol. XLIII, March 2005, pp 121-134. <https://doi.org/10.1257/0022051053737799>
- [53] Greenwood, Jeremy and Boyan Jovanovic. "Financial Development, Growth, and the Distribution of Income." *Journal of Political Economy*, vol. 98 (5), Oct. 1990, pp 1076-1107.
- [54] Hafer, R.W. "Against the Tide: Malcolm Bryan and the Introduction of Monetary Aggregate Targets." Federal Reserve Bank of Atlanta *Economic Review*, First Quarter 1999, pp 20-37.
- [55] Hetzel, Robert L. Interview of Robert Holland, March 2, 1995. <https://fraser.stlouisfed.org/archival-collection/robert-hetzel-oral-history-collection-4927/robert-c-holland-interview-501752>
- [56] Hetzel, Robert L. *The Monetary Policy of the Federal Reserve: A History*. Cambridge University Press, New York, 2008. <https://doi.org/10.1017/CBO9780511754173>
- [57] Hetzel, Robert L. and Ralph F. Leach. "The Treasury-Fed Accord: A New Narrative Account." Federal Reserve Bank of Richmond *Economic Quarterly*, Vol. 87(1), Winter 2001a, pp 33-55.
- [58] Hetzel, Robert L. and Ralph F. Leach. "After the Accord: Reminiscences on the Birth of the Modern Fed." Federal Reserve Bank of Richmond *Economic Quarterly*, Vol. 87(1), Winter 2001b, pp 57-64.
- [59] Keran, Michael W. "Expectations, Money, and the Stock Market." Federal Reserve Bank of St. Louis *Review*, January 1971, pp 16-31. <https://doi.org/10.20955/r.53.16-31.etl>

- [60] Kydland, Finn E. and Edward C. Prescott. “Rules Rather than Discretion: The Inconsistency of Optimal Plans.” *Journal of Political Economy*, Vol. 85 (3), June 1977, pp 473-492. <https://doi.org/10.1086/260580>
- [61] Kydland, Finn E. and Edward C. Prescott. “Time to Build and Aggregate Fluctuations.” *Econometrica*, Vol. 50 (6), November 1982, pp 1345-1370. <https://doi.org/10.2307/1913386>
- [62] Kydland, Finn E. and Edward C. Prescott. “Business Cycles: Real Facts and a Monetary Myth.” Federal Reserve Bank of Minneapolis *Quarterly Review*, Vol. 14 (2), Spring 1990, pp 3-18.
- [63] Laidler, David. *The Demand for Money: Theories, Evidence, and Problems*. Harper Collins Publishers, 1993.
- [64] Litterman, Robert B. “Forecasting with Bayesian Vector Autoregressions – Five Years of Experience.” *Journal of Business and Economic Statistics*, Vol. 4, 1986, pp 25-38. <https://doi.org/10.1080/07350015.1986.10509491>
- [65] Lowenstein, Roger. *America’s Bank: The Epic Struggle to Create the Federal Reserve*. Penguin Press, New York, 2015.
- [66] Lucas, Robert E., Jr. “Expectations and the Neutrality of Money.” *Journal of Economic Theory*, Vol. 4(2), April 1972, pp 103-124. [https://doi.org/10.1016/0022-0531\(72\)90142-1](https://doi.org/10.1016/0022-0531(72)90142-1)
- [67] Meigs, James A. “Campaigning for Monetary Reform: The Federal Reserve Bank of St. Louis in 1959 and 1960.” *Journal of Monetary Economics*, Vol. 2, 1976, pp 439-453. [https://doi.org/10.1016/0304-3932\(76\)90042-8](https://doi.org/10.1016/0304-3932(76)90042-8)
- [68] Meltzer, Allan H. *A History of the Federal Reserve, Vol. 1, 1913-1950*. University of Chicago Press, Chicago, 2002. <https://doi.org/10.7208/chicago/9780226519982.001.0001>

- [69] Meltzer, Allan H. *A History of the Federal Reserve: Vol II, Book One, 1951-1969*. University of Chicago Press, Chicago, 2009a. <https://doi.org/10.7208/chicago/9780226519852.001.0001>
- [70] Meltzer, Allan H. *A History of the Federal Reserve: Vol II, Book Two, 1970-1986*. University of Chicago Press, Chicago, 2009b. <https://doi.org/10.7208/chicago/9780226519968.001.0001>
- [71] Melzer, Thomas C. “The Making of a ‘Maverick’ Monetary Policymaker.” Remarks to The Newcomen Society of the United States, St. Louis, Missouri, November 8, 1989.
- [72] Moen, Jon R., and Ellis W. Tallman. “Close but not a Central Bank: The New York Clearing House and the Issuance of Clearing House Certificates.” In *Current Federal Reserve Policy Under the Lens of Economic History: Essays to Commemorate the Federal Reserve System’s Centennial* (Owen F. Humpage, ed.), Cambridge University Press, 2015, pp. 102–125.
- [73] Nikolsko-Rzhevskyy, Alex, David H. Papell, and Ruxandra Prodan. “Deviations from Rules-Based Policy and Their Effects.” *Journal of Economics Dynamics and Control*, Vol. 49, December 2014, pp 4-17. <https://doi.org/10.1016/j.jedc.2014.09.034>
- [74] Niskanen, William A. *Bureaucracy and Public Choice*. Aldine, Atherton, 1971.
- [75] Orphanides, Athanasios. “The Quest for Prosperity without Inflation.” *Journal of Monetary Economics*, Vol. 50, 2003, pp 633-663. [https://doi.org/10.1016/S0304-3932\(03\)00028-X](https://doi.org/10.1016/S0304-3932(03)00028-X)
- [76] Persson, Torsten and Guido Tabellini. “Designing Institutions for Monetary Stability.” *Carnegie-Rochester Conference Series on Public Policy*, Vol. 39, December 1993, pp 53-84. [https://doi.org/10.1016/0167-2231\(93\)90003-F](https://doi.org/10.1016/0167-2231(93)90003-F)
- [77] Prescott, Edward C. “Theory Ahead of Business Cycle Measurement.” Federal Reserve Bank of Minneapolis *Quarterly Review*, 10 (4), Fall 1986, pp 28-33.

- [78] Rasche, Robert H. and David C. Wheelock. "Interview with Jerry Jordan," Federal Reserve Bank of St. Louis Research Department, April 11, 2012. <https://fraser.stlouisfed.org/archival/5182/item/527390>
- [79] Rogoff, Kenneth. "The Optimal Degree of Commitment to an Intermediate Monetary Target." *Quarterly Journal of Economics*, Vol. 100, 1985, pp 1169-1190. <https://doi.org/10.2307/1885679>
- [80] Sargent, Thomas J. "Rational Expectations, the Real Rate of Interest, and the Natural Rate of Unemployment." *Brookings Papers on Economic Activity*, Vol. 2, 1973, pp 721-725. <https://doi.org/10.2307/2534097>
- [81] Sargent, Thomas J. "A Classical Macroeconometric Model for the United States." *Journal of Political Economy*, Vol. 84 (2), April 1976, pp 207-237. <https://doi.org/10.1086/260429>
- [82] Sargent, Thomas J. "Estimation of Dynamic Labor Demand Schedules under Rational Expectations." *Journal of Political Economy*, Vol. 86 (6), Sept. 1978, pp 1009-1044. <https://doi.org/10.1086/260726>
- [83] Sargent, Thomas J. and Neil Wallace. "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule." *Journal of Political Economy*, Vol. 83 (2), April 1975, pp 241-254. <https://doi.org/10.1086/260321>
- [84] Sargent, Thomas J. and Neil Wallace. "Rational Expectations and the Theory of Economic Policy." *Journal of Monetary Economics*, Vol. 2 (2), April 1976, pp 241-254. [https://doi.org/10.1016/0304-3932\(76\)90032-5](https://doi.org/10.1016/0304-3932(76)90032-5)
- [85] Sargent, Thomas J. and Neil Wallace. "Some Unpleasant Monetarist Arithmetic." Federal Reserve Bank of Minneapolis *Quarterly Review*, Vol. 5 (3), Fall 1981, pp 1-17.
- [86] Schultz, T.W. "Research at the Several Federal Reserve Banks." Manuscript, 1943.
- [87] Scott, Frank A., Jr. and Jeffrey D. Anstine. "Market Structure in the Production of Economics Ph. D.'s." *Southern Economic Journal*, Vol. 64 (1), July 1997, pp 307-320.

- [88] Sims, Christopher A. "Money, Income, and Causality." *American Economic Review*, Vol. 62 (4), Sept. 1972, pp 540-552.
- [89] Sims, Christopher A. "Macroeconomics and Reality." *Econometrica*, Vol. 48 (1), January 1980, pp 1-48. <https://doi.org/10.2307/1912017>
- [90] Sims, Christopher A. "Are Forecasting Models Usable for Policy Analysis?" Federal Reserve Bank of Minneapolis *Quarterly Review*, Vol. 10 (1), Winter 1986, pp 2-16.
- [91] Spencer, Roger W., and William P. Yohe. "The "Crowding Out" of Private Expenditures by Fiscal Policy Actions." Federal Reserve Bank of St. Louis *Review*, October 1970, pp 12-24. <https://doi.org/10.20955/r.52.12-24.kdr>
- [92] Svensson, Lars E.O. "Inflation Targeting." In *Handbook of Monetary Economics* (Eds. Benjamin M. Friedman and Michael Woodford), Vol. 3b, Elsevier Press, 2010, pp 1237-1302. <https://doi.org/10.1016/b978-0-444-53454-5.00010-4>
- [93] Taylor, John B. "Discretion versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy*, vol. 39, December 1993, pp 195-214. [https://doi.org/10.1016/0167-2231\(93\)90009-L](https://doi.org/10.1016/0167-2231(93)90009-L)
- [94] Taylor, John B. "Monetary Policy Rules Work and Discretion Doesn't: A Tale of Two Eras," *Journal of Money Credit and Banking*, Vol. 44 (6), September 2012, pp. 1017-1032 <https://doi.org/10.1111/j.1538-4616.2012.00521.x>
- [95] Timberlake, Richard H., Jr. "The Central Banking Role of Clearinghouse Associations." *Journal of Money, Credit, and Banking*, Vol. 16 (1), February 1984, pp. 1-15. <https://doi.org/10.2307/1992645>
- [96] *The Economist*. "Pyrrhic Banking Victory? From a Correspondent in New York." Vol. 179, June 2, 1956, pg. 896-7.
- [97] Tucker, Paul. *Unelected Power: The Quest for Legitimacy in Central Banking and the Regulatory State*. Princeton University Press, Princeton, 2018. <https://doi.org/10.2307/j.ctvc7789h>

- [98] Wheelock, David C. 1991. *The Strategy and Consistency of Federal Reserve Monetary Policy, 1924-1933*. Cambridge University Press, New York, 1991. <https://doi.org/10.1017/CBO9780511528743>
- [99] Wheelock, David C. “National Monetary Policy by Regional Design: The Evolving Role of the Federal Reserve Banks in Federal Reserve System Policy.” In *Regional Aspects of Monetary Policy in Europe*, (Eds. Jurgen von Hagen and Christopher J. Waller). Kluwer Academic Publishers, 2000, pp 241-274. https://doi.org/10.1007/978-1-4757-6390-4_9
- [100] Whittlesey, C.R. “Power and Influence in the Federal Reserve System.” *Economica*, Vol. 30 (117), February 1963, pp. 33-44. <https://doi.org/10.2307/2601710>
- [101] Woodford, Michael. “Central-Bank Communication and Policy Effectiveness.” NBER Working Paper No. 11898, December 2005. <https://doi.org/10.3386/w11898>