SOUND MONEY
Why It Matters, How to Have It

Essays in honour of Milton Friedman's contributions to monetary policy

June 2012

Friedman and the Phillips Curve
Jerry L. Jordan

Milton and Monetarism
Allan H. Meltzer

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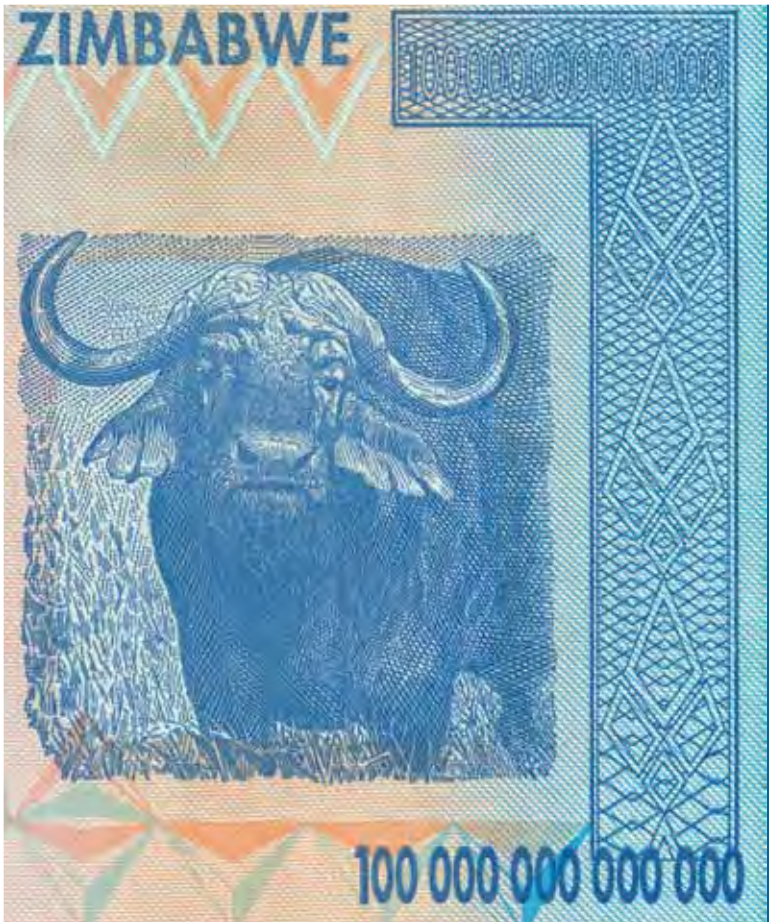

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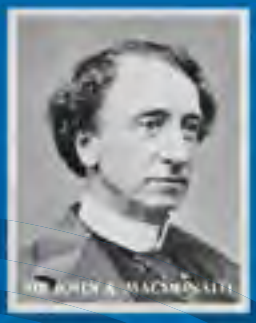

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Editor's Note

In 2010, Liberty Fund, Inc. in conjunction with the San Francisco-based Pacific Research Institute organized a conference of scholars and intellectuals to explore the ideas and contributions of Milton Friedman. Six original essays covering key areas of research by Friedman were commissioned: Education reform, conscription, mobility, economic freedom, and two on monetary policy.

With the cooperation of both Liberty Fund, Inc. and the Pacific Research Institute, the Macdonald-Laurier Institute is honoured to publish the two essays on monetary policy by internationally-noted economists Allan Meltzer of Carnegie-Mellon University and Jerry Jordan, former President of the Cleveland Federal Reserve Bank. Allan Meltzer was asked to comment on the broad contributions of Friedman and the ensuing insights for monetary policy while Jerry Jordan was asked to write on the more narrow issue of the relationship between inflation and unemployment, which existed at the heart of the debate of monetary policy for decades. Both essays provide important insights into the rules and principles that best guide monetary policy as well as the critical contributions made to our understanding of monetary policy by Milton Friedman.

Executive Summary

Allan Meltzer: Milton and Monetarism

The dominant views of monetary policy, and indeed economics more broadly were once rooted in Keynesianism, which held that money had little effect on prices and employment. This allowed for substantial discretion in the operation and implementation of monetary policy.

Beginning in the 1940s, Milton Friedman started a counter-revolution against the Keynesian consensus. In a series of papers Friedman, his students, and others restored and extended the neo-classical theory of money. Most of Friedman's propositions were eventually accepted as the corpus of macroeconomics.

Four of Friedman's contributions merit attention because of their influence on subsequent developments. Friedman's critical work on monetary policy spanned the 1940s through to the 1960s. The four areas worth specific consideration are: His formulation of the demand for money; his analysis of expectations, the natural rate of unemployment, and monetary neutrality; his early work on fixed and floating exchange rates; and his persistent advocacy of a rule for monetary policy.

By the late 1970s, the monetarist response had restored a version of the main propositions of classical monetary theory to which Milton Friedman brought renewed attention and insight. The Keynesian challenge had been met. Keynesianism had been reduced mainly to the claim that labor markets (and perhaps anticipations) do not adjust without a lag and to a preference for discretionary policy actions – fiscal and, more importantly for this discussion, monetary actions. Keynesians continued to favor

discretionary actions and oppose rules for monetary policy. No classical economist from David Hume to Alfred Marshall would have quarreled with the statement about lags in the adjustment of labor markets or anticipations.

There has been movement on the issue of rules vs. discretion in recent years. This movement is in the monetarist direction – toward rules as Friedman proposed. The rules that now receive most attention are adaptive rules. Some of these rules aim at stabilizing growth of nominal GDP at a low rate of inflation. Many Keynesians and monetarists agree on this objective. Announcing and following a rule is the only way to restore independence and also an effective way to reduce the extraordinary increase in excess reserves.

For many years, Friedman was the leading, and often the only, proponent of a monetary rule. After the introduction of rational expectations, the case for rule-like behavior was strengthened greatly. Rule-like behavior is now an accepted conclusion. Several central banks have adopted and followed rule-like procedures. Unfortunately, the Federal Reserve is not one of them.

Jerry Jordan: Friedman and the Phillips Curve

In 1958, A. W. Phillips asked whether standard economics propositions with respect to the commodity market also applied to the labor market. Phillips took the level of employment as his independent variable, and regressed it against his dependent variable – changes in nominal wages. He then illustrated the relationship he found by plotting a non-linear negative relationship between changes in nominal wages and the unemployment rate – and the Phillips curve became world famous.

By the beginning of the 1960s it seemed well established that there was a "trade-off" between inflation and unemployment. From there it was only a small step to the view that some social welfare function could be chosen which would make it possible to attain the optimal point on the "Phillips Curve" which would then be used by a policymaker in weighing alternative options of more stimulus or more restraint.

Two critical distinctions were introduced by this literature into thinking about labor markets – as opposed to commodity markets – that were essential to Friedman's formulation of the "natural rate" hypothesis about unemployment. The distinction between nominal and real wages – which Irving Fisher had introduced to thinking about market interest rates – and the distinction between "anticipated" and "unanticipated" changes in prices and/or wages.

The key to understanding that there is no long-run trade off – the Phillips Curve is vertical in the long run – is that there is no long-run money illusion. *Ex post* real wages can be temporarily depressed only by an increase in inflation that is not anticipated. But, expectations adjust to experience. You would have to be able to continually fool people to keep them from demanding nominal wages that restored their real wages.

The macroeconomic developments of the final two decades of the 20th century should have ended any further debate about the notion of some trade-off between inflation and unemployment. Rates

of inflation declined in market economies around the world, regardless of the political systems. Most places also experienced declines in unemployment rates, and where unemployment remained high it was almost universally acknowledged to be the result of national labor market rigidities and regulatory policies. Nowhere was the idea put forth that a bit higher inflation would even temporarily lower the unemployment rates. It seemed – for a while at least – that no minister of finance or central banker would dare to suggest that inflation was too low and that a bit more would in any way be a good thing.

By the mid 1990s policy makers were advocating the manipulation of demand for output in such a way as to raise or lower the actual unemployment relative to some estimate of the natural rate as a technique for controlling the inflation rate! The Phillips trade-off was dead in theory, but alive and well in practice.

Note de la rédaction

En 2010, l'organisme Liberty Fund, Inc., de concert avec le Pacific Research Institute de San Francisco, a organisé une conférence réunissant des chercheurs et des intellectuels pour explorer les idées et les contributions de Milton Friedman. Six essais originaux ont été commandés à cet effet sur des domaines clés de la recherche effectuée par Friedman : les réformes éducationnelles, la conscription, la mobilité, la liberté économique, et deux essais sur la politique monétaire.

Grâce à la coopération de Liberty Fund, Inc. et du Pacific Research Institute, l'Institut Macdonald-Laurier a l'honneur de publier les deux essais sur la politique monétaire rédigés par les économistes de renommée internationale Allan Meltzer, de l'Université Carnegie-Mellon, et Jerry Jordan, ex-président de la Réserve fédérale de Cleveland. Allan Meltzer a reçu le mandat de commenter de façon générale la contribution de Friedman et les nouvelles approches qu'elle a engendrées sur le plan de la politique monétaire, alors qu'on a demandé à Jerry Jordan de se pencher sur la question plus spécifique de la relation entre l'inflation et l'emploi, qui a été au cœur du débat sur la politique monétaire pendant des décennies. Les deux essais clarifient des points importants en ce qui concerne les règles et principes qui peuvent le mieux guider la politique monétaire, de même que la contribution fondamentale apportée à notre compréhension de la politique monétaire par Milton Friedman.

Sommaire

Allan Meltzer: Milton et le monétarisme

La perspective dominante concernant la politique monétaire – et d'ailleurs aussi pour ce qui est de la science économique dans son ensemble – était autrefois ancrée dans le keynésianisme, selon lequel la monnaie n'avait que peu d'effet sur les prix et l'emploi. Cela permettait une discrétion considérable dans le fonctionnement et la mise en œuvre de la politique monétaire.

À partir des années 1940, Milton Friedman a entrepris une contre-révolution pour renverser ce consensus keynésien. Dans une série d'articles, Friedman, ses étudiants et d'autres économistes ont rétabli et élaboré la théorie néoclassique de la monnaie. La plupart des propositions de Friedman ont éventuellement été acceptées dans le corpus de la macroéconomie.

Quatre des apports de Friedman méritent qu'on y porte attention à cause de leur influence sur des développements subséquents. Les travaux critiques de Friedman sur la politique monétaire se sont étendus des années 1940 aux années 1960. Les quatre domaines qui méritent une attention spécifique sont : son explication de la demande d'argent; son analyse des attentes, du taux de chômage naturel et de la neutralité de la monnaie; ses premiers travaux sur les taux de change fixes et flottants; et sa défense assidue d'une règle pour la politique monétaire.

Dès la fin des années 1970, la réponse monétariste avait permis de remettre à l'ordre du jour une version des principales propositions de la théorie monétaire classique que Milton Friedman avait renouvelée et ramenée à l'avant-scène. Le défi keynésien avait été relevé. Le keynésianisme avait pour l'essentiel été confiné à la prétention que le marché du travail (et peut-être les attentes) ne s'ajuste qu'avec un délai, et à une préférence pour les décisions politiques discrétionnaires – sur le plan fiscal et, de façon plus cruciale pour la présente analyse, sur le plan monétaire. Les keynésiens continuaient de favoriser des décisions discrétionnaires et de s'opposer à des règles pour mener la politique monétaire. Aucun économiste classique, de David Hume à Alfred Marshall, n'aurait contesté l'affirmation selon laquelle le marché du travail ou les anticipations ne s'ajustent qu'avec des délais.

La question des règles versus les décisions discrétionnaires a connu une certaine évolution au cours des dernières années. Ce mouvement a eu lieu dans le sens des propositions monétaristes – c'est-à-dire vers l'établissement de règles tel que proposé par Friedman. Les règles qui obtiennent aujourd'hui le plus d'attention sont les règles adaptives. Certaines de ces règles visent à stabiliser la croissance du PIB nominal à un bas taux d'inflation. Plusieurs keynésiens et monétaristes s'entendent sur cet objectif. L'annonce et le respect d'une règle constituent la seule façon de restaurer l'indépendance de la politique monétaire de même qu'une façon efficace de mettre un frein à la croissance extraordinaire des réserves excédentaires.

Pendant de nombreuses années, Friedman a été le principal, et parfois le seul, défenseur d'une règle monétaire. Le développement de la théorie des attentes rationnelles a considérablement renforcé les arguments en faveur d'une politique fondée sur des règles, qui est maintenant largement acceptée. Plusieurs banques centrales ont adopté et suivent une procédure fondée sur des règles. Malheureusement, la Réserve fédérale n'est pas de ce nombre.

Jerry Jordan: Friedman et la courbe de Phillips

En 1958, A. W. Phillips s'est demandé si les propositions économiques habituelles en ce qui a trait au marché des biens s'appliquaient également au marché du travail. Phillips prit le niveau d'emploi comme variable indépendante et y appliqua une régression en utilisant comme variable dépendante les changements dans les salaires nominaux. Il illustra par ensuite la relation qu'il avait trouvée en traçant un lien négatif non linéaire entre les salaires nominaux et le taux de chômage – et c'est ainsi que la courbe de Phillips devint mondialement connue.

Au début des années 1960, il était généralement accepté qu'il existait un « arbitrage » entre l'inflation et le chômage. De là, il ne restait qu'un pas à faire pour conclure qu'on pouvait choisir une fonction de bien-être social qui permettrait d'atteindre un point optimal sur la « courbe de Phillips », celui-ci servant alors de point de référence aux décideurs politiques pour soupeser les différentes options entre davantage de stimulus ou davantage d'austérité.

Ces travaux ont permis d'apporter deux distinctions fondamentales dans la compréhension des marchés du travail – par opposition aux marchés de biens – qui ont joué un rôle essentiel dans la formulation par Friedman de l'hypothèse du « taux naturel » de chômage : la distinction entre les salaires nominaux et réels – qu'Irving Fisher avait intégrée à l'analyse des taux d'intérêt du marché – et la distinction entre les changements « anticipés » et « non anticipés » dans les prix et/ou les salaires.

L'élément clé pour comprendre qu'il n'existe pas d'arbitrage à long terme – c'est-à-dire que la courbe de Phillips est verticale à long terme – est le fait qu'il ne peut y avoir d'illusion monétaire à long terme. Après le fait, les salaires réels ne peuvent temporairement être réduits que par une augmentation du taux d'inflation qui n'est pas anticipée. Cependant, les attentes s'ajustent à l'expérience. Il faudrait pouvoir continuellement berner les gens pour les empêcher d'exiger des salaires nominaux qui redonneraient une pleine valeur à leurs salaires réels.

Les développements macroéconomiques des deux dernières décennies du 20e siècle auraient dû mettre fin à tout débat sur la notion d'un arbitrage entre l'inflation et le chômage. Les taux d'inflation ont diminué dans les économies de marché partout dans le monde, quel que soit le système politique. La plupart ont aussi connu une baisse du taux de chômage, et lorsque le chômage est resté élevé, on reconnaissait partout que c'était la conséquence de rigidités dans le marché du travail et de politiques réglementaires inadéquates. Personne ne mettait de l'avant l'idée qu'un peu plus d'inflation permettrait de réduire même temporairement le taux de chômage. Il a semblé – à tout le moins pendant un certain temps – qu'aucun ministre des Finances ou dirigeant de banque centrale n'oserait prétendre que l'inflation était trop basse et que ce serait une bonne chose d'en avoir un peu plus.

Au milieu des années 1990, des décideurs politiques préconisaient toutefois de manipuler la demande globale de façon à augmenter ou diminuer le taux de chômage par rapport à une certaine estimation du taux naturel comme moyen de contrôler le taux d'inflation! La Courbe de Phillips était morte en théorie, mais était toujours vivante dans la pratique.

Friedman and the Phillips Curve

Jerry L. Jordan

> *A major problem of our time is that people have come to expect policies to produce results that they are incapable of producing...we economists in recent years have done vast harm – to society at large and to our profession in particular – by claiming more than we can deliver. We have thereby encouraged politicians to make extravagant promises, inculcate unrealistic expectations in the public at large, and promote discontent with reasonably satisfactory results because they fall short of the economists' promised land.*
>
> Milton Friedman (1972)

The notion of a trade-off between unemployment and inflation surely ranks among the most subversive ideas in economics.

Economists cannot be blamed or held responsible for the political misuses and abuses of their ideas. Nevertheless, the notion that economic policymakers can and should choose between more unemployment or more inflation – or "fine tune" some balance between them – has been subject to more political mischief over the last half century than any other theory or empirical regularity I can think of.

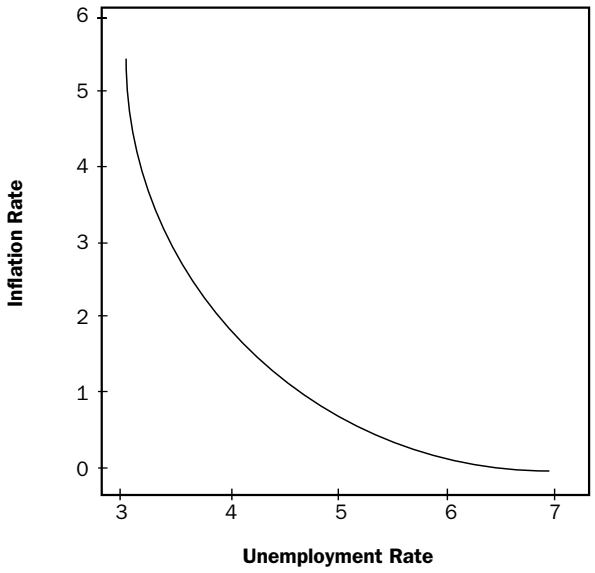
It has even been the basis for misinformed and unenlightened legislation requiring monetary policymakers to target both – even when it is assumed that less of one causes more of the other!

Because of the differences in the lags in the effects of policy actions on one versus the other it has led to politicians wanting to get a favorable near-term outcome on their watch and leave to their successors the delayed bad outcome of the policies pursued.

The infamous "Phillips Curve" has been to economics what the "hockey stick" has been to climate science. It has been the subject of an extraordinary amount of study and testing, national and even international proposals by politicians for humans to take actions through legislation and regulation to address a problem that is in fact based on fallacious reasoning and faulty – or worse – empirical testing.

The Phillips Curve has been to economics what the "hockey stick" has been to climate science.

One article published in 1978 (Santomero and Seater) – less than 20 years after the publication of the article by Professor Phillips – cited 228 articles in professional journals addressing the apparent "trade-off" illustrated by the Phillips curve. Several of the authors of these studies had already or would later receive the Nobel Prize in Economics. So, in addition to Milton Friedman, many of the best in the economics profession devoted some of their time and talents to the subject of these "twin problems" of so-called macroeconomics.



The Phillips Curve

Decades from now scholars will be drawing their own conclusions about the importance and lasting impact of the research and writings of Milton Friedman over six decades. At this point the most we can assert is that the issues of inflation and unemployment were important to Friedman as evidenced by the fact that he devoted some of his 1967 American Economic Association (AEA) Presidential address and all of his 1976 Nobel Prize address to these issues.

When Milton Friedman began to study and write about employment/unemployment and inflation, he was clear in acknowledging the importance of the writings and teachings of Irving Fisher (1926). Fisher explained that high inflation was accompanied by low unemployment and more output because when demand initially increases it is natural for the producer or vendor to think his good fortune is due to his superior product or service and that expanding his business an appropriate response. Only later does this seller of goods or services discover that there was not an increase in relative demand for what he sells, but a general increase in nominal demand. For Fisher, the chain of events was that changes in nominal demand affected prices, which affected wages and then employment. The demand for labor was a derived demand from the demand for output.

Phillips became more famous than contemporaries studying the same relationship because he drew the curve.

That insight was missing thirty years later when "wage-push" theories of inflation were in vogue. Essentially, the idea was that increased demand for labor resulted in higher wages forcing producers to have to raise their prices. Thus, understanding labor markets and how wages were determined was necessary to understand inflation.

In an article published in 1958, A. W. Phillips asked whether standard economics propositions with respect to the commodity market also applied to the labor market. It was

well accepted that if the demand for a commodity rose the price would also rise. So, he wondered, why wouldn't it also be true that if the demand for labor rose then wages would also rise? From the vantage point of over a half-century later, it is tempting to think Professor Phillips was interested in studying the market for day-labor at the corner of the local Home Depot. His analogy to commodity markets would seem appropriate in labor markets where wages are negotiated by hour or by day, with the available supply on any day and the daily demand determining the agreed upon wage.

In another respect the Phillips analogy to commodity markets also applies to the hourly or daily labor market at the corner of the Home Depot because there is no distinction necessary between nominal and real wages in such a market. But, even in the 1950s, long-term union contracts were common for significant sectors of the economy – especially in England where Professor Phillips conducted his studies.

Maybe because of limitations of the data available to him for empirical research, Phillips took the level of employment as his independent variable, and regressed it against his dependent variable – changes in nominal wages. He then illustrated the relationship he found by plotting a non-linear negative relationship between changes in nominal wages and the unemployment rate – and the Phillips curve became world famous.

He probably became more famous than others at the time who also were reporting a negative relationship between changes in wages and unemployment (Dicks-Mireaux and Dow 1959, Klein and Ball 1959) because he drew the curve. This makes his fame like the climate guy who drew the "hockey stick," but also like the modern "curve" drawn on a napkin to illustrate what Aristotle had discovered about the relationship between tax rates and collected tax revenue.

By the 1960s there was a well-established "trade-off" between inflation and unemployment.

Phillips' fame no doubt is also owed to Richard Lipsey, who retested the results using better statistical techniques and also introduced a measure of inflation. Lipsey (1960) reconfirmed Phillips basic conclusion that there was a non-linear, inverse relationship between wages or prices and unemployment, but also found the relationship was not stable over time, suggesting to him that there were omitted variables. Nevertheless, by the beginning of the 1960s it seemed well established that there was a "trade-off" between inflation and unemployment. From there it was only a small step to the view that some social welfare function could be chosen which would make it possible to attain the optimal point on the "Phillips Curve" which would then be used by a policymaker in weighing alternative options of more stimulus or more restraint.

Later, looking back on the economic policymaking environment of the 1960s, Friedman said, "It was said that what the Phillips curve means is that we are faced with a choice. If we choose a low level of inflation, say, stable prices, we shall have to reconcile ourselves to a high level of unemployment. If we choose a low level of unemployment, we shall have to reconcile ourselves to a high rate of inflation" (2003).

The race was then on among scores of economists in many countries around the world to refine the theories and investigate the empirical evidence. It seems now as though Phillips was writing for a gold standard world.[1] He used nominal wages as his dependent variable, but it is real wages that equate supply and demand in the labor market. So, if prices and wages are rising or falling, accelerating or decelerating, as long as they move together nothing happens to real wages. Then you need to introduce some sort of a wage-lag hypothesis, or start to get into anticipated versus unanticipated price changes to get real wages to change even temporarily.

To be generous to Phillips, he and many followers of Keynes assumed that prices are generally more rigid than output, so a change in nominal wages would also be a change in real wages. The thinking of the 1930s was that workers are resistant to accepting lower real wages in the form of lower nominal wages, so an acceleration of inflation could push down real wages – money illusion. Clearly, this thinking required that the inflation be unanticipated, but that distinction did not start to be made clear until the decade after Phillips.

Phillips wrote for a gold standard world.

For some time, researchers sought to torture the data on vacancies and help-wanted advertising versus unemployment statistics to see if they could measure "excess demand" for labor and learn something about wage behavior. Well before notions of an "output gap" between some measure of potential output and actual output became popular, there was a view that price inflation resulted from expansionary policies that persisted after the economy had already reached a critically high employment range. This critical high range was defined as the point where the number of employment vacancies approximately equaled the number of people seeking work. If vacancies exceed job seekers, there is excess demand, so wages rise; if job seekers exceed vacancies, there is excess supply, so wages rise more slowly or fall.

Those holding these views were clearly in the "wage-push" camp as to the causes of inflation.[2] For them there was the temptation – as reflected in the wage-price "Guideposts" in the 1960s and then the "income policies" implemented in the United States in the early 1970s – to resort to administrative approaches to restraining wage increases and thus, in their view, price increases.

The appearance of "backward-bending" labor supply curves yielded the application of income and substitution effects in labor markets and theorizing about the demand for leisure as the mirror of the supply of labor. These explanations for what was observed in the available data did not yet incorporate expectations in their theories, let alone the conjectures about "surprises" as necessary to achieve even temporary declines in unemployment.

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1 In fact, the data used in his studies came from a time when the gold-exchange standard still constrained the degree of discretion exercised by central banks.

2 The lively debate in the economics profession in the 1960s about the causes of inflation and the appropriate policies to address the problem is reported in considerable detail in Volume 1, Book 2, of Allan Meltzer's extensive history of the Federal Reserve. Prominent academic economists, members of the President's Council of Economic Advisers, and members of the Federal Reserve Board of Governors all denied that "inflation is a monetary phenomenon" as Friedman famously declared.

In the decade between publication of Phillips' article and Milton Friedman's AEA Presidential address there was a tremendous amount of theorizing and empirical work on inflation and employment reported for many nations around the world and even for states, provinces, and municipalities. While an inverse, non-linear relationship between changes in wages or prices and unemployment (somehow measured) was often reported, the implied curves shifted around a lot even in the same place and for the same set of workers. Conjectures about labor hoarding, explorations of ideas about productivity, and even business profitability were introduced to try to explain all the disparities in results. Even the role of unions appeared to give contradictory results at times.

Micro Foundations of Labor Markets

While all that was going on, there was an alternative approach to understanding why there was more or less unemployment in a place at different times, or in different places at the same time. This alternative was grounded in the micro foundations of labor markets – a focus on decision making by individuals. Articles by Friedman's colleague at the University of Chicago, George Stigler, in the early 1960s introduced theories of search costs and information costs – applied first to the commodity markets and then to labor markets. Then followed the writings of Armen Alchian, William R Allen, Reuben Kessel, and others that brought a very different way of thinking about labor markets. The supply of and demand for labor was not at all like the supply of and demand for commodities.

The supply of and demand for labor was not at all like those for commodities.

Changes in the demand for labor are derived from changes in the demand for output, but not immediately or directly, and the quantity of labor supplied responds only slowly to shifts in labor demand – for very rational reasons. In the initial steady-state equilibrium of the market for labor, the worker bears a cost of discovering opportunities because the employers are not actively seeking workers and publishing lists of vacancies. Employers are not so willing to absorb job training and relocation costs, so a potential employee bears more risk.

If the adoption of more expansionary economic policies were to then cause demand for output to rise, the derived demand for labor would – maybe with some lag – also increase. Employers not only engage in more "help-wanted advertising" and offer higher nominal wages, but also are more willing to offer training and relocation, thus lowering the cost to the employee. Workers will not have to search as long for acceptable employment and this shorter search time will be reflected in lower unemployment rates. Statistically, one would expect to observe an inverse relationship between nominal wages and measured unemployment, but this is not a result of some social trade-off.

Two critical distinctions were introduced by this literature into thinking about labor markets – as opposed to commodity markets – that were essential to Friedman's formulation of the "natural rate" hypothesis about unemployment. The distinction between nominal and real wages – which Irving Fisher had introduced to thinking about market interest rates – and the distinction between "anticipated" and "unanticipated" changes in prices and/or wages. Previous economists had loosely used the idea of "expectations" in describing behavior, but had failed to include *ex ante* versus *ex post* elements and had not made clear that if some "expected" event did not result in actions, it was not helpful in explaining behavior and consequences.

There is no long-run trade-off – the Phillips Curve is vertical in the long run.

When Milton and Rose visited UCLA for the spring quarter of 1966 they found the faculty and students abuzz with "search costs," "information costs," and "transactions costs" to explain all kinds of behavior, not least the labor markets. It was so much of every discussion that it caused Armen Alchian to caution his colleagues and students about turning it into a tautology by using the ideas to explain so much that they explained nothing. The discipline in the use of the micro foundations of labor and other markets came from Friedman's Methodology of Positive Economics. The requirement to formulate testable and falsifiable hypotheses assured that the application of the concepts of information, search, and transactions costs added to the understanding of observed behavior at the same time that our lack of knowledge was revealed more clearly.

Because the concepts of anticipated and unanticipated accelerations and decelerations of the rate of inflation were already becoming more commonly accepted, economists' ideas about real versus nominal interest rates and the distinction between *ex ante* and *ex post* were also evolving. Friedman took the next step of applying such ideas in such a way that the formulation of the "natural rate of unemployment" joined the "natural rate of interest" as common components of the economist's tool kit.

No Long-run Trade-Off

Ten years after Phillips had launched a massive and international study of the implied social and political trade-off between the twin evils of inflation and unemployment, Friedman used the occasion of his Presidential Address to the American Economics Association to reveal the pitfalls of trying to use the apparent inverse relationship in formulating economic policies. The wage-push hypothesis implicit in the original Phillips exposition – wages change first as a result of imbalances in the labor markets, then changes of prices of goods and services follow – was the first casualty of the micro foundations of labor markets.

Friedman explained,

> Because selling prices of products typically respond to an unanticipated rise in nominal demand faster than prices of factors of production, real wages received have gone down—though real wages anticipated by employees went up, since employees implicitly evaluated the wages offered at the earlier price level. Indeed, the simultaneous fall *ex post* in real wages to employers and the rise *ex ante* in real wages to employees is what enabled employment to increase. But the decline *ex post* in real wages will soon come to affect anticipations. Employees will start to reckon on rising prices of the things they buy and to demand higher nominal wages for the future. "Market" unemployment is below the "natural" level. There is an excess demand for labor so real wages will tend to rise toward their initial level.

Employers are then no longer motivated to continue hiring at the same pace and further bidding up nominal wages, and they pursue ways of substituting capital for labor or scaling back their operations. As the growth of labor demand slows, the observed unemployment rate rises back toward the natural rate. When the adjustment is complete, there is no "trade-off," there is no inverse relationship, there are no social/political choices to be made.

The key to understanding that there is no long-run trade-off – the Phillips Curve is vertical in the long run – is that there is no long-run money illusion. *Ex post* real wages can be temporarily depressed only by an increase in inflation that is not anticipated. But, expectations adjust to experience. You would have to be able to continually fool people to keep them from demanding nominal wages that restored their real wages.[3]

Friedman did not suggest that nothing could be done about unemployment.

Once the fallacies and limitations of the Phillips Curve are understood it becomes clear that only accelerating inflation – a situation in which actual price rises continue to exceed anticipated increases – can keep the actual unemployment rate below the natural rate. Initially, it was not understood that the level of the natural rate itself would be influenced by the rate or variability of inflation. The research agenda then turned to questions about where exactly the level of this "natural rate of unemployment" is. Does it change from time to time? Is it different for different countries/regions/institutional settings? Can policies of government cause it to change?

Friedman's adoption of Wicksell's terminology of the "natural rate of interest" to also describe a long-run unemployment rate that was consistent with any fully anticipated rate of inflation (or, presumably, deflation) was either not understood by some critics or was deliberately misrepresented. And, the concept morphed into versions that were misused in policy deliberations with terrible consequences.

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3 As Meltzer documents in his history of the Federal Reserve (Vol 2, Book 1, p. 487) Henry Wallich in 1966 had anticipated the reasoning by Friedman in the Presidential address about the apparent trade-off enduring for only a short time unless there was continuously accelerating inflation.

In the early introduction of the natural rate of unemployment, Friedman left the clear impression that a sustained rate of inflation – no matter how high – had no lasting effect on this "equilibrium" unemployment rate. And, some critics chose to draw the erroneous conclusion that he was saying that nothing could be done to change it so lots of people were doomed to remain unemployed. As Geoffrey Wood points out, "Some have taken it to mean that it corresponds to an inevitable level of unemployment, one that is desirable, perhaps optimal, and that those who use the concept are heartless and without concern for the plight of the unemployed" (2003, 25).

Of course, that was not at all true and a great deal of research and writing in the 1970s was focused on what could be done to get the rate lower. Friedman had pointed the way to future research saying, "[M] any of the market characteristics that determine [the level of the natural rate of unemployment] are man-made and policy-made." (1968)

A "mini-recession" occurred in the 1960s despite attempts at stimulative fiscal policies.

The micro foundations of labor markets suggested to many researchers what were the sources of friction and rigidities – some of them being legislation and regulation – that raised the natural rate. Friedman was a strong and consistent advocate of adopting policies that would result in lasting reductions in unemployment, while remaining firm that monetary policy could not achieve that result.

That didn't stop Congress from legislating that simultaneous achievement of low inflation and unemployment should be the mission of the central bank. In 1971 the Joint Economic Committee (JEC) of the US Congress reaffirmed the "Full Employment Act of 1946" saying, "The president and Congress should adopt as a long-term objective the twin goals of an unemployment rate of no higher than 3 per cent and an annual increase in the GNP deflator of no more than 2 per cent."

Unfortunate Detour in Economic Policymaking

Before continuing with the evolution of thinking about the natural rate hypothesis, it is important to report on a significant setback for the influence of Friedman and his allies and supporters in the contest of ideas over macroeconomic issues in general and unemployment and inflation in particular. The second half of the 1960s provided opportunities to test propositions about how monetary and fiscal policies influenced demand in the economy and, in turn, how inflation, output, and employment/unemployment responded.

In frequent writings and speaking opportunities – especially columns in *Newsweek* magazine reaching a large general public audience – Friedman was successful in convincing readers and listeners that the restrictive monetary policies of the mid 1960s were able to sharply slow the national economy. In fact,

a "mini-recession" occurred in spite of what was generally agreed to be highly stimulative fiscal policies. This experience provided Friedman the opportunity to educate people about the lags in the effects of policies on demand, and the differences in the shorter lagged effects on output and employment versus the longer lags in the effects on inflation.

Just a few years later, the US government adopted "anti-inflationary" budgetary policies that were characterized as a "massive dose of fiscal restraint," and even characterized as "overkill." However, monetary policies of the central bank remained highly expansionary and, as Friedman widely forecast, demand and inflation did not subside. After it was acknowledged that the fiscal restraint had fizzled, monetary policy actions turned restrictive, demand slowed, and a mild recession occurred.

The evidence from these two episodes of policymakers trying to manage the demand in the economy would seem to have settled a lot of issues and point toward better policies in the future, but it was not to be. Friedman's influence of US economic policies should have soared with the election of Richard Nixon and appointment of Friedman's teacher and friend, Arthur Burns, as Chairman of the Federal Reserve Board. Instead, Burns loudly rejected Friedman's teaching that inflation was a monetary phenomenon and publicly pressed the view that inflation was caused by rising costs, especially labor costs, and that "incomes policies" rather than monetary policies were the solution to persistent inflation.

Shortly after the JEC called for the executive and legislative branches to set goals for simultaneous low inflation and low unemployment, the Nixon administration chose the "magic wand" approach to economic policies and froze all wages and prices for three months, followed by a year-long control program. Under the cover of the controls, monetary policy turned highly expansionary – and aggregate demand soared – but inflationary pressures were masked so output and employment boomed.

Immediately after the "freeze" and controls were announced, Friedman very publicly resigned from an advisory role to the administration and also, in correspondence that was made public, broke off contact with Burns. A narrow and superficial look at the US economy of 1972 could easily lead someone to conclude that Friedman's teachings had been wrong. But Friedman knew the illusion would not last, the controls would break down, the excessive growth of money would result in sharply accelerating inflation, and the subsequent, inevitable turn to monetary restraint would yield a sharp economic contraction. And, he said so publicly and frequently to the consternation of the administration and the Federal Reserve.

Friedman knew the excessive growth of money would result in high inflation and then an inevitable sharp economic contraction.

Friedman writes, "We have been driven into a widespread system of arbitrary and tyrannical control over our economic life, not because 'economic laws are not working the way they used to,' not because the classical medicine cannot, if properly applied, halt inflation, but because the public at large has been led to expect standards of performance that as economists we do not know how to achieve" (1972).

As far as I can find, Friedman did not have anything good to say about the episode of the Nixon wage and price controls. However, looking at it almost forty years later, one can conclude that the experience demonstrated the "validity" of the Keynesian model inherited from the 1930s – and at the same time confirmed Friedman's criticism of that model! The fallacy of the Keynesian model, and the Phillips Curve that was based on it, was that it assumed that prices and wages, both real and nominal, were relatively rigid so changes in nominal demand would be reflected primarily in changes in output. They were right – at least for a limited period. The government imposed rigid controls on most prices and wages for the election year – 1972 – and the Federal Reserve sharply increased the growth of money and boosted nominal spending growth. The result was a huge increase in real output growth, just as the Keynesian model predicted!

"Stagflation" demonstrates that there is not even a short-run trade-off to exploit.

Of course, the next year the controls collapsed, inflation skyrocketed, Fed policy turned sharply restrictive, and a severe recession ensued. As Friedman noted, if you are going to get very drunk, you can expect to have a severe hangover.

Persistence Pays Off

Although his analysis and supporting empirical evidence were rejected by the Nixon administration and Arthur Burns at the Fed, Friedman persisted in his research and writing about unemployment and inflation. In a lecture in London at the Institute for Economic Affairs (IEA) in 1974, Friedman argued that while Irving Fisher in the 1920s clearly had a dynamic model in mind when writing about inflation and employment, Phillips in the late 1950s reverted to a static analysis. For this Friedman blamed Keynes and his General Theory more than he criticized Phillips.

While Phillips failed to make a distinction between nominal and real wages, he was also implicitly saying that changes in *anticipated* nominal wages were the same as *anticipated* real wages. In a footnote to the lecture, Friedman laid it all in the lap of J. M. Keynes' *The General Theory of Employment, Interest, and Money*. Keynes writes,

> Whilst workers will usually resist a reduction of money wages, it is not their practice to withdraw their labour whenever there is a rise in the price of wage-goods…The workers, though unconsciously, are instinctively more reasonable economists than the classical school…They resist reductions of money-wages…whereas they do not resist reductions of real wages…Since no trade union would dream of striking on every occasion of a rise in the cost of living, they do not raise the obstacle to any increase in aggregate employment attributed to them by the classical school. (1936, 9-15)

Thus Friedman let Phillips off the hook for the use of his work as the "missing equation" in the Keynesian framework – a connection between the real system and the monetary system.[4] This, Friedman asserted, was false because Phillips' work did not determine an equilibrium price level in the Keynesian model.

Nevertheless, there had been a rush to use the relationship for policy purposes. Subsequent theoretical and empirical findings exposed the fallacies of the paradigm, but it was the experience of "stagflation" – simultaneous high inflation and high unemployment – that demonstrated that there was not even a short-run trade-off that could be exploited.

In his Nobel Prize lecture, Friedman spoke about the history of the relationship between inflation and unemployment.

In the 1974 IEA lecture Friedman addressed some of the misunderstandings about the "natural rate hypothesis." He suggested that economic policies could affect the natural rate in either direction by causing less or more friction in the labor markets, but monetary policy was not among the instruments available to policy makers.

Friedman also summarized both the work on adaptive expectations and rational expectations as they applied to labor markets, but did not yet introduce the idea that bad experience with inflation – faulty monetary policy – could actually raise the natural rate of unemployment. He simply concluded that while everyone had come to agreement that the long-run Phillips Curve was steeper than the short-run curve, not everyone was yet willing to accept that the long-run curve was vertical, as Friedman believed.

The Nobel Lecture

Milton Friedman's lecture in December 1976 on the occasion of the award of the Nobel Prize in economics is no doubt the most widely read and cited treatment of the relationship between inflation and unemployment, yet the lecture did not expand on Friedman's earlier critique of the theoretical and empirical shortcomings of the Phillips Curve and related research. Instead, the Nobel lecture was about "the positive scientific character of economics" with the history of the relationship between inflation and employment as an illustration of the scientific process.

While acknowledging that there were two closely related debates going on – how monetary and fiscal policies affect nominal aggregate demand, and how such changes in demand affect inflation and unemployment – the Nobel lecture addressed only the second debate. Friedman explains, "…recent experience

4 Brunner and Meltzer in *Money and the Economy: Issues in Monetary Analysis* point out that "The idea of a relation between the price *level* and output, or between wages (cost of production) and output can be found as far back as Hume and Thornton. The appeal…(arose) from the contribution to the Keynesian analysis of that time." And, "With the assumption of constant productivity growth, the Phillips curve became an aggregate supply curve relating not the price level (as in traditional analysis) but the rate of price change to the level of excess supply, the latter measured by unemployment." (1993, 32)

Friedman's "natural rate hypothesis" continues to be misused in policy applications.

leaves me less satisfied with the adequacy of my earlier work on that issue than with the adequacy of my earlier work on the forces producing changes in aggregate nominal demand." Now, over thirty years later, the debate over how monetary and fiscal policy actions affect nominal aggregate demand seems less settled than ever.

In concluding the Nobel lecture, Friedman faults his "natural rate hypothesis" for failing to explain the occurrence of "slumpflation" – rising inflation even in the face of falling output and employment. Only in passing did he suggest that the greater variability of inflation may have rendered all markets – including labor markets – less efficient and thus raised the measured unemployment rate. It was, at the time, only a hypothesis that needed fuller development and empirical testing.

Policy Blunders

Late in the decade of the 1970s, the infamous "Humphrey-Hawkins" legislation mandated that the Federal Reserve pursue the "twin goals" that had been set forth in the 1946 legislation and reaffirmed in the 1971 JEC report. This was clearly a mistake for several reasons, including Friedman's belief that "[t]reating the Fed as having two separate objectives is an open invitation to engage in fine-tuning, something that has almost always proved mistaken practice" (Paper prepared for David Laidler's Festschrift, 2006.)

Friedman wrote, spoke, and testified repeatedly about the impossibility, if not absurdity, of this legislation in the '70s, but it was not until the disastrous opposite – simultaneous accelerating inflation and rising unemployment – occurred at the end of the 1970s that the tide of thinking shifted to the primacy of achieving and maintaining price stability.[5]

For some people, the hypothesis that there was a natural rate of unemployment meant that inflation was not a problem as long as actual employment was above this equilibrium rate – something Friedman did not intend or anticipate. In the mid 1970s Modigliani and Papademos introduced the non-inflationary rate of unemployment, NIRU, which later became NAIRU – non-accelerating inflation rate of unemployment. The notion was, and still is, that as long as unemployment is above some number, the inflation rate will fall – or at least not accelerate.

5 The inflation experience of the 1970s was punctuated by the occurrence of an "oil shock" which caused the popular measures of inflation to exaggerate the purely monetary component of the inflation. Friedman and a few others were careful to distinguish between a one-time change in the price level caused by a "supply shock" versus a sustained rate of change in prices caused by monetary policies. However, numerous commentators either did not understand the importance of the distinction, or simply were not careful.

This misunderstanding or mischaracterization of the natural rate hypothesis caused some policy advisors as well as politicians to believe that ever-larger doses of economic stimulus would not result in inflation as long as there were sufficient unutilized resources, including idle workers. The US President even declared that his advisors had assured him that there was no risk of rising inflation until aggregate demand "spilled over" some threshold of potential output. The observed fact of rising inflation *and* unemployment that resulted from this misguided analysis eventually led to revision of thinking about the natural rate to include the view that high and rising inflation made all markets, including labor markets, less efficient.

The obvious conclusion was that the natural rate of unemployment was actually *increased* as a result of greater inflation.

So, 20 years after Phillips asserted a trade-off between inflation and unemployment it became clear to some policymakers as well as politicians that not only was there no choice for policymakers to ponder, but achieving and maintaining a *low* inflation rate was a necessary condition for achieving a *low* unemployment rate! At least two important political leaders of the 1980s – Margaret Thatcher and Ronald Reagan – were convinced by Friedman's arguments that *reducing* inflation was also the right policy for reducing unemployment.

Importantly, they also understood that inflation was a monetary problem that required perseverance by central banks in restraining monetary growth over a protracted period to be successful. However, neither accepted the views of some economists that prolonged sacrifices of output and employment would be the consequence of prevailing against inflation. In both the United States and the United Kingdom tax rate reduction and regulatory reform accompanied the sustained policies of reducing monetary growth to reduce inflation, so output growth and then employment growth in the private sector, led by strong private investment, produced the longest periods of economic expansion and prosperity that either country had experienced in a century.

By the mid 1990's, economists again began to worry that low unemployment rates would lead to inflation.

In the United States, the Fed Chairman in the final year of the Carter Administration, Paul Volcker, already had explicitly rejected the Phillips Curve trade-off as a framework for formulating and implementing monetary policy. His successor, Alan Greenspan, also was skeptical of the reliability of the relationship as a basis for making economic forecasts, yet other Federal Reserve officials and staff resumed emphasis of the unemployment/inflation relationship in the 1990s.

Theory versus Practice

The macroeconomic developments of the final two decades of the 20th century should have ended any further debate about the notion of some trade-off between inflation and unemployment. Rates of inflation declined in market economies around the world, regardless of the political systems. Most places also experienced declines in unemployment rates, and where unemployment remained high it was almost universally acknowledged to be the result of national labor market rigidities and regulatory policies. Nowhere was the idea put forth that a bit higher inflation would even temporarily lower the unemployment rates. It seemed – for a while at least – that no minister of finance or central banker would dare to suggest that inflation was too low and that a bit more would in any way be a good thing.

To the contrary, by the mid 1990s it was more common to hear and read economists inside and outside of central banks fret over the possibility that unemployment rates might be too low and could result in greater inflation! Prominent Keynesian economists of the 1970s had been mugged by the reality of simultaneous high unemployment and soaring inflation and became so hawkish on "price stability" that they were actually on the side of policies that would produce *higher* unemployment in order to guard against emerging inflationary pressures.

Friedman advocated steady growth of money, confined to a narrow range.

A digression about unintended consequences in the contests of ideas about policies to affect the economy is warranted. Friedman had been a leader in both the debate about how monetary and fiscal policies affected aggregate nominal demand, and how the resulting changes in demand were manifested in prices and employment. In both arenas Friedman and his allies were later to find their success in these theoretical and empirical battles used by policy activists in ways that they had neither anticipated nor advocated.

Friedman and co-author David Meiselman had engaged others in the debate about the relative importance of fiscal versus monetary policy actions in the early 1960s at a time when the ideas about monetary policies were dominated by such thinking as reflected in the Radcliffe report – money had little to do with inflation. By the mid 1970s the empirical evidence was strong that impulses emanating from accelerations and decelerations of the stock of money had a strong effect on what subsequently happened to nominal spending. To Friedman the lesson was that since monetary impulses were strong, don't go messing around with them! He consistently advocated steady growth of money, confined to a narrow range.

But to policy makers and their allies that were prone to policy activism the lesson was that they had a new and powerful instrument for "managing" the demand in the economy. Powerful politicians supported monetary authorities who sought ever-faster growth in measures of money in futile efforts to spur output and drive down unemployment rates. Friedman and his allies proved that monetary policy was a powerful tool, and experience proved that in the wrong hands it was a dangerous tool to use with unconstrained discretion.

Similarly, Friedman's success (along with Edmund Phelps) in theoretical and empirical contests about the "natural rate" of unemployment was misused by policy activists in ways that could not have been anticipated. As discussed above, in the 1970s the NIRU and NAIRU surfaced in the economic literature. By the mid 1990s policy makers were advocating the manipulation of demand for output in such a way as to raise or lower the actual unemployment *relative to* some estimate of the natural rate as a technique for controlling the inflation rate!

The Phillips trade-off was dead in theory, but alive and well in practice.

In the US Federal Reserve, the primary framework of the staff of the Board of Governors was the size of the "gap" between the forecasted unemployment rate and their guesses about where the NAIRU happened to be. Attending his first meeting of the Federal Open Market Committee (FOMC), former Federal Reserve Governor Lawrence Meyer said,

> The unemployment rate is admittedly below the staff estimate of NAIRU, which in turn is virtually identical to my own point estimate. However, there is no broad-based evidence of a demand-induced acceleration of inflation despite the persistence of a low unemployment rate for nearly two years. Indeed, core measures of inflation for both the CPI and the PPI actually have moved lower this year. So for my part, if there is any surprise about inflation, it is how well contained it is rather than how high it is. The *staff continues to project, based on the unemployment gap, a gradual acceleration of inflation* pressures in coming quarters. (emphasis added)
>
> …In the current context, I wonder if it would not be useful to think of NAIRU more as a range than as a point – say, 5-1/2 to 6 percent. If the unemployment rate remains within this range, then there is no case for intervening. As the unemployment rate moves toward the bottom end, then we should become increasingly alert to the potential need for a tighter policy but action should be postponed until the rate moves outside this range. (FOMC transcript, July 1996, 38-39)

At the same meeting of the FOMC there was an extended discussion of the longer run objectives of the policy makers. One leader of the initial debate was Fed Governor Janet Yellen who argued that

> The key question is how much permanent unemployment rises as inflation falls, and here the methodology used to assess the consequences does matter. These authors[6] used general equilibrium methodology and here is what they find: The natural rate rises above its assumed 5.8 percent minimum to 6.1 percent as measured inflation falls from 4 down to 2 percent; the natural rate rises to 6.5 percent at 1 percent inflation, and then to 7.6 percent at zero percent inflation. (1996, 44)

6 Citing a study by George Akerlof, Bill Dickens, and George Perry.

This astonishing invocation of the "natural rate of unemployment" was actually quite common in such meetings even though there was (is?) no theoretical or empirical support for it. The Phillips Curve had resurfaced in policy discussions in new clothing, using Friedman's language but ignoring everything he had said about the notion of some "trade-off" that should or could be exploited by policymakers.

Common sense would have prevented the belief that too many people working is a problem.

Over the next four years the unemployment rate continued to fall – averaging only 4 percent in 2000 – yet the inflation rate remained low. For the staff at the Board of Governors this did not suggest that their model was incorrect but was the gift of productivity that kept on giving. Meeting after meeting, year after year in the late 1990s, staff forecasts called for an eventual end to the continuously surprising gains in productivity. The staff did successively reduce their estimates of NAIRU as the actual unemployment rate continued to trend down, but they never did get it down to the actual unemployment rate.

At an FOMC meeting in early 2000, senior Board staff Don Kohn explained,

> The baseline simulation over the next two years has a 1 percent plus NAIRU gap and only a very small upward creep in inflation. That implies a pretty high sacrifice ratio. That's great when the unemployment rate is below NAIRU because it doesn't result in much upward creep in inflation. Obviously, if you want to lower inflation, you have to be a lot above NAIRU for a long time to get inflation to come down. So, this sacrifice ratio was intended to be consistent with the basic story in the Greenbook in terms of how fast inflation would accelerate over the next few years given the assumed output gap. It's important to recognize that there are a lot of things going on in the Greenbook scenario that have to do with price shocks, oil prices moving, and so forth. But this analysis tries to abstract from that and get at the underlying slope of the Phillips curve. (FOMC transcript, February 2000, 41-42)

The Phillips trade-off was dead in theory, but alive and well in practice. As Allan Meltzer notes toward the end of his 2100 page *A History of the Federal Reserve*, "The staff continued to use the Phillips curve to forecast inflation. Research has shown that a key input to the forecast, the full employment level or natural rate of unemployment, has not been estimated accurately." (2010, 1230)

The way it influenced policy discussions was well demonstrated by Fed Governor Gramley:

> Since the unemployment rate is now well below the structural estimate of NAIRU, incipient inflationary pressures are out there, pressures that should be counteracted by a fairly sharp, early rise in the funds rate. This is something I think we've all more or less suspected for a while now, but the staff exercise is still valuable in showing just how high a funds rate is required to stabilize inflation – something like 7 percent…The second lesson is that preemption is good. Again, we have all suspected that, but the staff exercise

> shows that the inflation-targeting funds rate has to rise another full percentage point or so if we wait to see actual acceleration, and hence get behind the curve…The third point is that in the present circumstances reversals seem to be, at least to me, relatively unlikely. The staff did an exercise assuming that NAIRU is 4 percent. None of the professional forecasters that Larry Meyer recently surveyed in a paper is prepared to go that low, though 4 percent is within the normal statistical distribution of these estimates and it is the estimate from the recent paper by Brainard and Perry. For the sake of argument, the staff assumes that 4 percent is the right number and then works back to the optimal monetary policy. They still get a funds rate rising to 6 percent in the near future. (FOMC transcript, February 2000, 71-72)

In speeches and interviews the new Phillips Curve advocates certainly sounded to most folks like they came from a different planet. They would explain the threat of renewed inflation came from too many mommies and daddies working, earning a living, and supporting their families, and the policy makers were going to do something about it!

Even if there had been theoretical and/or empirical support for the notion that the low unemployment rate raised the risk of inflation, it would have never sat well with the public and their elected representatives that monetary authorities were determined to seek a *higher* rate of unemployment. Common sense would have prevented all but a few economists from believing that too many people working was somehow a problem.

Torturing the Theory and the Data

The attempts by Fed Board of Governors staff and others to rescue the Phillips Curve as an instrument for making policy decisions by resort to surprising gains in productivity ran into both theoretical and empirical problems. Friedman, Lucas, and others had demonstrated that even the short-run implied trade-off required that workers suffer a form of "money illusion" – they did not know initially that the higher nominal wages being offered were the result of reduced purchasing power of money. The productivity argument for a decline of NAIRU, or the natural rate of unemployment, required that prospective workers did not initially recognize that that the value of their labor services rose as a result of greater productivity, so they were slow to demand higher nominal wages.

The search for some relationship between inflation and unemployment continued in the 2000s.

Clearly, this would only be a temporary reduction of NAIRU unless workers never realized that they were more productive and could demand more compensation for what they did. Alternatively, one might conjecture an ever accelerating pace of productivity gains which would leave workers persistently underestimating the market value of their labor (Altig and Gomme, 1998). Of course, such a phenomenon would be just a variation of the "accelerationist hypothesis" set forth by Friedman in his early work on the Phillips Curve.

By the end of the last century, even among policymakers in the Federal Reserve there were increasing dissents from the use of the Phillips Curve and NAIRU to explain the relationship between inflation and unemployment. As Federal Reserve Bank (FRB) Minneapolis President Gary Stern argued, "it would seem that the burden of proof has shifted to those who continue to assert NAIRU's value in understanding and predicting inflation" (*The Region*, June 2000).

"Price levels" cannot be known, much less influenced by policy.

In conclusion to research comparing inflation forecasts obtained from Phillips Curve or NAIRU models, UCLA economists Atkeson and Ohanian urged poliymakers to be "skeptical of arguments to change policy based on the claim that someone's favorite inflation indicator, whatever it may be, is currently signalling a big change in inflation in the near term" (2001).

The admoniton by Stern and the evidence presented by Atkeson and Ohanian had little effect; the search for some relationship between inflation and unemployment continued. The favorable experience of downward trending inflation *and* unemployment in the 1990s generally carried over into the new millennium. It became generally accepted that people's expectations about inflation were important to explaining the NAIRU, but there was not agreement about how people went about forming such expectations.

The credibility of the central bank's commitment to price stability or low inflation was asserted to be important in the formation of inflation expectations, but how credibility was gained or lost remained a mystery. It was thought, but not supported by data, that the way monetary authorities responded to various economic events had become important. In contrast to the "oil shocks" of the 1970s when it had been asserted that higher energy prices, per se, were a cause of inflation, it was now thought that central banks' responses to changing energy prices might be more important. That is, the idea was that the public watched to see if actions by the central bank would cause the energy-price spike to spread to prices in general.

Whatever the merits of that, this attempt to incorporate the credibility of the monetary authorities was still a pursuit of the "equilibrium unemployment rate," or Friedman's "natural rate," as an instrument for assessing inflationary pressures emanating from pressures in the labor markets. At least prior to the "global economic crisis" beginning in 2008, the stance of governments' fiscal policies as indicated by spending growth, deficits, and debt was largely absent from discussion about how the public formed their expectations with regard to inflation.

Now, post-global economic crisis, governments' deficits and debts have surfaced as major concerns cited in surveys of people's expectations about future inflation risks. Because even a short-run inverse relation between unemployment and prices requires that inflation be *unanticipated,* the monetary authorities confront the problem of the public taking actions in anticipation of greater inflation than actually is occuring. A regime in which people act on the belief that observed low inflation is temporary – that it will be higher in the future – causes real interest rates to be higher. Such a situation was anticipated when,

as Brunner and Meltzer noted, "Robert Lucas joined the natural rate hypothesis to John Muth's rational expectations hypothesis, further reducing the scope for monetary policy to affect real output." (1993) In fact, consistent with other literature and macro models, the persistence of large budget deficits and rising indebtedness, accompanied by a sustained non-inflationary monetary stance, is a prescription for economic stagnation or contraction.

Current Usage of the Natural Rate

Half a century after Phillips first drew the curve and his contemporaries (Dow and Dicks-Mireaux) reported on data showing a relationship between job openings or vacancies versus unemployment, the idea resurfaced as a possible way to salvage some measure of excess demand for or supply of labor that might help in explaining inflation pressures. (William Dickens, 2008, "A new method to estimate time variation in the NAIRU," FRB Boston. Conference Series/Proceedings. 53.)

In an August 2010 blog posting at the Atlanta Federal Reserve Bank called "Just how curious is that Beveridge curve?" David Altig observes, "Since the second quarter of last year, the unemployment rate has far exceeded the level that would be predicted by the average correlation between unemployment and job vacancies over the past decade." The so-called Beveridge curve was described by the Cleveland Fed's Murat Tasci and John Lindner as: "[A]n empirical relationship between job openings (vacancies) and unemployment. It serves as a simple representation of how efficient labor markets are in terms of matching unemployed workers to available job openings in the aggregate economy" (2010).

The natural unemployment rate is too variable to be useful in policy making.

Underlying all this is the lack of knowledge about how the prices of goods and services are actually set in a market economy. The notion persists that there is something called a "price level" that not only can be known but can be influenced by economic policy makers. Especially if a policymaker believes that there is a average level of prices that should not be allowed to fall (Bernanke, 2010) then it is important to have a model or framework of analysis for gauging the pressures on this level of prices that would tend to cause it to rise or fall. For central banks, that model continues to take the form of supply of and demand for labor, or supply of and demand for aggregate output. In this regard, the Friedman formulation of the natural rate hypothesis became a framework for seeking to determine when there exists an excess demand for or excess supply of labor – if the policy makers can figure out where the natural rate happens to be at the moment.

Doubts Persist

In the spring of 2010 a FRB Richmond publication on the natural rate (Courtois, 2010) quotes Edmund Phelps: "The medium term natural unemployment rate can dart around just like any other economic variable." The article attributes to Phelps the view that "the natural rate is partly a function of the values that entrepreneurs and investors put on business assets," and quotes him saying, "If that takes a jump, your best guess about the medium term natural unemployment rate takes a jump too." The author concludes, "Some economists, such as Stanford University's Robert Hall, have gone as far as suggesting that the natural rate is too variable to be useful in policymaking." Amen.

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Milton and Monetarism
Allan H. Meltzer

At home and elsewhere in Europe, I have often been called a monetarist… For me it was an honor, they, however, meant it as an offense.

Vaclav Klaus (1995)

Monetarism is the name Karl Brunner gave to propositions about the role of money in economic theory and policy analysis. The propositions are much older than the name; several are found among the earliest discussions of economics. Beginning in the 1950s, Milton Friedman redeveloped and extended analysis of the role of money and the transmission of monetary policy.[1]

Friedman had a rare combination of skills. He was a theorist of the first rank with lasting major contributions to several branches of economics, but he was also an exceptional expositor of his ideas to the public. And he was indefatigable, travelling to many countries and writing a long stream of columns in the popular press to bring his ideas to a larger audience. He taught me and others not to limit one's teaching to those who appeared in the classroom but to make one's ideas available and understandable to a broader public.

Looking back, the proposition that money has little effect on prices and unemployment is not only wrong but seems extreme.

The Keynesian Revolution was a major event in the macroeconomics of the 1930s and 1940s. The mood of the early postwar years is suggested by Joseph Schumpeter's claim that socialism was the future of mankind. (Schumpeter 1942) A main result of the Keynesian revolution was adoption of so-called full-employment policies in the United States and other developed countries making government responsible for adopting and carrying out policies to manage aggregate output, employment, and the price level.

Keynesianism of the 1940s and 1950s typically described the relation between money and income as weak. An exception might be made for inflation, but even this was challenged by Kaldor (1982), Robinson (1985), and other prominent Keynesians. A sample from Joan Robinson (1985, 90) suffices: "The notion that inflation is a monetary phenomena and that it can be prevented by refusing to allow the quantity of money to increase is to mistake a symptom for a cause." This statement came late in the controversy. It is more representative of views widely held in the 1940s and 1950s, but it also suggests the tenacity with which some held to their views.

1 A more complete survey is Lecture 1 of Brunner and Meltzer (1993). Much of this summary is from that source and from Meltzer (1998). Regrettably, Karl Brunner cannot object to this abridgement.

Looking back, the proposition that money has little effect on prices and employment is not only wrong but seems extreme. I will cite only three sources to suggest how broadly it was held. First is the survey of monetary theory written for the American Economic Association's sponsored *Survey of Contemporary Economics*. (Villard 1948). Second is the 1959 report of the Radcliffe Committee in Britain. (Committee on the Working of the Monetary System 1959). Third is the American Economic Association's *Readings in Business Cycles.* (Gordon and Klein 1965). I cite these studies not because they were unusual but because they reflect the dominant or consensus views found in professional discussion, in popular textbooks, such as Ackley (1961), and in econometric models of the period.

Friedman's Contributions

Milton Friedman led the counter-revolution that ended with the revival of neo-classical economics. In the 1940s, he criticized Keynesian economics, for example in a review of Abba Lerner's *Economics of Control*, Friedman (1947) and elsewhere (1948) developed a major policy proposal that relied on rules rather than discretion. The main developments of an analytical alternative began in the workshop at the University of Chicago where he and a group of students analyzed the role of money. Friedman's written contribution to these studies was an essay restating the quantity theory of money that introduced the volume *Studies in the Quantity Theory of Money* (1956). Friedman's essay interpreted stability of the demand for money to mean not a constant, but a stable function of a few determinants.

In *A Theory of the Consumption Function*, Friedman (1957) replaced Keynes's consumption function with a more classical function that, contrary to Keynesian analysis, implied that temporary tax reduction would have no effect on aggregate demand. And the monetary history showed that money growth had a major influence on output and prices (Friedman and Schwartz 1963). The book had a decisive role in changing professional and eventually policymaker's opinions about the importance of monetary policy for economic fluctuations and inflation.

Friedman continued to produce influential papers on lags in the effect of monetary policy, on the relative importance of fiscal and monetary changes for output, and exchange rate theory. In lectures at Fordham, he presented a comprehensive framework for economic and financial stability (Friedman 1965).

Early Keynesian theory held the price level fixed to observe fluctuations in output. Inflationary episodes during the 1950s in several countries made this assumption untenable. Keynesians introduced a Phillips curve relating departures from full employment to inflation. Their work in the 1960s implied that policymakers could choose to raise the inflation rate to increase employment.

Friedman showed that the Keynesian Phillips Curve trade-off was based on a fundamental error.

In his presidential address to the American Economic Association, Friedman (1968) showed that the Keynesian Phillips curve trade-off was based on a fundamental error. Keynesians failed to distinguish between nominal and real values. Friedman showed that any increase in employment brought about by increasing the inflation rate had to be a temporary result of failure to anticipate inflation correctly. The message was as old as systematic economics – real variables like employment are independent of nominal changes except during times when expectations do not correctly reflect the full nominal impulse. Keynesians had neglected it.

Friedman made many additional contributions to the theory and practice of monetarism. The discussion went through several phases. He was active in all of them, especially as a spokesman and advocate in many countries. He wrote and talked repeatedly about money, inflation, free markets, and capitalism.

Four of his contributions merit more discussion because of their influence on subsequent developments. The four are: His formulation of the demand for money (Friedman 1956); his analysis of expectations, the natural rate of unemployment, and monetary neutrality (Friedman 1968); his early work on fixed and floating exchange rates (Friedman 1953); and his persistent advocacy of a rule for monetary policy.

Friedman permanently changed the discussion of the Keynesian trade-off of inflation and unemployment and much else.

Friedman's presentation of the demand for money analyzed money as a substitute for all assets and output categories. This rejected the Keynesian position that treated money as a residual determined by choosing between holding money and short-term securities. Friedman called money holdings "a temporary abode of purchasing power."

Friedman never developed this analysis into a general equilibrium framework, but Tobin (1969) and Brunner and Meltzer (1968, 1993) did. Particularly in periods of monetary and financial crisis, economists have found portfolio balance and the role of asset prices to be significant for understanding why a liquidity trap is unlikely and even impossible in a multi-asset world where assets are imperfect substitutes particularly in the short-run. Rapid increases in asset prices during periods of low output price inflation have alerted central bankers and economists to consider the role taken by asset prices in the transmission of monetary policy.

Friedman's (1968) insistence on long-run monetary neutrality permanently changed the discussion of the Keynesian trade-off of inflation and unemployment and much else. Soon after his argument was greatly strengthened by the introduction of rational expectations, or model-consistent expectations, in place of the ad hoc distributed lag of past behavior used to estimate expectations (Lucas 1972). Lucas's model accelerated development of the dynamic models of aggregate economics that now dominate work in the area. They put an end to the analytic basis for fiscal and monetary fine-tuning by highlighting dependence on the anticipations aroused by policy actions. Their influence on policy action remains for the future. Also, the policy response lasted only until the crisis that began in 2007.

When President Nixon floated the dollar in August 1971, he followed the advice that Friedman (1953) had offered policymakers for two decades. His early work was followed by many others. Frenkel and Johnson (1976) analyzed the international transmission of monetary impulses under fixed and flexible exchange rates. Although politicians and policymakers often criticized and deplored the variability of flexible rates, major countries either continued to permit exchange rate adjustment as in the United States, Canada, Britain, and Japan or joined a monetary union as in Germany, France, Italy, and Spain.

In his Presidential address to the American Economic Association, Franco Modigliani, a leading Keynesian economist, conceded that the monetarist position was correct on each of these major issues (1977). The principal remaining issue between monetarists and Keynesians that he would not concede, he said, was whether monetary policy should follow a rule such as Friedman's rule for constant money growth, or proceed according to the discretionary choice of officials. I believe Modigliani's speech is a useful statement for a Keynesian perspective of professional consensus on the monetarist – Keynesian controversy at the end of the 1970s. Although some real business cycle advocates denied any short-run effect of money on real variables, the principal substantive issue on which there was no resolution to the Keynesian-monetarist controversy was on the issues of rules versus discretion. Issues about neutrality and the natural rate are no longer in dispute; this included the effect of inflation on money wages, nominal interest rates and exchange rates, and any permanent real effects of inflation except those arising from the inflation tax and institutional restrictions. The latter include non-indexation of tax rules and other legal impediments to adjustment.

By the late 1970s, the Keynesian challenge had been met.

To sum up, by the late 1970s, the monetarist response had restored a version of the main propositions of classical monetary theory to which Milton Friedman brought renewed attention and insight. The Keynesian challenge had been met. Keynesianism had been reduced mainly to the claim that labor markets (and perhaps anticipations) do not adjust without a lag and to a preference for discretionary policy actions – fiscal and, more importantly for this discussion, monetary actions. No classical economist from David Hume to Alfred Marshall would have quarreled with the statement about lags in the adjustment of labor markets or anticipations. The policy issue remained. Let me turn to that.

The Challenge to Rule-Based Policies

Classical monetary policy was based on rules. The best known rule was the gold standard, but other proposed rules included bimetallism, commodity standards, and Irving Fisher's compensated dollar. These and other proposals were developed to achieve price or exchange rate stability.

The best writers, including Jevons, Marshall, Fisher, Wicksell, and Keynes, were concerned not only with long-run stability of the price level or exchange rate but also with the costs experienced in achieving that goal. The gold standard, for example, was often criticized on the grounds that money growth was pro-cyclical – rising in periods of inflation and falling in recession. One of the monetarist complaints about discretionary monetary policy in the 1960s and 1970s renewed this classical criticism.

Much could be saved on "Fed-watching" if central banks announced and followed a rule.

From the 1950s to the 1970s most discussion of rules focused on Milton Friedman's proposal that money growth be held constant. This rule was criticized by many economists. Perhaps the most frequent criticism is that the rule in inefficient, and therefore excessively burdensome, because it does not use accruing information. This argument loses much of its force if the accruing information is difficult to interpret. This is likely to be the case when the new data are very noisy and subject to large revisions, or when there are large transitory changes that cannot be distinguished promptly from persistent or permanent changes. If discretionary action responds to temporary changes that promptly reverse, discretionary policy action can add more variability than it removes. The well-intentioned discretionary policymaker becomes a source of instability.

Discussion of rules versus discretion made little progress until the late 1970s. Just about the time that Modigliani's (1977) address chose discretionary, stabilization policy as the main, outstanding issue, Kydland and Prescott's (1977) paper on time inconsistency changed the discussion in three important ways. First, the paper offered a general argument against discretionary policies as time inconsistent, hence inefficient.

Second, the paper opened a discussion of credibility that eventually influenced some central bankers to change the way they conduct policy. The new approaches focus on a long- or medium-term objective. Several countries – Australia, Finland, Israel, New Zealand, Spain, Sweden, and the United Kingdom – announced explicit target bands for inflation. The European Monetary Union made control of inflation its principal aim for the new euro. Even the US Congress has discussed giving the Federal Reserve a mandate for price stability. These recent changes (or proposals) are better described as quasi-rules, or rule-like behavior, than as explicit rules. Whatever name is given, they should be seen, however, as a less ambiguous guide to monetary policy than discretion and an effort to increase accountability.

Third, the Kydland and Prescott paper raises a question about the meaning of "discretion" in a rational expectations world. Complete discretion would be hard to distinguish from random behavior. Although timing and magnitude of actions may differ from one period to another, there is generally a systematic core to policy actions. Careful research finds these patterns of systematic behavior. For example, John Taylor's rule (1993) started as a positive, empirical study of what the Federal Reserve does (or had done). Taylor showed that a simple rule described the setting of the Federal funds rate with considerable accuracy for the period he considered. Later work changed the positive finding into a prescription.

Firms and households invest heavily in monitoring the central bank's decisions, often called Fed-watching and interpreting. Every action is seen as either a modification of the procedure that the Fed follows or as a reinforcement of the existing procedure. This use of skilled resources involves much deadweight loss that would be saved if the Fed (and other central banks) gave more accurate information about current procedures and objectives by announcing and following a rule.

Theoretical arguments for rules based on rational expectations and time inconsistency are reinforced by concerns about forecasts. Discretionary policy that relies on forecasts makes policy actions depend on the size of the forecast error. In the 1970s and 1980s, data suggest that the standard deviation of errors for quarterly or annual forecasts of real GDP growth was from 1/3 to 1/2 of the average rate of growth. Policymaker's forecasts were generally no more accurate than a sample of private forecasts. The size of the error suggests that policymakers cannot expect to make accurate short-term adjustments based on forecasts (Meltzer 1987).

Forecast errors by the best forecasters are lower for the years 1985 to 1997 than for earlier periods. A likely reason is that there was only one mild recession in this fifteen year period. Forecasters often make their largest errors at cyclical turning points.

Policymakers cannot expect to make accurate short-term adjustments based on forecasts.

The studies of forecast errors in the United States and abroad, of which these examples are a small part, support the case for rules or rule-like behavior, as Friedman proposed. Economics is not the science that generates small short-term forecast errors for GDP growth, inflation, and other macro variables. There is no such science. Basing policy on forecasts of macro variables cannot be an optimal policy procedure given the size of forecast errors. A major problem is that heavy reliance on forecasts has concentrated attention on near-term events over which the central bank has little influence and the neglect of longer-term response to policy action (Meltzer 2010).

A frequent criticism of rules concerns action during a crisis caused by bank runs or financial panics. Leave aside whether these panics are endogenous responses to past policy, as in the early 1930s. Should the central bank follow a rule under these circumstances?

My answer is that a properly stated rule requires the central bank to respond. A simple way to include the response as part of a rule is to adopt a penalty rate for discounting at the central bank. Financial institutions should be permitted to discount freely, using marketable assets, at a penalty rate. This lender-of-last-resort rule should be part of the monetary rule.

The growing realization that short-term forecasts are subject to large errors and the theoretical work on credibility weakens the case for discretion. In his 1997 Mais Lecture, Eddie George, then Governor of the Bank of England, recognized the change that has occurred.

> [T]here has, over the past decade or more, been a clear change of emphasis—across Europe but much more widely internationally—*away* from short-term macro-economic, demand management as the means of promoting the agreed end-objectives of economic policy, of growth of output and employment, and rising living standards, and *towards* the need for macro-economic stability in the medium and longer term…
>
> The result is a broad consensus…on the need for macro-economic policy to be directed towards stability and sustainability in the medium- and longer-term. (1997, 1)

The new policy of sustainability requires greater transparency, hence more information to markets and rule-like behavior by central banks. Governor George's statement echoes Milton Friedman.

Friedman recognized that spending plans conflicted with the fixed exchange rate system.

All of the change in the analysis of rules and discretion has not been on one side. The monetary policy rules that economists have proposed in recent years are adaptive rules that adjust to current or recent information. (McCallum 1987, Meltzer 1987, Taylor 1993). An important difference between adaptive and fixed rules is in the treatment of permanent changes in velocity growth, in output, or in output growth. A fixed rule would not achieve the objective of price stability or zero inflation by setting money growth equal to the long-run average growth of output if output or velocity growth change permanently. An adaptive rule gradually adjusts to the new information. The optimal speed of adjustment depends on the relative variances of permanent and transitory changes (Muth 1961).

To sum up this section: There has been movement on the issue of rules vs. discretion in recent years. This movement is in the monetarist direction – toward rules as Friedman proposed. The rules that now receive most attention are adaptive rules. Some of these rules aim at stabilizing growth of nominal GDP at a low rate of inflation. Many Keynesians and monetarists agree on this objective.

The movement toward monetary rules suffered a setback following the 2007-09 financial crisis. Central banks in many countries responded to political and financial market pressures to bail out failing banks. In the United States, monetary policy became less independent of Treasury and Congressional influence. I believe that announcing and following a rule is the only way to restore independence and also an effective way to reduce the extraordinary increase in excess reserves.

Exchange Rates

Controlling money growth and domestic inflation requires central banks to accept changes in nominal exchange rates. Soon after the Bretton Woods system of fixed but adjustable exchange rates began, Milton wrote "The Case for Flexible Exchange Rates" in 1950-51, published as Friedman (1953). He recognized that plans for military spending and foreign aid and the commitment to full employment policies created a conflict with the fixed exchange rate system.

Official opinion did not accept his criticism. Soon after western European countries accepted current account convertibility in 1958, United States policymakers began to respond to gold losses. In 1962-65 Treasury Undersecretary Robert Roosa developed and negotiated programs to reduce the loss of US gold stock. The disinflationary policy from 1959 to 1964 appreciated the US real exchange rate and prompted many analysts at the time to expect the system to continue.

The movement toward rules is in the monetarist direction.

The Federal Reserve accepted that exchange rate management was the Treasury's problem. It cooperated in the program of short-term foreign exchange purchases beginning in 1962. Neither the Treasury nor the Federal Reserve had a long-term program. The Johnson administration undertook large increases in spending to finance the Vietnam War and the Great Society. That ended the appreciation of the real exchange rate. By 1968, the administration limited gold sales.

Friedman tried to convince President Nixon to let the dollar float at the start of his administration, but Arthur Burns opposed. Less than three years later, in August 1971, the United States ended gold sales and moved toward floating rates.

At a symposium for Milton's 80th birthday, I estimated an equation containing the variables he discussed in his 1953 paper. The fit to annual data for the multi-lateral dollar exchange rate supported his argument (Meltzer 1993). Military spending and money growth explained much of the variance in the nominal exchange rate.

The Role of Money

Monetarists emphasize some measure of the money stock as an indicator of policy, policy target, or instrument variable. On this issue, the monetarist's program has not been accepted broadly within the profession or at central banks. There are four principal reasons. First, for a time, some economists either denied monetary neutrality or claimed that it held only in a very distant future. Few economists now question neutrality. Proponents of real business cycles, however, went beyond the long-run evidence to deny even temporary effects of money on real variables. Neither experience nor econometric

evidence supports such claims. Mishkin (1983) and others showed that the data support the monetarist propositions – short-run real effects of money and long-run neutrality.

Second, some economists claim either that the definition of money is subject to frequent change or that monetary velocity is too unstable to be useful empirically. Benjamin Friedman has argued this position in several papers (1993, 1997). He concludes that any relation between money and output or prices in the 1970s had vanished by the 1980s and 1990s. The discussants of his 1997 paper show that this result is not general, and they suggest that his results for the United States depend on his procedure – the use of vector autoregressions to test the hypothesis (Longworth 1997, Rich 1997). Further, Hoffman and Rasche (1996, 102-110) show that the results in Friedman and Kuttner (1993) are obtained using a semi-log specification with logarithms of real balances and income but the level of interest rates. Using the log of interest rates reverses the conclusion. The reason is that the Friedman-Kuttner specification misses badly in the period 1979-81 when short-term rates rose as high as 20 percent. Once again, we see the danger of reaching strong conclusions from a linear relation estimated over a short time period.
Third, monetarists explain inflation as the result of excessive money growth. Money growth is excessive when it persistently exceeds the growth of real output with adjustment for improvements in the efficiency of monetary exchange, innovations in intermediation, or other sustained changes in monetary velocity. The Meltzer and McCallum monetary rules, referred to earlier, include such adjustments. The best known short statement of the monetarist position on this issue is Milton Friedman's often quoted remark that inflation is always and everywhere a monetary phenomenon.

Non-monetarists often explain inflation as the result of individual price changes. The oil shocks of the 1970s, supplemented by other special factors – food prices and El Niño – are offered as explanations of past inflation. Years ago, Karl Brunner named this procedure the upper-tail theory of inflation. Now, we have its complement – the lower-tail theory of disinflation. Recent disinflation is often said to be caused by the substantial decline in the rate of increase in health care costs supplemented by the continued decline in computer prices, a "surprising" reduction in the NAIRU (non-accelerating inflation rate of unemployment) and new zeal to reduce costs of production. Slower money growth is rarely mentioned as a reason for disinflation.

Monetarists explain inflation as the result of excessive money growth.

To a monetarist, this is strange data analysis. Disinflation is nearly universal. Health care costs have decelerated mainly in the United States. It is even stranger as economic analysis. Economists are trained to distinguish between individual prices and the aggregate price level. Computer prices have been falling for more than a decade. Why did the price level not decelerate until the 1990s?

An additional problem arises from failure to distinguish between one-time price level changes, distributed over time, and the maintained rate of price change. Milton Friedman's familiar statement, and both classical and monetarist propositions about inflation, refer to sustained movements in some measure of

the central tendency of a broad-based price index. Productivity shocks, sales or VAT tax changes, and other one-time effects are just that – changes in the price level that do not persist. Not surprisingly, a 1978 multi-country, empirical study of inflation found it useful to distinguish the two (Brunner and Meltzer 1978).

The sustained motion of the price level is the central tendency of inflation. Friedman argued that central tendency will be higher or lower as money growth is higher or lower. Quarterly or even annual movements may reflect the effect of individual prices on an index number. Such effects depend in part on the way in which the index is computed. A fixed weight index will reflect large, one-time changes more than an "ideal" index. But such changes do not affect the *maintained* rate of increase of the price level.

Many central banks and econometric studies draw conclusions from quarterly data. Friedman and other monetarists accept that quarterly observations often do not show the stability of the demand for money. Annual data are much less subject to short-term noise and lags in the effect of money on inflation. In Meltzer (2010, 1726) the velocity of base money is shown in relation to an interest rate using annual observations from 1919 to 1997. The plot looks as it should. Two findings especially support the stability of the demand for money. First, when interest rates in the 1960s returned to the level observed in the 1920s, base velocity returned to its 1920s values. Second, when inflation and nominal interest rates declined in the 1980s, base velocity declined along the same path on which it rose as inflation and interest rates rose in the 1970s. This evidence supports the claim that monetary velocity is a stable function of interest rates.

Non-monetarists often explain inflation as the result of individual price changes.

Three common criticisms are made of the monetary base. One applies to other monetary aggregates. Before concluding, I comment briefly on these criticisms.

First, the effect of the base and other monetary aggregates is said to depend on the payments technology and intermediation. Innovations in intermediation or payments technology change the relation of the base to GDP by changing the demand for base money.

Effects on aggregate demand resulting from changes in payments technology are not limited to base (or other measures of money). All economic relationships are, in principle, affected by changes in payments technology. The size of the effect, and its disruptive consequences, is an empirical issue. The stability of base velocity in relation to the interest rate, discussed above, suggests that this criticism is not especially relevant unless we confine our interest to quarterly or other short-term data.

Second, the base consists mainly of currency. This is a correct statement about the uses side of the monetary base. It is no less correct to say that, on the sources side, the US base has long been dominated by the Federal Reserve's portfolio of government securities. Under fluctuating exchange rates, quarterly and annual changes in the base are mainly a reflection of Federal Reserve open market operations; that is, policy actions.

Third, part of the base is held abroad for long periods of time; these holdings do not directly affect US GDP, interest rates, or other variables of concern. This criticism applies to the level. Monetarist analysis pays attention to the growth rate of the base or to accelerations and decelerations.

Most of Friedman's propositions were eventually accepted as the corpus of macroeconomics.

Porter and Judson (1996) produced estimates of foreign holdings of US currency. They find that more than 60 percent of US currency is held abroad. Based on their estimates, more than 50 percent of the monetary base is held abroad. Jefferson (1997) shows that McCallum's monetary rule works better when estimates of foreign holdings of US currency are removed from the base.

The differences Jefferson reports are not large, however. One reason is that McCallum's rule uses the growth rate of the base, not the level. The growth rates of the base and the base net of currency abroad (the home base) differ, but the differences are not large using annual data.

Conclusion

Beginning in the 1950s, Milton Friedman started a counter-revolution against the Keynesian consensus. In a series of papers Friedman, his students, and others restored and extended the neo-classical theory of money. Most of Friedman's propositions were eventually accepted as the corpus of macroeconomics.

For many years, Friedman was the leading, and often the only, proponent of a monetary rule. After the introduction of rational expectations, the case for rule-like behavior was strengthened greatly. Rule-like behavior is now an accepted conclusion. Several central banks have adopted and followed rule-like procedures. Unfortunately, the Federal Reserve is not one of them.

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About the Author

Allan H. Meltzer is the Allan H. Meltzer University Professor of Political Economy at Carnegie Mellon University. He is the author of ***History of the Federal Reserve, Volume I: 1913-1951*** (University of Chicago Press, 2002) and *History of the Federal Reserve, Volume II: 1951-1986* (University of Chicago Press, 2010), a definitive research work on the Federal Reserve System. He has been a member of the President's Economic Policy Advisory Board, an acting member of the President's Council of Economic Advisers, and a consultant to the US Treasury Department and the Board of Governors of the Federal Reserve System. In 1999 and 2000, he served as the chairman of the International Financial Institution Advisory Commission, which was appointed by Congress to review the role of the International Monetary Fund, the World Bank, and other institutions. The author of several books and numerous papers on economic theory and policy, Mr. Meltzer is also a founder of the Shadow Open Market Committee.

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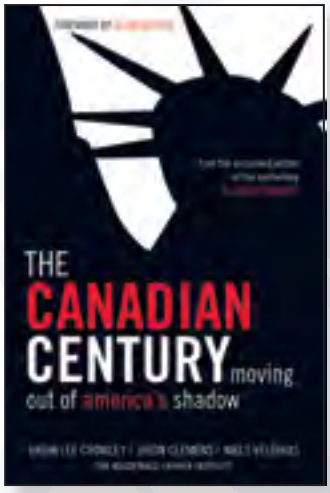

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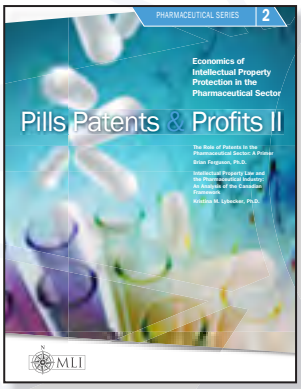

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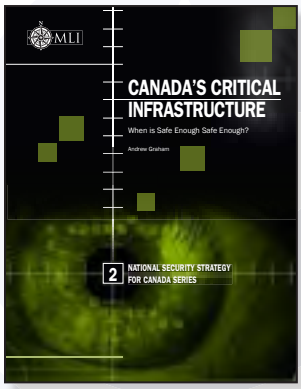

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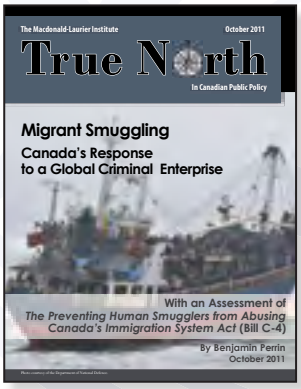

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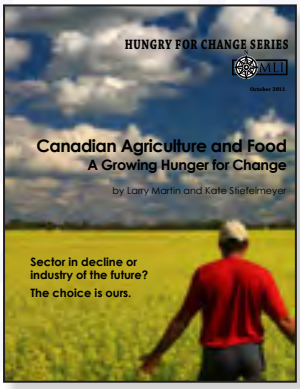

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