A Critique of Interest Rate–Oriented Monetary Economics

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Scott B. Sumner. "A Critique of Interest Rate–Oriented Monetary Economics." Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, November 2020.

Abstract

In recent years, Keynesians and NeoFisherians have debated whether a low-interest-rate policy is inflationary or disinflationary. Both sides are wrong; interest rates are not a useful indicator of the stance of monetary policy. Some contractionary monetary policies lead to lower interest rates, while other contractionary monetary policies lead to higher interest rates. Instead, economists should use market expectations of inflation, nominal GDP growth, or both to measure the stance of monetary policy. Furthermore, the Fed should no longer target interest rates.

JEL codes: E4, E5

Keywords: interest rates, monetary policy, NeoFisherian, Keynesian

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This paper can be accessed at https://www.mercatus.org/publications/monetary-policy/critique-interest-rate-oriented-monetary-economics

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1. Introduction

Interest rates have played a central role in monetary policy analysis. The short-term nominal interest rate is often viewed as the appropriate instrument of monetary policy, and interest rates are also viewed as an indicator of changes in the stance of money policy. In this paper, I show that too much weight is placed on movements in interest rates as a policy indicator and that confusion on this point has contributed to previous monetary policy failures. More speculatively, one needs to rethink whether interest rates are even the appropriate policy instrument for central banks.

Keynesian economists often describe a reduction in interest rates as an *expansionary* monetary policy. This orthodoxy has recently been challenged by an alternative group termed *NeoFisherians*, who argue that lower interest rates may actually be disinflationary, or contractionary.[1] A dispute over such a basic question is rather embarrassing for the field of macroeconomics, particularly because central bankers use interest rates as an important policy instrument. The monetary policy steering mechanism is unreliable.

In this paper, I argue that both groups are engaged in the fallacy of *reasoning from a price change*, that is, drawing causal inferences from the change in a price without first knowing what caused the price to change. Interest rate movements are not monetary policy; they are one of many effects of monetary policy. Speaking of a central bank cutting interest rates by 25 basis points is pointless, unless one indicates whether the rate cut was achieved with an expansionary or a contractionary policy. This critique of mainstream monetary economics has important

[1] Williamson (2016) and Cochrane (2017) have argued that NeoFisherism is a model worthy of serious consideration. García-Schmidt and Woodford (2015) offer a defense of the Keynesian view.

implications for understanding real-world monetary policy errors and points the way toward a more reliable set of monetary policy tools.

This paper employs an eclectic set of arguments because these issues are obscured when one uses traditional (mathematical) models. Keynesians and NeoFisherians can look at the same highly technical dynamic stochastic general equilibrium model and reach different conclusions as to what the model indicates about monetary policy. In general, fiat money models have a sort of indeterminacy, more accurately described as *solution multiplicity*,[2] because the effect of a current policy action depends mostly on how that action is expected to affect the future path of policy.

Thus, no one knows the effect of a cut in the target interest rate without first knowing the implication of that policy change for the expected future path of various policy instruments. A reduction in interest rates might be contractionary if it reflects the Fisher effect—the tendency of lower inflation to lead to lower nominal interest rates. This is the focus of NeoFisherian models. In contrast, lower interest rates might be inflationary if they reflect the liquidity effect of an increase in the money supply. This is the focus of Keynesian models.

Unfortunately, both Keynesians and NeoFisherians rely on models in which interest rates are treated as monetary policy, rather than as one of many variables affected by changes in the stance of monetary policy. This conceptual error makes it difficult to resolve the Keynesian-NeoFisherian dispute, which needs to be reframed in a way that does not equate interest rates with monetary policy.[3] I show that reframing the debate with a policy regime employing exchange rates as a policy instrument allows one to clarify the disagreement between the two schools of thought.

[2] See McCallum's (2003) National Bureau of Economic Research working paper.
[3] Hummel (2017) provides an excellent discussion of why equating interest rates and monetary policy is a mistake.

As shown in this paper, the question is not whether lower interest rates constitute an expansionary or a contractionary monetary policy. Instead, one needs to figure out *when* expansionary monetary policies are associated with lower nominal interest rates and *when* contractionary monetary policies are associated with lower nominal interest rates.

I begin by discussing monetary policy terminology, which is often ambiguous. Then I explain how monetary economics has been plagued by the problem of *reasoning from a price change*—wrongly drawing inferences about quantities from the change in a market price. This includes changes in market interest rates, which do not represent the stance of monetary policy. Then I consider alternative measures of the stance of policy, including the money supply and exchange rates. The contrasting predictions of Keynesian and NeoFisherian models are illustrated with a simple model of exchange rates and interest parity. This analysis is further developed by drawing a distinction between level shifts and growth rate shifts in monetary policy. Finally, I show some examples of the ways a focus on interest rates led to monetary policy failures in the past, as well as the implications of this analysis for monetary policy reform. One conclusion is that central banks should switch from targeting interest rates to targeting forecasts of the policy goal variable.

2. Note on Terminology

I use a number of terms that are defined in multiple ways, such as monetary policy, policy instrument, Keynesian, NeoFisherian, expansionary, contractionary, and more generally the stance of monetary policy. Unfortunately, universally accepted definitions do not exist for any of these terms. However, a lack of precise definitions does not prevent the terms from playing an important role in the policy debate. Finding any high-level discussion of Federal Reserve (Fed)

policy that does not employ terms such as expansionary and contractionary policy (or perhaps accommodative and restrictive policy) is almost impossible. The following definitions fit the way I use the terms in this paper:

- *Monetary policy* is the set of actions taken by a central bank that affect the supply and demand for base money. A monetary policy *regime* is a set of policy decisions (which might be systematic) that influence broader macroeconomic variables. Open market operations (OMOs) and changes in the interest rate on bank reserves (IOR) are examples of policy tools that affect the supply and demand for base money. In contrast, changes in market interest rates such as the federal funds rate are generally the effect of explicit central bank actions such as OMOs and IOR changes.
- A *more expansionary* monetary policy is a policy that tends to increase nominal aggregates such as inflation and nominal GDP. The term *expansionary* is less clear when used in an absolute sense, but one plausible definition is a policy stance that results in above-target nominal growth or inflation. The exact opposite applies to *contractionary* policy. Note that many economists use other definitions for expansionary and contractionary policy, such as changes in interest rates or in the money supply.
- The *stance of monetary policy* is the extent to which policy is expansionary or contractionary. Thus, under a 2 percent inflation targeting regime, a monetary policy stance that leads to 4 percent or 8 percent inflation is relatively expansionary, and the 8 percent inflation policy is more highly expansionary than a policy that leads to 4 percent inflation. A zero inflation rate would be relatively contractionary under that regime.
- The *Keynesian view* is that a high-interest-rate policy is contractionary, while the *NeoFisherian view* is that a high-interest-rate policy is expansionary. Obviously, these

definitions overlook important nuances such as effects over the short run versus the long run, which are considered later in this paper, but the current debate over NeoFisherian models indicates that two very different views are actually in play, where no general agreement exists.

- A *policy instrument* is a variable over which the central bank has tight control in the short run, and the bank uses it to adjust the stance of monetary policy. Short-term interest rates, the monetary base, exchange rates, and the price of gold have all been used as monetary policy instruments at various times in history.
- The (nominal) *natural rate of interest* is the market interest rate that allows the central bank to achieve its target (such as 2 percent inflation). The natural rate of interest is more often defined in real terms, but I find the nominal definition to be more useful.

3. Reasoning from a Price Change

One of the most common errors in economic analysis is to *reason from a price change*, which means to draw inferences about changes in quantity on the basis of a change in a price. For instance, one will occasionally see the media suggest that the supply-and-demand model predicts that people would be expected to consume less oil when the price of oil rises. In fact, the supply-and-demand model has no implications for the correlation between changes in price and changes in quantity; it depends entirely on whether the price change was driven by a demand shift or a supply shift. Thus in the mid-2000s, a rise in oil demand led to an increase in both oil consumption and oil production. In contrast, a fall in oil supply during 1974 led to a decrease in oil consumption that coincided with a period of rising oil prices.

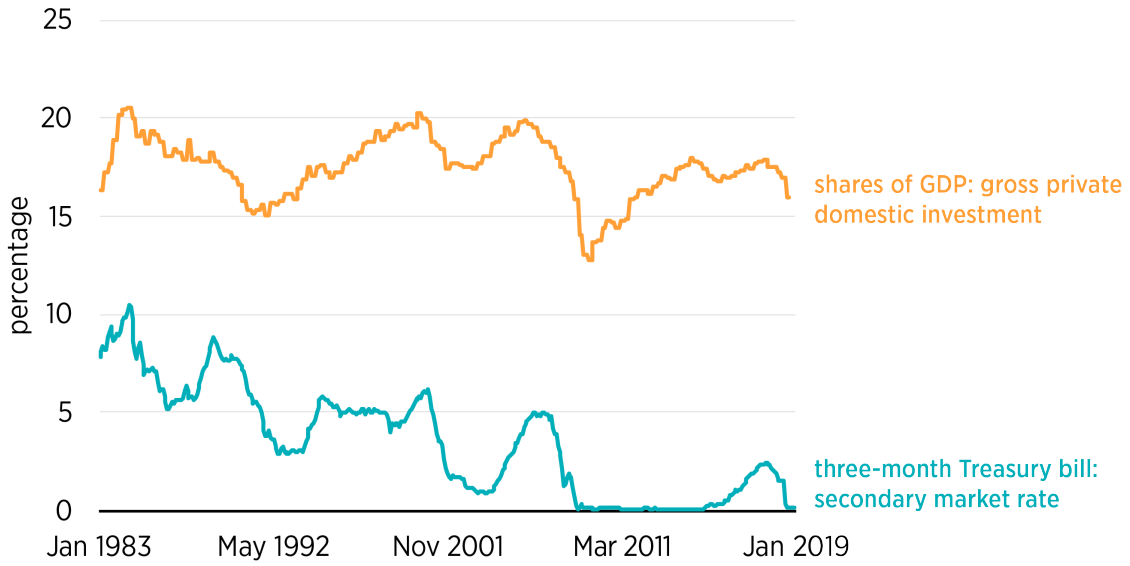
Nor does holding other things constant help when considering a price change. If there is no shift in supply and demand, then any price change leads to disequilibrium, and the effect on output cannot be predicted without understanding the (nonprice) rationing mechanism.

Although reasoning from a price change is a serious error, it is also an easy mistake to make—I have fallen into the trap myself. So have prominent economists such as Nobel laureate Robert Shiller (Weil 2015):

> Real interest rates have turned negative in many countries, as inflation remains quiescent and economies overseas struggle.
>
> Yet, these negative rates haven't done much to inspire investment, and Nobel laureate economist Robert Shiller is perplexed as to why.
>
> "If I can borrow at a negative interest rate, I ought to be able to do something with that," he tells U.K. magazine *MoneyWeek*. "The government should be borrowing, it would seem, heavily and investing in anything that yields a positive return."
>
> But, "that isn't happening anywhere," Shiller notes. "No country has that. . . . Even the corporate sector, you might think, would be investing at a very high pitch. They're not, so something is amiss."
>
> And what is that?
>
> "I don't have a complete story of why it is. It's a puzzle of our time," he maintains.

In fact, there is no mystery. Relatively low levels of investment are usually associated with low interest rates, because interest rates and investment are both highly procyclical. This relationship occurs because the investment schedule is much more volatile than the saving schedule. Thus although a rightward shift in the saving schedule could lead to both lower interest rates and higher investment, a leftward shift of the investment schedule more often produces a fall in interest rates. If saving schedule shifts were dominant, then more investment would tend to occur during periods of low interest rates, such as the early 1930s and 2009. In fact, both interest rates and investment as a share of GDP are strongly procyclical, declining sharply during recessions (figure 1).

Figure 1. Investment Share of GDP and Treasury Bill Yield



Source: Federal Reserve Economic Data, "Shares of Gross Domestic Product: Gross Private Domestic Investment" and "3-Month Treasury Bill: Secondary Market Rate" (datasets), accessed November 11, 2020, https://fred.stlouisfed.org/series/A006RE1Q156NBEA and https://fred.stlouisfed.org/series/DTB3.

There are cases where what appears to be reasoning from a price change is justified owing to a tacit assumption that the cause of the price change is obvious. Consider a discussion of a price increase following the implementation of a substantial new cigarette tax. If all parties in the discussion understand that a tax increase caused the price increase, then a claim that a much higher cigarette price will likely reduce consumption does not pose a problem. Everyone presumably understands that higher prices are occurring because the tax on cigarettes shifts the supply curve to the left.

The central argument in this paper is that contemporary monetary theory and practice are marred by an unfortunate tendency to reason from a price change, to conflate changes in interest rates with changes in the stance of monetary policy. In fact, there is no necessary correlation between changes in interest rates and changes in the stance of monetary policy. In other words,

market interest rates are *not* monetary policy; they are one of many variables affected by monetary policy.

I suspect that when economists discuss the effect of interest rates on the broader economy, they often tacitly assume that the change in rates is caused by the central bank, perhaps an adjustment in the IOR, and that this change allows one to avoid the fallacy of reasoning from a price change. Unfortunately, it does not. A change in interest rates is not equivalent to a change in the stance of monetary policy for two important reasons. First, changes in the Fed's target interest rate are often linked to broader monetary policy announcements, which also affect the natural rate of interest. For instance, an expansionary monetary policy might raise inflation expectations via the Fisher effect and hence increase the (nominal) natural rate of interest.

Second, the central bank's policy rate often moves in the same direction as the natural rate of interest, but by a smaller amount. Interest rates are partly endogenous, and the central bank responds to exogenous changes in the natural rate of interest. This pattern is true even for interest rates that are under the direct control of the central bank, such as the discount rate and the interest rate on reserves. When the natural rate of interest fell sharply during the 2007–2008 banking crisis, the Fed responded by reducing its policy target more slowly, effectively tightening policy.

Although Saudi Arabia can be confident that a decision to sharply boost its oil output will have a depressing effect on oil prices, the Fed cannot be confident that a decision to boost the money supply will have a depressing effect on interest rates. So, what makes money different from oil? Start with the fact that (unlike oil) money is one side of almost all transactions. Thus, any oil supply shock is also a demand for money shock. When Saudi Arabia sells more oil, it also buys more money. With respect to oil, however, and indeed for all goods other than money,

a change in the market fundamentals does not directly alter the stock of base money (currency and bank reserves), which is determined by the central bank.

One typically assumes that when an oil supply shock changes the nominal price of oil, it has too little effect on the value of money (i.e., aggregate price level) for the nominal price of oil to move in the opposite direction from its real price. Thus, an increase in Saudi oil production is highly unlikely to cause the value of money to fall by so much that the nominal (dollar) price of Saudi oil would rise even as the real price (i.e., relative to other goods) declined. When looking at specific product prices, one justifiably focuses on the good or service in question, not the money flowing in the other direction. In a sense, this focus is what distinguishes microeconomic price theory from macro theory.

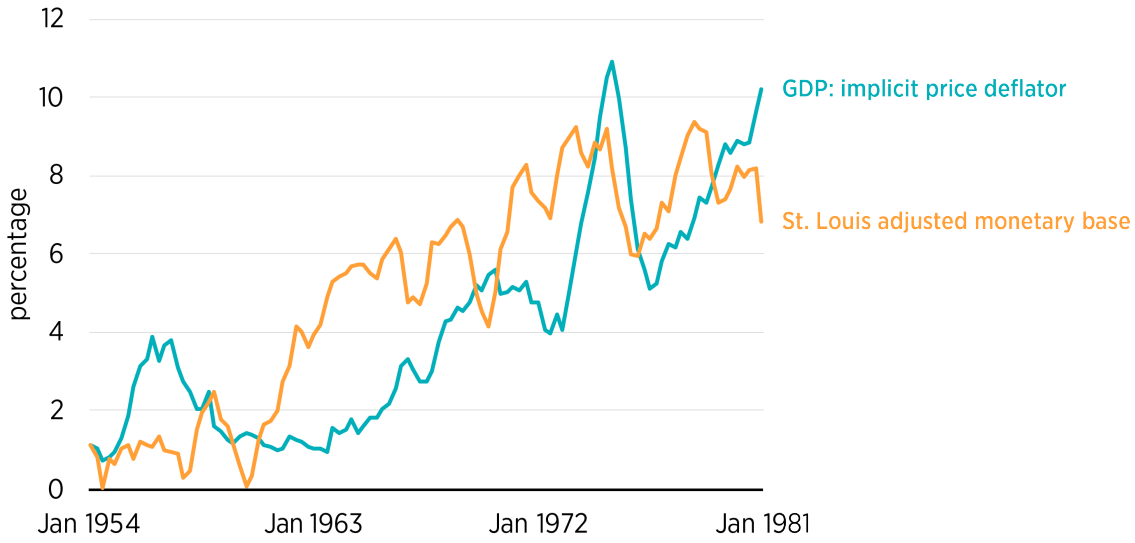
Money is different. One might think that a massive Fed purchase of Treasury securities should raise the price of Treasury bonds. Isn't that just basic supply and demand? Actually no, because open market purchases also have the effect of increasing the supply of money, which can easily raise inflation expectations and thereby boost nominal interest rates. In addition, of course, higher nominal interest rates are associated with falling bond prices.

This effect is not just a theoretical curiosity; indeed, in the longer term the Fisher effect is close to the norm. Figure 2 shows that during the 1960s and 1970s, the Fed began increasing the stock of money at a much more rapid rate, pushing inflation higher.

Figure 3 shows that this acceleration in the rate that Treasury securities were being purchased with newly created money led to increased inflation expectations, higher nominal interest rates, and one of the worst bond markets in American history.[4]

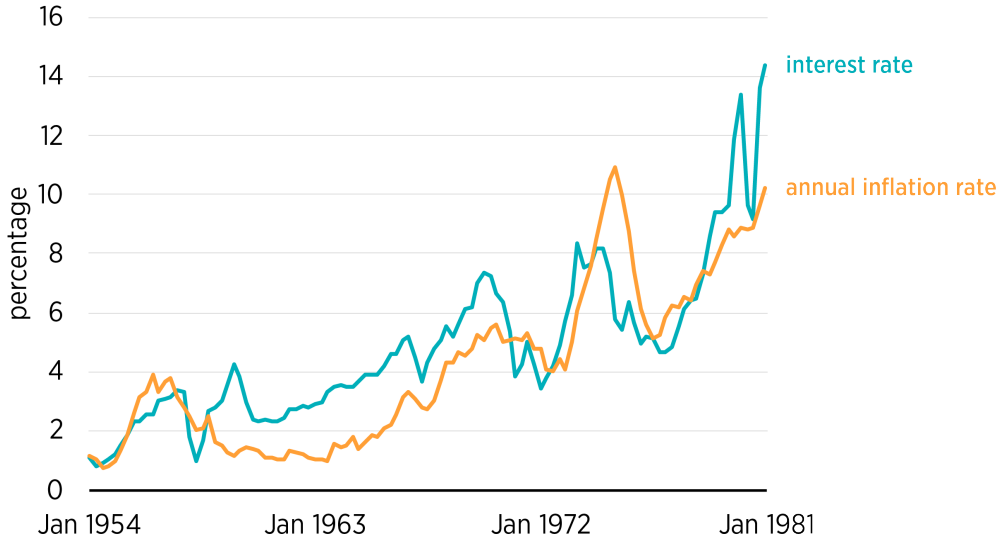
[4] This episode should make us very suspicious of claims that Fed asset purchases *subsidize* the holders of the assets being sold to the Fed. The Treasury debt holders of the 1970s would have greatly preferred to do without that alleged Fed subsidy.

Figure 2. Monetary Base Growth and Inflation



Source: Federal Reserve Economic Data, "St. Louis Adjusted Monetary Base (Discontinued)" and "Gross Domestic Product: Implicit Price Deflator" (datasets), accessed November 11, 2020, https://fred.stlouisfed.org/series/AMBSL and https://fred.stlouisfed.org/series/GDPDEF.

Figure 3. Three Month T-bill Yields and Inflation



Source: Federal Reserve Economic Data, "3-Month Treasury Bill: Secondary Market Rate" and "Gross Domestic Product: Implicit Price Deflator" (datasets), accessed November 11, 2020, https://fred.stlouisfed.org/series/TB3MS and https://fred.stlouisfed.org/series/GDPDEF.

Some economists will concede the importance of the Fisher effect in the long run, but they continue to insist that it is meaningful to consider a thought experiment whereby the Fed adjusts interest rates, other things equal. However, unless the term *interest rate* refers to a Fed-administered rate (such as the discount rate or the interest rate on bank reserves), there is no basis for assuming other things equal when the Fed does something to move *market* interest rates. The Fed cannot magically change market interest rates, other things equal; it must take affirmative actions.

This complication is not merely a theoretical curiosity. In the real world, the most important effect of Fed policy results not from the current setting of a single policy instrument; the dominant factor is communication about the future path of all the various policy instruments. A vector autoregression (VAR) study that looks at the effect of changes in interest rates—other things equal—will not be able to provide useful guidance to monetary policymakers, because it will ultimately gloss over the more important aspects of monetary policy announcements. This is one aspect of the famous *identification problem*. Indeed, later in this paper one will see that the Fed can raise interest rates with either an expansionary or a contractionary monetary policy. The effects on the economy are quite different in the two cases.

There is also a less obvious problem with reasoning from an interest rate change; the short-term interest rate has both exogenous and endogenous features. Short-term interest rates are exogenous in the sense that on any given day the Fed can set rates at various levels. In contrast, when short-term interest rates are the only policy instrument, then the interest rate is endogenous in the sense that only one interest rate setting is consistent with exactly 2 percent inflation. Thus under a successful inflation-targeting regime, the interest rate (as well as the money supply) is endogenous. More broadly, for *any* monetary policy target, including the price

of gold, the foreign exchange rate, the inflation rate, or nominal GDP, generally only one interest rate path is consistent with policy success.

The following analogy might help. Consider a bus going from Denver, Colorado, to Salt Lake City, Utah. What determines the path of the bus as it winds its way over the Rocky Mountains? From one perspective, the bus's path is determined by the driver, who adjusts the position of the steering wheel. From another perspective, the bus's path is determined by the highway itself, combined with the assumption that the driver does not wish to allow the bus to fall into a ditch. Returning to monetary policy, one might say that the short-term interest rate is determined by the vote of the Federal Open Market Committee (FOMC), or that it is determined by the fundamentals of the economy, *combined with the FOMC's preference that the inflation rate not stray very far from 2 percent.*

One is so used to thinking of central banks determining the interest rate that one can easily forget that until 1913, the Fed did not exist and the level of interest rates reflected economic fundamentals. Consider the following thought experiment. Before 1913, imagine the economy being affected by shocks A, B, and C. In each case, interest rates rose or fell as a result. Now imagine the same three shocks hitting an economy with a central bank. Assume the central bank moves its target interest rate in response to shocks A, B, and C in exactly the same way as interest rates moved in the previous (pre-1913) case. In the latter case, would it make more sense to describe those interest rate changes as being caused by the central bank or by shocks A, B, and C? The language of causality struggles with these subtleties.

In my view, debating whether the Fed controls interest rates is just as meaningless a question as disputing whether the path of the bus is determined by the layout of the road or by the steering decisions of the driver. Whether a variable is viewed as exogenous or endogenous is

simply a matter of *convenience*, not some sort of deep scientific question that can be resolved once and for all. For some purposes (e.g., day-to-day decision-making), thinking of the central bank as setting the interest rate makes sense. For other problems (e.g., the long-run path of interest rates under inflation targeting), thinking of macroeconomic fundamentals determining the interest rate makes sense. In that case, even a Fed-administered rate such as IOR cannot be viewed as a policy indicator; it too is largely endogenous in the medium to long run.

Unfortunately, the problem of interest rates has one additional layer of complexity, which cannot be compared by analogy with the bus journey. After all, when the bus driver turns the steering wheel, the road itself does not move. In contrast, monetary policy actions by the central bank actually change the fundamentals of the economy. As shown, an expansionary monetary policy can increase inflation, real income, or both, which then may lead to a situation in which an entirely different (and higher) interest rate is required to restore macroeconomic equilibrium. According to the language of Keynesian economics, a change in the policy interest rate can lead to a change in the natural interest rate.

Unfortunately, there is no single accepted definition of the natural interest rate, and indeed there is not even a single generally accepted term (both *equilibrium* and *neutral* are sometimes substituted for *natural*). When Knut Wicksell (1936) first popularized the concept, he had in mind a policy setting for the short-term interest rate that led to stable prices. Overall price stability is an arbitrary policy goal, however, and one could just as easily define a "natural rate of interest" as one that led to 2 percent inflation or one that led to 4 percent nominal GDP growth. The important point is that a change in monetary policy leads to movements in prices and output, which in turn change the natural rate of interest. Friedman and Schwartz (1971) showed that a tight money policy by the Fed during the early 1930s led to falling prices and output. This

economic slump contributed to a major decline in the natural rate of interest. Money got tighter even as the Fed's policy rate gradually declined (albeit too slowly).

So far, I have been revisiting perspectives that have already received extensive coverage in the literature. Thus, the following is by Milton Friedman (1997):

> Low interest rates are generally a sign that money has been tight, as in Japan; high interest rates, that money has been easy. . . .
>
> After the U.S. experience during the Great Depression, and after inflation and rising interest rates in the 1970s and disinflation and falling interest rates in the 1980s, I thought the fallacy of identifying tight money with high interest rates and easy money with low interest rates was dead. Apparently, old fallacies never die.

Friedman (1997) is saying that low rates are generally a sign that a previous tight money policy (which he would have defined as a reduction in the money growth rate) reduced the (nominal) natural rate of interest and that the central bank eventually accepts the inevitable and reduces the policy rate. However, notice that Friedman warns that this point is less well understood than he had assumed. In retrospect, his 1997 comments exposed a weak spot in mainstream economics. The failure to address that flaw over the next two decades eventually led to a split between Keynesians and NeoFisherians. Nevertheless, the NeoFisherians are not just saying that low rates mean money *has been* tight; they are saying that persistently reducing interest rates makes money tighter.

Friedman, the Keynesians, and the NeoFisherians have not provided a satisfactory account of the relationship between the stance of monetary policy and the nominal interest rate. Although Friedman's views are closest to my own, his "has been" phrasing is inadequate. Traditional monetarism lacks a satisfactory account of the relationship between interest rates and monetary policy in a world of efficient markets and rational expectations. In the remainder of this paper, I suggest an alternative framework for thinking about the relationship between money and interest rates.

4. Alternative Approaches to Monetary Policy

The Keynesian-NeoFisherian dispute is difficult to resolve using modern macroeconomic models that assume the interest rate is the instrument of monetary policy. This section examines alternative approaches to monetary policy using the money supply and exchange rates and then uses a simple exchange rate model to reframe the debate in a much clearer and more useful fashion. Just to be clear, these are thought experiments. I am not advocating that the Fed actually target the money supply or the nominal exchange rate. Nor am I relying on any controversial assumptions regarding the stability of money demand, velocity, or real exchange rates. Instead, I use a much weaker set of assumptions, that boosting the money supply or depreciating the currency is inflationary, ceteris paribus.

Perhaps the most famous alternative to the Keynesian approach is monetarism, where the *quantity of money* (defined in various ways) is used as either the instrument or the short-run target of monetary policy. In most such proposals, the monetary base is used as the policy instrument, because it is directly controlled by the central bank. Broader money aggregates such as M1 or M2 are short-run targets.[5] Contrast this with the pre-2008 regime, where open market operations adding and subtracting base money were the policy instrument used to target the fed funds rate.

Another heterodox approach relies on changes in the *price of money*. Indeed, some of the earliest examples of monetary policy involved the debasement of coinage. Thus, a monarch might change the definition of the unit of account from one pound of silver to one-half pound of silver, effectively doubling the price of silver in terms of money. President Franklin D. Roosevelt adopted an analogous policy during 1933–1934, when he gradually raised the dollar price of gold

[5] M1 includes cash held by the public and checking account balances. M2 includes M1 plus various types of savings account balances and money market mutual funds.

before adjusting the official definition of the dollar from 1/20.67 ounce of gold to 1/35.00 ounce of gold. The central bank of Singapore uses adjustments in the foreign exchange value of the Singapore dollar as its monetary instrument.[6]

Thus, one has at least three broad categories for thinking about the stance of monetary policy: changes in the quantity of money (M1, M2, etc.), changes in the price of money (exchange rates, etc.), and changes in the rental cost of base money (interest rates). The Keynesian-NeoFisherian dispute is much easier to understand if one chooses any monetary policy approach *other than interest rates*. I begin with the quantity-of-money approach, but later I argue that the price-of-money approach is the framing that most clearly distinguishes the two perspectives.

4.1. The Level and Growth Rate of the Money Supply

John Cochrane has been a leader in developing NeoFisherian ideas, and in 2016 Nick Rowe wrote a blog post responding to Cochrane. Rowe (2016) considered a thought experiment involving an increase in the rate of interest paid on money (*Rm*), which might be viewed as the interest rate paid on bank reserves:

> If the central bank announces that *Rm* increases by 1 percent, and at the same time announces that money growth increases by 1 percent, then we get NeoFisherian results. The inflation rate increases by 1 percent, but the opportunity cost of holding money is unchanged (the increased *Rm* and increased inflation cancel out), so there is no initial jump up or down in the price level.
>
> But if the central bank announces that *Rm* increases by 1 percent, and at the same time announces that money growth will not change, then we get an initial drop in the price level, because the opportunity cost of holding money has fallen so the demand for money has increased, but there is no subsequent change in the inflation rate.
>
> If we assumed prices are sticky rather than perfectly flexible, that initial drop in the price level would take a few years of deflation to work itself out.
>
> It's not enough to ask what happens if the central bank changes the deposit rate of interest. We must also ask what the central bank does with the money supply. And the

[6] One advantage of this approach is that there is no zero bound problem.

> New Keynesians (Neo-Wicksellians) are to blame by deleting that second question, by deleting money from their model.
>
> And by the way, my model is bog-standard IS-LM [investment/savings–liquidity preference/money supply], except that the central bank pays interest on money, and you can make the IS curve New Keynesian if you like, and add flexible prices or an expectations-augmented Phillips Curve.

This helps one understand an empirical fact that might otherwise be confusing. Today, people often talk about changes in the Fed's interest rate on excess reserves (IOER) as being equivalent to a change in market interest rates. When the Fed cut the IOER close to zero in 2020, market rates fell by a roughly similar amount. And yet in 1981, short-term market interest rates were about 15 percent while the IOER was zero. So the IOER is clearly not *necessarily* equivalent to the market interest rate.

Proponents of using interest rates as a policy indicator face a dilemma. If they put market interest rates into a VAR study, then they engage in the fallacy of reasoning from a price change. Market interest rates never change, *other things equal*. If they put IOER into a VAR study, then they are treating *the interest rate* as being 0 percent from 1980 to 2007. One might argue that IOER equals the market rate when the banking system is saturated with large quantities of reserves, but that approach leads to a deeper question: why are those vast excess reserves not inflationary, as in places such as Zimbabwe or Venezuela? Peter Ireland (2014, 1309) writes the following:

> In the long run, the additional degree of freedom provided by the ability to pay interest on reserves is best described as one that gives the Federal Reserve the ability to target the real quantity of reserves separately from the federal funds rate. Even when it pays interest on reserves, the Fed must continue to use open market operations to adjust the nominal quantity of reserves proportionally, following any policy action intended to bring about a long-run change in the aggregate price level.

Thus, although IOER can push the ratio of base money to GDP up from 5 percent to 50 percent or 100 percent, money remains neutral in the long run. As long as the real demand for

reserves is determinate, a permanent exogenous doubling of the monetary base will still lead to a doubling of the price level and nominal GDP in the long run.[7] Because this point is frequently misunderstood, consider the following from Ireland (2017, 10):

> Thus, while the Fed's newly-obtained ability to pay interest on reserves does allow it to tighten monetary policy by raising its federal funds rate target in the short run without any immediate open market operation, the long-run effects of this monetary policy tightening turn out to be the same with interest on reserves in figure 2 as they were in figure 1 without. From a monetarist perspective, the open market operation that leads to a contraction in the dollar volume of reserves supplied is still necessary for bringing about a permanent reduction in the price level.

For a zero rate of IOER to produce low market interest rates and a low rate of inflation, something else is needed. One possibility is that in 2020, a zero rate of IOER coincides with investors having confidence that the Fed will keep money growth at a level consistent with low interest rates and low inflation, whereas that was not true in 1981 when investors expected rapid money growth to lead to persistently high rates of inflation and high equilibrium market interest rates.

This point is easily missed because zero interest rates create a much larger demand for base money as a share of GDP. Thus at the zero bound, a large one-time increase in the monetary base, dubbed *quantitative easing* (QE), often coincides with a reduction in the longer-run expected rate of money growth. So low interest rates and low inflation expectations do not appear to be anchored with expectations of low rates of money growth. People see the previous fast growth in the money supply, not the falling expectations for future money growth. Monetarism looks irrelevant.

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[7] Ireland (2014, 1295) shows that it is not difficult to make reserve demand determinate: "Further, in both this model and Hornstein's, these extra mechanisms for ensuring determinacy could be eliminated if the monetary authority lowered the rate of interest it pays on reserves ever so slightly below the market rate; here, an arbitrarily small but still positive interest rate spread would work, through (37), in exactly the same way as the arbitrarily small but positive labor requirement measured by the parameter φ_v, to keep the demand for real reserves finite and well defined."

Nick Rowe (2016) is correct that the New Keynesian–NeoFisherian dispute can be more easily understood by bringing the money supply into the analysis. This framing allows one to distinguish between the effect of one-time changes in the money supply (or demand) on interest rates and the effect of permanent changes in the growth rate of the money supply.

At the same time, several factors suggest an even better way of resolving the Keynesian-NeoFisherian dispute—using exchange rates as an indicator or instrument of monetary policy. First, unlike with the money supply, exchange rate targeting has occurred in many times and places.[8] Second, one sees forward markets in exchange rates but no forward markets in the money supply. Third, the interest parity condition is more reliable than the Fisher effect. Finally, the recent importance of the zero lower bound makes it exceedingly difficult to see quantity theoretic relationships (i.e., money and price correlations), even when money still does affect prices, ceteris paribus. In contrast, the zero lower bound condition has little relevance for the purchasing power parity (PPP) relationship, which links changes in exchange rates and international inflation differentials.

For a more specific example of this final point, no one doubts that a tenfold increase in the yen price of dollars (say, from 105 yen to the dollar to 1,050 yen to the dollar) would be highly inflationary for Japan. However, some economists would be skeptical of a claim that a tenfold increase in the Japanese monetary base would be highly inflationary.[9] At the zero bound, real exchange rates are more stable than real money demand.

[8] Singapore's central bank uses the exchange rate as its monetary instrument.
[9] To be clear, I am not arguing that a tenfold increase in the Japanese base, *from the current level of roughly 100 percent of GDP*, would not be inflationary. Rather, one has seen that sort of increase in the past—at the zero bound—without much inflation in Japan.

4.2. Exchange Rates and Interest Rates

Interest rate differentials between two countries with open capital markets are closely related to differences in the expected rate of change in the exchange rate. If two open economies have a fixed exchange rate, such as Germany and Denmark, then one would expect nominal interest rates on risk-free bonds to be almost identical. In contrast, if the British pound is expected to depreciate at 2 percent a year against the euro, then risk-free interest rates should be roughly 2 percent higher in the United Kingdom than in Germany. This *interest parity condition* does not hold perfectly, because various frictions in the real world prevent costless financial arbitrage. However, it does hold much more precisely than PPP, indeed well enough to illustrate both sides of the Keynesian-NeoFisherian debate.

The Keynesian view of monetary policy and interest rates can be shown most effectively using the example of Dornbusch overshooting. Rudiger Dornbusch (1976) combined four off-the-shelf macroeconomic concepts to illustrate the link between monetary shocks, interest rates, and exchange rates:

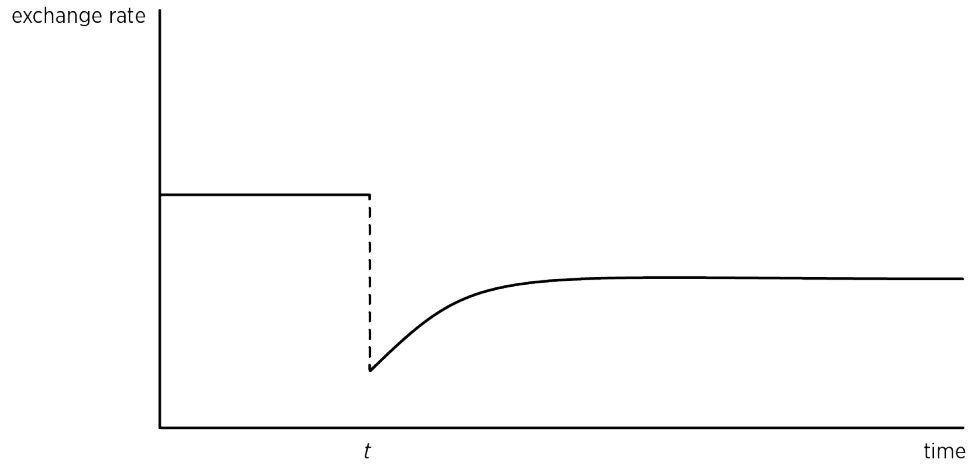
a) The quantity theory of money
b) PPP
c) The liquidity effect
d) The interest parity condition

The basic idea can be illustrated with a simple thought experiment involving a permanent and exogenous 10 percent increase in the money supply in a single country. According to the quantity theory (a), this increase would be expected to boost the domestic price level by 10 percent in the long run. According to PPP (b), an exogenous 10 percent price level increase would be expected to depreciate the exchange rate by 10 percent in the long run. According to

the liquidity effect (c), the monetary injection would be expected to lower nominal interest rates in the short run, but not the long run. Because the monetary injection has lowered nominal interest rates relative to the (unchanged) foreign interest rate, interest parity (d) suggests the exchange rate would be expected to appreciate going forward.

Figure 4 shows that if one combines these four assumptions, then the monetary shock must cause the exchange rate to immediately depreciate by more than 10 percent, overshooting its long-run equilibrium. After the initial depreciation, the exchange rate will be expected to gradually appreciate (because of interest parity), finishing 10 percent lower than before the exogenous monetary injection.

Figure 4. The Keynesian View of Monetary Stimulus and Exchange Rates



As noted earlier, this thought experiment illustrates the traditional Keynesian view that monetary stimulus reduces nominal interest rates. A NeoFisherian might rightly object that it

does not prove the Keynesian case because the liquidity effect is simply assumed, not shown to be true.

To understand the real value of this thought experiment, one needs to reframe the monetary shock from a money supply injection to a change in the expected path of exchange rates. Thus suppose that at $t = 0$, there is no announcement of an injection of new money into the economy. Instead, the central bank announces that it will immediately depreciate the currency by 18 percent and then gradually appreciate the currency by 1 percent a year for eight years. In the long run, the currency will depreciate by 10 percent relative to the initial equilibrium, just as in the Dornbusch overshooting thought experiment. What can one say about the effect of this monetary policy shock?

Now one can jettison the quantity theory of money and the liquidity effect. All one needs is the interest parity condition and PPP. According to PPP, this monetary shock is inflationary, in the sense that it is expected to boost the price level by 10 percent in the long run. And according to the interest parity condition, this monetary shock will reduce the nominal interest rate by 1 percent for a period of eight years.[10]

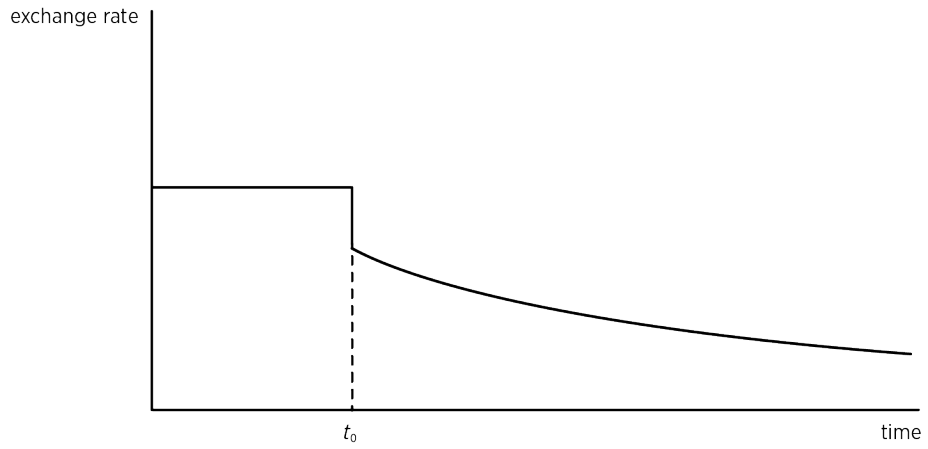
Of course a NeoFisherian might reject either PPP or the interest parity condition, but that would be an odd move. Both conditions are classical ideas, akin to the Fisher effect for interest rates. For instance, PPP becomes increasingly dominant as the inflation differential between two countries increases, because a larger inflation differential makes changes in the real exchange rate relatively less important. Similarly, the Fisher effect becomes increasingly important at higher inflation rates, because changes in the real interest rate become relatively less important.

[10] It is less clear that this policy shock would be inflationary in the short run. The overall price level might instantly rise by 18 percent and then gradually lose 8 percent of that increase over eight years. But I believe it would be inflationary even in the short run, because of sticky prices.

A more plausible NeoFisherian rebuttal would be that this thought experiment is a theoretical curiosity, but that in the real world higher inflation is generally associated with higher nominal interest rates. Central banks do not generally announce the sort of target path for exchange rates that is seen in figure 4. For now, simply recognize that some feasible monetary shocks simultaneously raise the expected future price level and lower the domestic nominal interest rate.

Figure 5 shows that a NeoFisherian outcome can be illustrated by assuming a monetary shock that causes the exchange rate to depreciate at a point in time and also be expected to depreciate even further over time.

Figure 5. The NeoFisherian View of Monetary Stimulus and Exchange Rates



With the expected depreciation of the exchange rate, the price level will be expected to rise over time (owing to PPP). Because of the expected future depreciation of the currency, the nominal interest rate will also rise (owing to interest parity). A Keynesian might argue that

although this situation is possible, in most cases it is merely a theoretical curiosity—with real-world applications only in extreme cases such as Latin American–style hyperinflation. After all, this shows a monetary shock that causes both higher interest rates and a weaker currency.

Nonetheless, at least one prominent Keynesian economist took this hypothetical case very seriously, albeit at a point in time when the NeoFisherian model had not yet been created. Lars Svensson (2001, 297) discusses one implication of his "foolproof" method for Japan to escape from the zero lower bound trap:

> (1) It is technically feasible for the central bank to devalue the currency and peg the exchange rate at a level corresponding to an initial real depreciation of the domestic currency relative to the steady state. (2) If the central bank demonstrates that it both can and wants to hold the peg, the peg will be credible. That is, the private sector will expect the peg to hold in the future. (3) When the peg is credible, the central bank has to raise the short nominal interest rate above the zero bound to a level corresponding to uncovered interest rate parity. Thus, the economy is formally out of the liquidity trap. In spite of the rise of the nominal interest rate, the long real rate falls, as we shall see.

Here Svensson is merely calling for Japan to depreciate and then peg the yen, not depreciate and then further depreciate the yen. However, this approach amounts to the same general idea because Japanese interest rates have been lower than American interest rates for most of the past few decades, indicating expectations of further yen appreciation. Thus, merely pegging the yen to the dollar would immediately raise Japanese interest rates and eventually bring Japanese inflation closer to US rates; outright yen depreciation is not necessary to achieve exit from the liquidity trap.

Svensson (2001, 297) uses the phrase "in spite of" in the final sentence, which is an indication of his Keynesian perspective. He is reassuring his readers that the policy is inflationary in spite of the higher nominal interest rates. By implication, this pattern is not normal.

In contrast, NeoFisherians would say the higher nominal rates are exactly what one would expect from an inflationary monetary shock. They might note that Svensson specifically

cited this as a “foolproof” reflation tool. Svensson has shown that *highly effective* monetary policies (expansionary or contractionary) are likely to be NeoFisherian in nature. This is an important point to which I return in section 6 on policy.

4.3. Empirical Evidence

The correlation between interest rates and the stance of monetary policy is ambiguous. One can draw up a path for the exchange rate where lower nominal interest rates are associated with either an inflationary or a disinflationary monetary policy. But which pattern is more likely?

The traditional answer focuses on the distinction between short- and long-run effects. Thus, an expansionary monetary policy may depress interest rates in the short run (liquidity effect) and then raise them higher in the long run (income and Fisher effects). This is the traditional monetarist view.

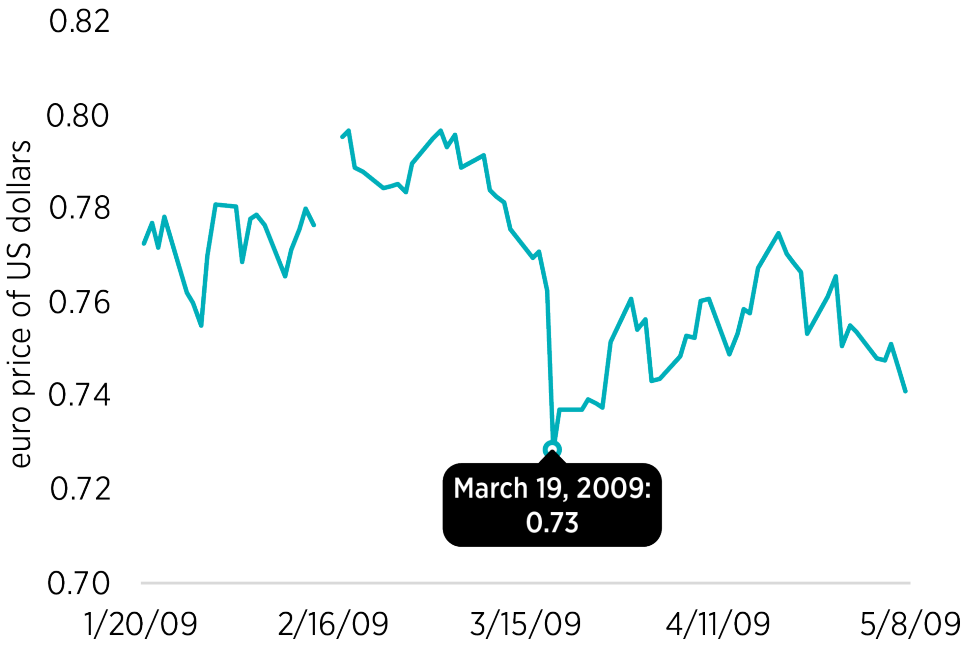
As the previous hypothetical examples demonstrate, however, that distinction is not enough. Even in the short run, an expansionary monetary policy may depress or increase interest rates, depending on the expected path for the exchange rate. Although a comprehensive empirical investigation of this issue is beyond the scope of this paper, a recent study by Martín Uribe (2020, 1) suggests that the NeoFisherian result is not uncommon, even in the short run:

> The paper then estimates a standard new-Keynesian model driven by permanent and stationary but persistent inflation-target shocks as well as a battery of other conventional monetary and real disturbances. It finds that 50 percent of the variance of inflation changes is accounted for by monetary shocks that induce positive short-run comovement in the interest rate and inflation.

Thus, it may be useful to provide real-world examples of both Keynesian and NeoFisherian policy shocks to illustrate the two cases.

On March 18, 2009, the Fed announced its first major QE program, promising to purchase $1.15 trillion in Treasury securities and mortgage-backed securities. This announcement was followed by a sharp increase in the price of Treasury bonds and a decline in bond yields.[11] Figure 6 shows that following the announcement, the dollar fell more than 4.5 percent against the euro,[12] an unusually large daily move.

Figure 6. The Euro Price of US Dollars



Source: Federal Reserve Economic Data, "U.S. / Euro Foreign Exchange Rate" (dataset), accessed November 12, 2020, https://fred.stlouisfed.org/series/DEXUSEU.

Other asset prices such as US equities and gold increased sharply (Andrews 2009). Overall, these initial reactions look almost exactly like those one would expect from the Dornbusch overshooting model. The announcement of a large increase in the money supply boosted inflation expectations and reduced nominal interest rates. The spot exchange rate of the

[11] One-year Treasury bill yields fell by roughly 11 basis points right after the policy was announced.
[12] This decrease occurred from noon EST on March 18, 2009, to noon EST on the following day.

dollar fell more sharply than the forward exchange rate. Thus, the dollar's forward premium actually increased as interest rates fell.

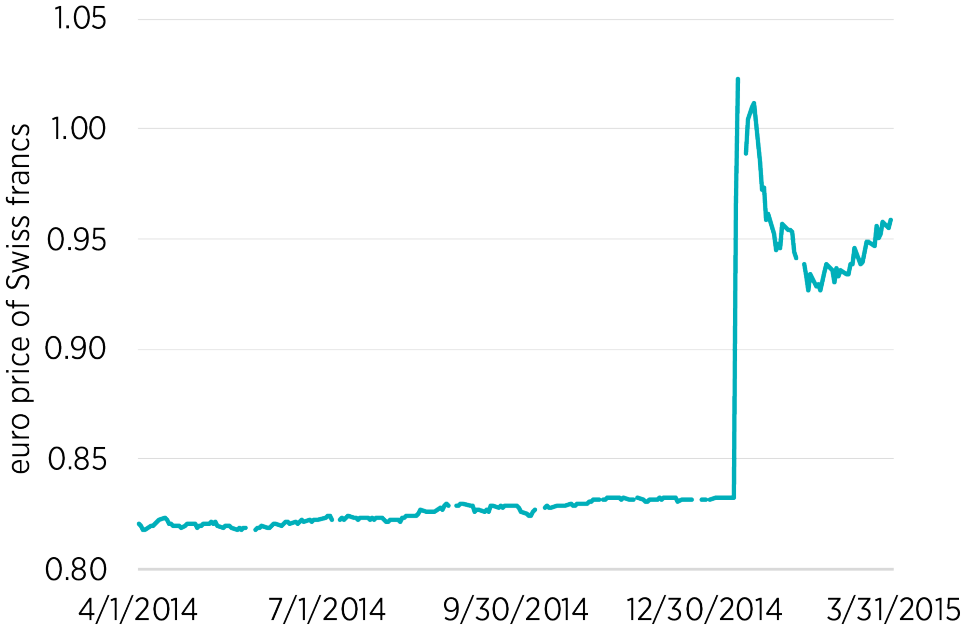
A very different sort of monetary shock occurred in Switzerland in 2015, although as with the US QE program, it had the effect of depressing nominal interest rates. Figure 7 shows that before January 2015, the Swiss franc had been pegged to the euro at a fairly stable exchange rate. On January 15, 2015, the Swiss National Bank (SNB) surprised markets with a dramatic revaluation of the franc, which spiked more than 20 percent higher before settling in with a roughly 15 percent appreciation against the euro.[13]

The SNB was under the mistaken impression that this revaluation would reduce speculative pressure on the Swiss franc. Instead, the appetite for francs increased even more, because the franc was perceived as a currency that was likely to gradually appreciate over time.

On the day of the revaluation, the SNB also cut its short-term policy rate to −0.75 percent, and yields on Swiss bonds also fell sharply. The forward exchange rate for Swiss francs appreciated even more than the spot rate, which is an implication of the interest parity condition during a period of falling Swiss interest rates. Swiss equity prices fell sharply, as did the price of gold measured in Swiss francs. Thus, all the major asset markets were suggesting that investors saw the policy move as disinflationary, *despite* the sharp fall in nominal interest rates.

[13] Contrary to widespread opinion, the Swiss franc appreciation was not inevitable. At the time, the Danish krone was also under speculative pressure. But Denmark refused to break the euro peg, and the speculation then subsided. Also note that figure 7 shows the dollar and franc exchange rate. The euro and franc exchange rate would have been flat before January 2015.

Figure 7. The Euro Price of Swiss Francs



Source: Federal Reserve Economic Data, "Switzerland / U.S. Foreign Exchange Rate" and "U.S. / Euro Foreign Exchange Rate" (datasets), accessed November 12, 2020, https://fred.stlouisfed.org/series/DEXSZUS and https://fred.stlouisfed.org/series/DEXUSEU.

The Swiss policy shock was essentially identical to Svensson's (2001) proposed "foolproof" method for escaping from a liquidity trap, except in the opposite direction. In Svensson's model, Japan could escape the zero bound by sharply depreciating its currency and then stabilizing it or, better yet, promising further depreciation. As shown earlier, this sort of expansionary monetary policy would actually raise Japanese interest rates. The Swiss sharply appreciated their currency and implicitly signaled further appreciation ahead by simultaneously depressing interest rates even further below the level in the United States. One might call this a foolproof method for *staying in a liquidity trap*.

The Fed's QE1 announcement was an inflationary low-interest-rate policy (Keynesian), whereas the Swiss franc appreciation was a disinflationary low-interest-rate policy (NeoFisherian). So what determines which result holds in any given case? Ultimately, there is no

easy answer to this question. One possibility is that the immediate response to monetary shocks tends to be Keynesian when the nominal interest rate is the primary policy instrument (i.e., signal) and NeoFisherian when interest rate changes are subservient to exchange rate changes (or some other policy signal).[14]

Consider an emerging-market central bank that is forced to break an exchange rate peg and then very sharply devalue its currency. That action is clearly inflationary, and it is often accompanied by a sharp increase in the central bank's target interest rate—signaling even more depreciation ahead. That would be a NeoFisherian policy mix and one where the change in the interest rate would take a backseat to the change in the exchange rate.

At this point, some economists might be inclined to fall back on a ceteris paribus argument, claiming that lower interest rates continue to be expansionary, other things equal. That would be a mistake, just as it makes no sense to claim that lower oil prices cause higher consumption (or lower production), other things equal. Recall that the change in equilibrium quantity depends on what causes the lower oil prices. Similarly, low interest rates caused by a tight money policy are disinflationary, whereas low interest rates caused by an easy money policy are inflationary. Market interest rates *never change for no reason at all*; there is always a causal factor or combination of factors, and one must consider how those factors affect inflation expectations.[15]

5. Level Shifts versus Growth Rate Changes

To gain a deeper understanding of the difference between Keynesian and NeoFisherian policy shocks, one needs to consider monetary policy in two dimensions—level shifts and growth rate

[14] Sumner (2015) shows that policy seemed to become NeoFisherian during a brief period in November 1933, when President Roosevelt began using higher gold prices as an instrument of monetary policy.
[15] Unlike market interest rates, IOER can be viewed as an exogenous policy instrument. However, IOER need not equal the market interest rates, as seen before 2008.

changes. In section 4 of this paper, that distinction applied to exchange rates. A central bank can change the spot exchange rate and also change the expected future path of exchange rates. More important, those changes may or may not be in the same direction.

Economists are used to thinking about monetary policy shocks in unidimensional terms—more or less expansionary. However, if policy has two dimensions—level shifts and growth rate changes—then policy shocks can be expansionary in one dimension and contractionary in another. Thus in the Dornbusch overshooting model, an increase in the money supply causes an immediate depreciation in the spot exchange rate (expansionary) and an expected appreciation in the future exchange rate (contractionary). This distinction is especially important in modern macroeconomic models where aggregate demand is much more powerfully affected by changes in the expected future path of the policy instrument than by changes in the current setting of the policy instrument (see Eggertsson and Woodford 2003).

In 1998, Paul Krugman developed a model of the zero lower bound that emphasized the role of policy expectations. Krugman (1998) pointed out that traditional models of liquidity traps ignored the role of expectations. Even at the zero bound, a large increase in the money supply should be inflationary, because it would push prices higher once nominal interest rates were no longer holding fast at zero. The expectation of higher future inflation should depress the current level of real interest rates (if one assumes nominal rates are holding fast at zero). Thus, monetary injections should continue to be expansionary even at the zero bound, indeed even when base money is (temporarily) a perfect substitute for Treasury bills. Additionally, even if nominal interest rates were to immediately rise for NeoFisherian reasons, the monetary injection would continue to be expansionary owing to the boost that higher nominal interest rates would give to base money velocity.

Krugman argued that the real problem is not a liquidity trap, but rather what might be called an *expectations trap*. Central bank injections of new money will not be inflationary if they are not expected to be permanent, but conservative central bankers will be reluctant to allow inflation once the economy has exited the liquidity trap. Because the removal of excess cash balances can prevent higher inflation once rates are positive, the public will expect the monetary injections to be only temporary. Central banks can break out of this expectations trap only if they can credibly promise to be irresponsible, that is, promise to allow higher inflation after exiting the zero bound for interest rates.[16]

Central banks can also *sterilize* monetary injections with the payment of interest on bank reserves, and this approach has the same effect as making monetary injections temporary. Thus for a conservative central bank, the injection of zero-interest *high-powered money* at the zero bound is often ineffective owing to the fact that it is expected to be temporary. The money will later be withdrawn, or it will begin to earn interest and thus no longer represent high-powered money. Only *permanent* injections of zero-interest high-powered money (currency or zero-interest bank reserves) are reliably inflationary.

In summary, a monetary shock in Krugman's expectations trap model has two dimensions—a change in the current money supply and a change in the expected future money supply. Policy is reliably inflationary only when both dimensions of policy are expansionary.

Interest rates are especially poorly suited to measure the stance of monetary policy because they pick up only one of the two dimensions of policy changes. The monetary stimulus shown in the Fed's 2009 QE program (figure 6) and the monetary contraction in the 2015 Swiss policy

[16] Krugman later seemed to regret using the phrase "promise to be irresponsible," because central bankers are not known for being attracted to irresponsible policies. Furthermore, the sort of *level targeting* regime that can overcome an expectations trap might actually be regarded as quite responsible when viewed from a social welfare perspective.

shock (figure 7) had the same qualitative effect on nominal interest rates, which fell immediately in both cases. That effect occurred because both the monetary stimulus and the monetary contraction led to expectations of future currency appreciation. However, one policy was effectively expansionary while the other was contractionary, a difference immediately apparent when one looks at exchange rate data. The problem is that although changes in interest rates indicate something about changes in the expected rate of appreciation in a currency, they do not indicate anything about level shifts—changes in the level of the spot and forward exchange rates.

Much of modern macroeconomics formed in a world where the distinction between level and growth rate shifts was difficult to perceive. Keynes was famously dismissive of the Fisher effect, viewing it as a theoretical curiosity outside a few extreme cases of hyperinflation. Until 1968, however, growth rate shifts were greatly restricted by the long-run link between currencies and gold. By the 1970s, in contrast, economists had begun to distinguish between level and growth rate shifts. In 1975, Friedman (1975, 177) noted the following:

> As I see it, we have advanced beyond Hume in two respects only; first, we now have a more secure grasp of the quantitative magnitudes involved; second, we have gone one derivative beyond Hume.

For instance, the nominal price of gold in the United States was $20.67 an ounce between 1879 and 1933, and then $35.00 an ounce between 1934 and 1968. During periods when the price of gold was fixed, there were frequent changes in the level of prices owing to factors such as one-time shifts in gold supply and demand. However, Barsky (1987) showed that expected inflation rates were usually close to zero before World War I, because both the long-run price level was relatively flat under a commodity price peg and actual price level changes were approximately a random walk.

Interestingly, a period of gradual dollar depreciation occurred between 1933 and 1934. For most of this 10-month period, markets viewed gold price changes as a one-time adjustment in levels, not a change in the expected growth rate of gold prices. An exception occurred during November 1933, however, when President Roosevelt began intentionally raising gold prices by a small amount almost every day. For a brief period, bond yields actually rose on expansionary monetary policy news (higher gold prices). This brief NeoFisherian period was viewed as highly unusual by bond traders who had spent their entire life working in a financial system anchored by a gold price pegged at $20.67 an ounce. Of course, the Fisher effect came back with a vengeance beginning in the late 1960s, as the last links with gold were dismantled.[17]

NeoFisherian outcomes are most apparent when one looks at changes in long-run growth rates of the exchange rate or the money supply. The link of interest rates with exchange rates is tighter, because the interest parity condition holds relatively well. The link between interest rates and the money growth rate is much weaker, because it relies on two relatively loose relationships—the quantity theory and the Fisher effect. Nonetheless, given a sufficiently large and persistent increase in the expected long-run growth rate of the money supply, nominal interest rates will rise together with money growth, as occurred in the 1960s and 1970s. Therefore, a Keynesian result (low interest rates being inflationary) requires a scenario where the level shift dominates the growth rate shift, as in Dornbusch overshooting, which involves a one-time change in the money supply but no long-run growth rate shift.

It is easier to dispense with interest rates when describing the changes in the stance of monetary policy and to replace them with a vector of both level shifts and growth rate shifts. Thus, the January 2015 Swiss monetary shock could be described as a 15 percent increase in the

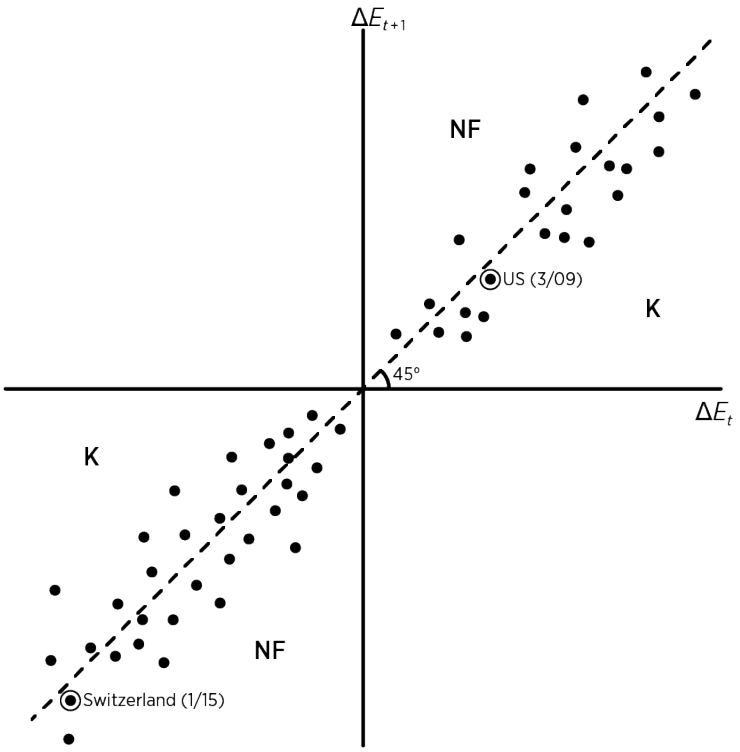
[17] The end of the gold standard is often wrongly dated as August 1971, when the dollar was officially devalued. However, the peg had been unofficially abandoned in March 1968, when the free market price of gold was allowed to rise above $35 an ounce.

level of the franc and a simultaneous 0.25 percent increase in the expected growth rate of the franc (reflecting a roughly 25-basis-point decline in Swiss interest rates). The March 2009 Fed QE program could be described as a 4.50 percent *decrease* in the level of the US dollar and an 11-basis-point increase in the expected growth rate of the dollar, because the one-year bond yield fell by 11 basis points.

This multivariate approach to policy shocks can illustrate monetary policy shifts much more effectively than a simple discussion about a 25-basis-point reduction in a central bank's target interest rate. Alternatively, monetarists could describe monetary policy shocks in terms of both a shift in the current money supply and a shift in the expected future path of the money supply.

Perhaps the best way to see how interest rates can be a misleading policy indicator is to look at the effect of monetary shocks on spot and forward exchange rates, which implicitly picks up the change in the expected forward premium (roughly the expected change in the exchange rate). Figure 8 illustrates various possible monetary shocks. E_t represents the spot price of foreign currency. Thus if E_t increases, then the domestic currency depreciates, and if E_t decreases, then the domestic currency appreciates. In figure 8, the vertical axis shows the change in the one-year forward exchange rate (E_t+1), while the horizontal axis shows the change in the spot exchange rate (E_t). Each point represents the response of foreign exchange markets to a monetary policy announcement.

Figure 8. Relationship Between Changes in Spot and Forward Exchange Rates



Note: K indicates Keynesian. NF indicates NeoFisherian.

The scattered points in the upper right quadrant represent (hypothetical) expansionary monetary shocks, which cause the currency to depreciate in both the spot and the forward markets, that is, *E* increases. Figure 8 provides a specific example showing the market reaction to the US announcement of QE1 on March 18, 2009. The points in the lower left quadrant represent (hypothetical) contractionary monetary shocks, and the Swiss decision to let the franc appreciate in January 2015 represents a specific example.

If the spot rate moves by more than the forward rate, as in the March 2009 US example, then nominal interest rates will fall with expansionary policy and rise with contractionary policy.

If the spot rate moves by less than the forward rate, as in the January 2015 Swiss example, then nominal interest rates will rise with expansionary policy and fall with contractionary policy.

The 45-degree line allows one to see whether the spot or the forward exchange rate responds more strongly to the monetary shock. Is it important whether points lie slightly above or slightly below the 45-degree line? It is difficult to see why. However, that slight distinction determines whether the policy shock ultimately is Keynesian (K), with lower interest rates accompanying easier money, or NeoFisherian (NF), with lower interest rates accompanying tighter money.

Notice that the effect of policy on exchange rates (and presumably inflation) does not primarily depend on whether interest rates rise or fall; it depends on whether spot and forward exchange rates rise or fall. When one thinks about the effect of policy on inflation, it does not matter much whether one is slightly above or below the dotted line; it matters whether one is in the upper right quadrant or the lower left quadrant.

6. Problems with Using Interest Rates as a Policy Indicator

Misconceptions about the relationship between interest rates and monetary policy have had negative consequences for monetary policy. In this section, I first examine a few important historical examples showing the consequences of misdiagnosing the stance of monetary policy. Then I consider the implications of this analysis for policy going forward, particularly at the zero lower bound on nominal interest rates.

6.1. Historical Policy Failures

Friedman and Schwartz's (1971) *A Monetary History of the United States, 1867–1960* might be the most influential treatise on economic history ever published. Their core argument is that the stance of monetary policy is often misidentified. Although the Fed cut interest rates sharply between 1929 and 1932, monetary policy actually became much tighter, and this contributed to a period of sharp deflation.

Because monetary policy was widely seen as being expansionary during the early 1930s, not many people blamed the Fed policy for the deep depression. Thus, there is a sense that widespread misjudgments of the stance of monetary policy may have contributed to the policy failure that caused the deflation of 1929–1933.

This critique has since been accepted by many nonmonetarists, including Ben Bernanke and Frederic Mishkin (see Bernanke 2003; Mishkin 2007), although they did not accept the specific Friedman and Schwartz (1971) claim that movements in the broader monetary aggregates were the best way to identify the stance of monetary policy. Unfortunately, no alternative policy indicator has been widely accepted by the economics profession. Given that lack of consensus, many economists fall back on using interest rate changes as a proxy for monetary policy changes, especially during periods where inflation expectations are fairly low.

In the 1960s and 1970s, the Fed gradually raised its target interest rate, eventually reaching double-digit levels. Once again, monetarists like Friedman suggested that interest rate increases were not a reliable policy tool or indicator and that the Fed needed to slow growth in the money supply. During 1979–1982, money supply targeting did help slow inflation, but instability in the velocity of circulation eventually led to dissatisfaction with money supply targeting.

In 1999, Bernanke argued that the Bank of Japan had made essentially the same mistake as the Fed made in the early 1930s, when it assumed that low interest rates implied easy money. Bernanke (1999, 25) argued that the Bank of Japan needed to show "Rooseveltian resolve," a reference to President Roosevelt's bold decision to devalue the dollar in 1933. Once again, a major monetary policy error resulted (in part) from excessive focus on nominal interest rates as an indicator of the stance of monetary policy. Elsewhere, Bernanke (2003) pointed out that even real interest rates are not a reliable monetary policy indicator.

Sumner and Erdmann (2020) argue that the recession of 2008–2009 was worsened by a series of Fed policy errors, partly reflecting a mistaken assumption that falling interest rates during 2007–2008 had eased monetary policy. In fact, policy was effectively becoming tighter all through 2007, 2008, and early 2009. Cúrdia (2015) shows that during this period, the natural interest rate was declining even more rapidly than the policy rate. This is known because both inflation and nominal GDP growth were below the Fed's implicit policy goal in 2009. Below-target inflation occurs when policy interest rates are set above the natural rate.

Frederic Mishkin (2007) is author of the foremost monetary economics textbook, which warns students that low interest rates do not represent easy money. Mishkin also served on the Federal Reserve Board until August 2008. In his final FOMC meeting, Mishkin (2008, 121–22) warned his fellow committee members not to rely on the assumption that low interest rates represent easy money:

> First of all, let me talk about the issue of focusing too much on the federal funds rate as indicating the stance of monetary policy. This is something that's very dear to my heart. I have a chapter in my textbook that deals with this whole issue and talks about the very deep mistakes that have been made in monetary policy because of exactly that focus on the short-term interest rate as indicating the stance of monetary policy. In particular, when you think about the stance of monetary policy, you should look at all asset prices, which means look at all interest rates. All asset prices have a very important effect on aggregate demand. Also you should look at credit market conditions because some things

> are actually not reflected in market prices but are still very important. If you don't do that, you can make horrendous mistakes. The Great Depression is a classic example of when they made two mistakes in looking at the policy interest rate. One is that they didn't understand the difference between real and nominal interest rates. That mistake I'm not worried about here. People fully understand that. But it is an example when nominal rates went down, but only on default-free Treasury securities; in fact, they skyrocketed on other ones. The stance of monetary policy was incredibly tight during the Great Depression, and we had a disaster. The Japanese made the same mistake, and I just very much hope that this Committee does not make this mistake because I have to tell you that the situation is scary to me.

Mishkin's warning proved prescient. The very next month, Lehman Brothers failed. In an FOMC meeting two days after Lehman failed, the committee decided not to cut interest rates, which were then targeted at 2 percent. In his memoir, Ben Bernanke (2015) acknowledged that the Fed had erred in not easing policy after Lehman failed.

Even today, however, many economists continue to believe the Fed did all it could to prevent a steep fall in aggregate demand during 2008–2009, even though it clearly did not even do all it could *in conventional monetary policy* (i.e., cutting rates). Of course, there are almost no technical limits to unconventional policies such as printing money to buy financial assets. The Fed policy was far too tight during 2008.

Perhaps the relatively low level of interest rates lulled economists into assuming that monetary policy was expansionary, exactly the same error that many economists made during the early 1930s. In fairness, however, the Fed did not do as poorly as the European Central Bank, which did not cut rates to zero until 2013, and as a result, the eurozone suffered a far more severe recession.

One recurring pattern is that the policy rate often changes more slowly than the (nominal) natural interest rate. When nominal interest rates rise, as in the 1960s and 1970s, the natural interest rate often rises even more rapidly. This rapid rise can be inferred from the fact that inflation rates rose sharply during the Great Inflation (1966–1981) to levels far above those

preferred by policymakers. This circumstance means that periods of rising interest rates are often (not always) associated with inflationary monetary policies. Money looks tight to those who focus on interest rates as a policy indicator, but policy is actually expansionary. Conversely, periods when the policy rate is falling, such as the early 1930s and 2008 in the United States or the 1990s in Japan, are often associated with disinflationary monetary policy because the policy rate tends to fall more slowly than the natural rate of interest.

Another recurring pattern is that central banks seem to struggle more with policy when inflation and interest rates are either unusually low or unusually high. In one sense, that is almost a tautology, because unusually low or high inflation rates are generally viewed as policy errors. Nonetheless, the literature shows there is an increased sense that policy is impotent during these periods. During periods of high inflation such as the late 1960s and 1970s, there was pessimism as to whether tight money could solve the problem.

This pessimism is even more pronounced during periods of deflation, when monetary policy is often viewed as ineffective. Because the focus on interest rates frequently leads to a misdiagnosis of the stance of policy, many pundits wrongly assume that central banks are lacking effective tools at zero interest rates. That mistaken assumption is much less likely to occur when a central bank is targeting the exchange rate, for which there is no zero lower bound.

Unfortunately, exchange rates are probably not a feasible policy instrument for a major economy such as the United States. So what does this analysis of the Keynesian-NeoFisherian dispute indicate about the most effective policy tools for a central bank like the Fed, European Central Bank, or Bank of Japan?

6.2. Policy Implications

The most important policy implication of the Keynesian-NeoFisherian debate occurs at the zero lower bound for interest rates. During normal times, that is, when interest rates are well above zero, central banks seem to have little trouble keeping inflation near the 2 percent target. Unfortunately, zero lower bound episodes are becoming increasingly frequent, and financial futures markets suggest that low interest rates may become the new normal. How should central banks conduct monetary policy in an environment of low interest rates?

There are a number of policy options that are beyond the scope of this paper, including the use of negative interest rates and the raising of the inflation target from 2 percent to 4 percent. Both of these options are viewed as highly controversial within the Fed. Instead, the Fed intends to double down on interest rate targeting, supplemented with QE programs that are aimed at depressing longer-term bond yields.

In some Keynesian models, one of the most promising policies at the zero lower bound is *forward guidance*. Thus, the Fed could promise to keep interest rates near zero for a specified period of time or until a specific macroeconomic objective is achieved. This approach recognizes that what matters most is not the current stance of monetary policy but rather the expected path of policy over time.

Unfortunately, just as the current interest rate is an ambiguous indicator of the stance of monetary policy, forward guidance as to the future path of interest rates can be interpreted in multiple ways. Would a promise to hold the fed funds rate at zero for 20 years be interpreted by markets as highly expansionary or as a promise to adopt a Japanese-style monetary regime of near-zero nominal GDP growth? As discussed earlier, very low rates are consistent with

both expansionary and contractionary policy. So how might the central bank signal *expansionary intent*?

In Svensson's (2001) proposal for a foolproof escape from a liquidity trap, the zero lower bound constraint was overcome by targeting exchange rates, and there is good reason to believe that exchange rate targeting can be a powerful tool. When President Roosevelt raised the price of gold from $20.67 an ounce to $35.00 an ounce in 1934, the expected future price level likely rose significantly as a result, because the real value of gold in the long run is linked to the marginal cost of production (see Barro 1979), and thus a higher nominal gold price implies a somewhat higher price level in the long run.[18]

Before the devaluation of the dollar, the Fed had cut interest rates close to zero and also engaged in QE (during the spring of 1932). These policies did not lead to a robust recovery. In contrast, the dollar devaluation of 1933–1934 led to substantial inflation, despite 25 percent unemployment, and rapid growth in industrial production. This result supports the view that exchange rate–oriented policies are more stimulative than policies of lower interest rates, at least in a deflationary slump.

Unfortunately, President Roosevelt's policy would not work today. An increase in gold prices would no longer be viewed as a credible indicator of monetary stimulus, because no one would expect the Fed to maintain the new and higher price for decades (as they did after 1934). In addition, exchange rate manipulation by a country as large as the United States would not be acceptable to its trading partners (and vice versa.)

To achieve the same effect as the 1933–1934 dollar devaluation, a modern central bank would have to go beyond targeting a single price and instead target the overall price level. Thus,

[18] See Eggertsson (2008). The link between gold prices and goods prices was weakened by the prohibition on Americans owning gold, but not eliminated. An international gold market remained, so $35 actually was the free market price of gold for many decades after 1934.

Woodford (2012) suggested that forward guidance for interest rates should be linked to a target path for the price level, or better yet for the level of nominal GDP (which better reflects the Fed's dual mandate).[19] When the price level falls below the target path, expectations of faster future inflation have the effect of lowering the real interest rate on longer-term bonds. This effect pins down the long-run average rate of inflation and thus allows market participants to discriminate between a contractionary (NeoFisherian) low-interest-rate policy and an expansionary (Keynesian) low-interest-rate policy. The Fed's recent decision to adopt *average inflation targeting* is a modest, albeit inadequate, step in this direction.

In a sense, the current focus on interest rates as an instrument and indicator of policy reflects a *missing market*. With regard to a simple price-level target for an actively traded commodity, such as a gold exchange standard, interest rate targeting is redundant. There is no difference between doing enough open market purchases and sales to keep gold prices at $35 an ounce and doing enough open market purchases and sales to keep interest rates at a level that will push gold prices to $35 an ounce. Interest rates become a sort of fifth wheel when the central bank can directly target gold prices, or indeed any flexible asset price. The problem, of course, is that keeping gold at $35 an ounce does not necessarily achieve the broader goals of the Fed's dual mandate. In addition, the Fed cannot directly peg the overall Consumer Price Index (CPI), which includes prices that are both sticky and measured with a significant lag.

In principle, open market operations could be used to peg a CPI *futures* contract price in much the same way as gold prices were pegged before 1968. There would be no need to worry about the ambiguity of a target interest rate path. However, if such a CPI futures market does not exist or is not liquid enough to be viewed as an unbiased estimate of the future price level, then

[19] Beckworth (2017) shows how nominal GDP level targeting is a way to overcome the problem that temporary currency injections are ineffective.

central banks may fall back on a policy that involves interest rate targeting guided by complex and sometimes unreliable macroeconomic models.

Nonetheless, the insights derived by considering a price-level futures market are useful for thinking about monetary policy at the zero lower bound. Svensson (2003) argued that central banks should engage in "forecast targeting," which means setting policy at a position where the central bank forecast of the goal variable (consumer prices, or nominal GDP growth) is equal to the target growth rate. Richard Clarida (2020, 13), the Fed vice chairman, recently suggested that when forecasting inflation, he puts weight on both the forecasts of economists and the implied inflation forecasts in asset markets:

> Market- and survey-based estimates of expected inflation are correlated, but, again, when there is a divergence between the two, I place at least as much weight on the survey evidence as on the market-derived estimates.

If one combines Svensson's general approach with Clarida's specific forecasting technique, then one can see how monetary policy might move beyond interest rate targeting. Consider a composite inflation forecast that includes both nonmarket and market components. The Fed could update this inflation forecast every time asset prices changed (in other words, many times each day). Even though the nonmarket forecast of inflation changes infrequently, any composite forecast including asset prices would react continually in real time to policy innovations. In principle, targeting an optimal forecast of inflation one or two years in the future is little different from targeting an exchange rate or the price of gold.

The Fed could instruct its open market desk to engage in sufficient open market purchases and sales to essentially peg the inflation forecast at a position equal to the policy target. Thus, suppose the inflation forecast based on non-real-time data (consensus forecast of private economists plus the Fed's macro models) predicts 2.2 percent inflation during the current

month. That forecast might be given a 50 percent weight in the Fed's forecast of inflation. In that case, the Fed would engage in open market operations with the goal of producing an asset market forecast of 1.8 percent inflation, so that the overall inflation forecast was 2 percent.

This approach does not necessarily require a 1.8 percent Treasury inflation-protected securities (TIPS) spread, partly because (a) TIPS are adjusted according to CPI inflation, whereas the Fed targets personal consumption expenditure inflation, and (b) the Fed may have *some* ability to estimate a risk or liquidity premium that biases the TIPS spread away from the actual market forecast of inflation. In other words, although one could imagine asset prices being used to create a completely *rules-based model*, strictly speaking this approach is equally compatible with a fair degree of policy discretion. The point is to remove the need for Taylor Rule–type models from policymaking, because interest rate targeting tends to be especially unreliable during periods of near-zero interest rates or an unstable natural interest rate.

Thus, the ultimate goal should be to remove interest rates entirely from the policymaking process. To do that, one needs to develop a flexible price target that is highly correlated with the optimal forecast of the goal variable (inflation or nominal GDP). If such a price forecast can be created, then open market operations can directly target asset prices, rather than indirectly influence inflation expectations by manipulating interest rates according to a macroeconomic model (Sumner 2016).

Even without an efficient asset market to guide monetary policy, it is important to avoid ambiguous forward guidance of the future path of interest rates. At the zero bound, central banks should commit to doing whatever amount of asset purchases is necessary (perhaps combined with negative IOER) to reach the price level (or nominal GDP level) target path over time. A

vague promise to keep interest rates near zero indefinitely is equally consistent with Japanese-style stagnation. It is not enough.

The Fed should also consider eliminating (or at least reducing) the payment of interest on bank reserves. Although Ireland (2014) showed that the price level could be controlled via open market operations even in a regime with IOER, the quantity of bonds that the Fed would need to purchase to achieve a given-size price increase would be substantially larger, and a bloated Fed balance sheet might raise some tricky political economy issues. Before 2008, the Fed operated quite effectively without paying any IOER.

7. Moving Past the Keynesian-NeoFisherian Dispute

I have discussed the ideas in this paper with a number of other economists, in a variety of settings. One common response is to argue that I have oversimplified the standard view of monetary policy, that most good economists are aware of the pitfalls in using interest rates as indicators of the stance of policy. Reasoning from a price change is not a problem.

Arguably, there is some validity to criticisms of oversimplification in this paper. Nonetheless, the fact that a number of highly distinguished economists have staked out radically different positions on the relationship between interest rates and monetary policy shows that mainstream monetary theory has a serious problem. NeoFisherians believe that Keynesians are wrong in claiming that lower interest rates are expansionary. Keynesians believe NeoFisherians are wrong in claiming that lower interest rates are disinflationary. At least one group is wrong; I would argue both are wrong.

Peter Ireland (2020) recently suggested that interest rates were not enough and that control of the money supply was also necessary to pin down the price level. In the comment

section, John Cochrane responded that pegging the interest rate and allowing the money supply to respond endogenously should be enough (see Ireland 2020, 207). Ironically, Cochrane has challenged the dominant (Keynesian) view of how interest rates affect the economy. If one returns to the bus analogy, having both Keynesians and NeoFisherians advocate interest rate targeting would be like a bus passenger expressing confidence in the bus driver's steering mechanism, even though the passenger thought turning the steering wheel to the left made the bus go to the left, whereas the bus driver believed that turning the wheel to the left made the bus go to the right! Ireland (2020, 208) responded,

> This is what you hear from central bankers during a hyperinflation. They'll say, "But we have to keep printing money to keep up with the demand, because the price level is rising so fast." I'm uneasy about an intellectual framework that appears to suggest, in exactly the same way, that an expansion in a nominal magnitude is just done exclusively to accommodate demand.

In fairness to Cochrane, the end of the famous German hyperinflation looks very NeoFisherian, when both inflation and interest rates suddenly plunged to low levels in 1924. Of course, that plunge does not mean that the German hyperinflation was ended by cutting interest rates. Nonetheless, monetary policies that are highly effective (such as Svensson's foolproof escape from a liquidity trap) often look more NeoFisherian than Keynesian.

Interestingly, Cochrane (2017) has suggested a special case where Keynesians might be correct, while García-Schmidt and Woodford (2015) have suggested a special case where NeoFisherians might be correct. However, each paper found its hypothesized special case to be implausible. Cochrane suggests that the Keynesian result occurs only under a very specific assumption about fiscal policy, whereas García-Schmidt and Woodford argue that the NeoFisherian result requires completely rational expectations. Both sides seem too willing to

dismiss the empirical relevance of the alternative hypothesis, because one can easily sketch out exchange rate paths that yield either outcome and find empirical examples of just such policies.

The Keynesian-NeoFisherian dispute cannot be resolved if one starts with the assumption that interest rate adjustments represent monetary policy and, therefore, all one needs to do is determine the effect of a change in interest rates. That is reasoning from a price change. If one reframes the debate by looking at how monetary policy shocks affect spot and forward exchange rates, or nominal GDP growth expectations, then previously puzzling issues suddenly become much clearer.

If the analysis in this paper is correct, then interest rate changes should be viewed as an epiphenomenon—just one of many effects of a change in monetary policy—and far from the most powerful part of the transmission mechanism. Whether a reduction in interest rates is a side effect of easier money or tighter money depends on a wide range of circumstances, including the expected future path of the money supply, exchange rates, or both. Movements in interest rates are not that important, once one has considered other indicators such as exchange rates and the money supply.

At a minimum, the Keynesian-NeoFisherian debate is clear evidence that something is wrong with using interest rates as a policy indicator. I suspect that flaws in the way policymakers interpret interest rates have played an important role in the failure of many central banks to achieve their inflation targets in recent years. Fixing the problem will require the development of less ambiguous indicators of the stance of monetary policy, indicators that include highly flexible asset prices.

One recent paper suggests that economists are already moving in this direction. Jarociński and Karadi (2020, 1) show that "a surprise policy tightening raises interest rates and

reduces stock prices, while the complementary positive central bank information shock [i.e., more optimistic growth forecast] raises both." Stock prices are an imperfect indicator of demand shocks, and ultimately one can expect economists to develop even better market indicators of monetary policy shocks.

8. Summary

Interest rates are widely viewed as a reliable indicator of changes in the stance of monetary policy, with lower rates viewed as a more expansionary policy, and vice versa. This is an example of reasoning from a price change.

There are two reasons that lower interest rates may not indicate easier money. First, a Fed announcement that leads to lower rates may contain other information that reduces the natural interest rate even more sharply. For instance, if the policy announcement leads to expectations of lower inflation, then lower interest rates may reflect the Fisher effect from a tight money policy. The January 2015 Swiss devaluation is an example. Second, when the natural rate of interest falls for nonpolicy reasons, the Fed often reduces its target interest rate less sharply, effectively tightening policy. The severe slumps of 1929–1933 and 2007–2009 are two examples of this phenomenon.

Some of the problems associated with using interest rates as a policy indicator can be avoided by using alternative variables, such as the money supply, exchange rates, and other asset prices. However, these variables are also affected by nonmonetary factors and do not always provide a reliable policy indicator. In my view, market indicators of inflation expectations or, better yet, market forecasts of nominal GDP growth expectations are the best policy indicator.

Although interest rates are not a reliable policy *indicator*, central banks may find rates to be a useful policy *instrument*. For instance, interest rate targeting performed relatively well during the Great Moderation of 1984–2007. In recent years, however, the zero bound has become an increasingly important constraint in many developed economies. In this environment, the short-term interest rate is no longer a reliable policy instrument. Instead, central banks should consider alternative instruments such as exchange rates (in small economies) and market inflation forecasts (in large economies).

Because central bankers are reluctant to rely exclusively on market inflation forecasts, the Fed should consider a hybrid policy target that is a weighted average of model-based inflation forecasts and (liquidity-adjusted) inflation forecasts derived from asset prices. The Fed could use open market operations to target these forecasts directly, without any target interest rate. Doing so would not preclude continuing the payment of interest on bank reserves at a floating rate slightly below short-term market interest rates.

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