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A quantity theory framework for thinking about monetary policy

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Abstract. In August 2020, FOMC chair Jerome Powell announced a strategy for achieving an inclusive value of the FOMC's goal of maximum employment. The strategy rests on discovering the minimal value of sustainable unemployment by running the economy above potential until the unemployment rate declines to a level that initiates an inflation overshoot from the FOMC's longer-run 2 percent target. There is presumably no contradiction with an FOMC target for inflation of 2 percent. As indicated by the appellation "flexible-average-inflation targeting" (FAIT), the inflation overshoot would compensate for prior undershoots of the 2 percent target. The FOMC's current framework is reminiscent of the 1970s. With a country fractured over the Vietnam War and a militant civil rights movement, a socially desirable low unemployment rate became a political imperative. FOMC chairman Arthur Burns accepted the challenge (Hetzel 1998, 2008, Ch. 8). The Keynesian consensus of the time promised to deliver a socially desirable rate of unemployment at least as low as 4 percent at the cost of only moderate inflation. This desirable Phillips curve trade-off between unemployment and inflation became the centerpiece of monetary policy. Modigliani & Papademos (1975 and 1976) provided the organizing principle for monetary policy. Namely, there is a predictable and "exploitable" trade-off in which changes in inflation depend upon the difference between the unemployment rate and a full-employment rate termed the nonaccelerating inflation rate of unemployment (NAIRU). At least in 2021, however, the FOMC assumption is that there is no trade-off because the Phillips curve is assumed flat at least down to its prepandemic low of 3.5%. When persistent inflation above 2% emerges, the adjective "flexible" in FAIT becomes relevant. The FOMC will then trade off between two competing goals – 2% inflation and inclusive maximum employment.
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1. Introduction

The bulge in the monetary aggregate M2 of 26% from January 2020 to January 2021 is unprecedented apart from wartime. The size of the increase suggests a surge in inflation, perhaps with the two-year lag documented by Milton Friedman (1989). The quantity theory perspective offered here comprises two parts. (A third part reviews the characterization of monetary policy offered by FOMC participants.) The first part argues that the Federal Open Market Committee (FOMC) should discipline its policy by the need to unwind the bulge in money. The FOMC would need to reverse its decision to abandon the Pau Volcker/Alan Greenspan policy of

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preemptive increases in the funds rate, that is, increases to forestall rather than respond to realized inflation.

As of early 2021, financial markets were assuming that the bulge in liquid savings built up during the pandemic will result in a surge of spending due to pent-up demand as the service sector reopens. There will be a desirable one-time increase in spending and in the price level. For a one-time increase in spending to occur, the FOMC must eliminate the additional purchasing power represented by the bulge in M2 through reducing its nominal quantity. The alternative is for the additional purchasing power to dissipate through an undesirably large increase in inflation. To reduce the nominal quantity of M2, the FOMC must be ready to implement some combination of asset sales and of increases in the funds rate sufficient to cause households to repay bank debt.

The second part exposits the quantity theory that underlies the critique of monetary policy made in the first part. It does so in a way that takes account of the FOMC's operating procedures that incorporate a funds rate target and interest on reserves (IOR) as well as quantitative easing (QE) through the purchase of Treasury securities and mortgage-backed-securities (MBS). The exposition uses the Goodfriend-King (1997) version of the New Keynesian (NK) model. In this version, price stickiness is the key friction. A policy of price stability then removes the friction, and the real business cycle core of the economy determines real variables. The economy exhibits a "classical dichotomy" in that real variables are determined independently of the price level. A credible rule that provides for a stable nominal anchor and that allows the price system to determine real variables as a consequence of procedures that cause the real funds rate to track the natural rate of interest guarantees the monetary control required for real and nominal stability.

The steady flow of commentary from FOMC participants makes clear that FOMC discussion is organized around the exploitation of the possibilities offered by a Phillips curve assumed flat down to a level of unemployment likely lower than the 3.5% that existed at the onset of the pandemic. (The final section reproduces commentary by FOMC participants to support this characterization.) Such a monetary policy is reminiscent of the 1970s. Inflation is a nonmonetary phenomenon in that it depends upon real variables—the degree of slack in the economy and cost push shocks (or cost pull shocks due to globalization). The FOMC exercises the high degree of control required to move aggregate demand and output and thus unemployment predictably along a Phillips curve. The issues raised by the FOMC's new strategy of FAIT are the same as those that arose in the 1970s monetarist-Keynesian debate.

2. The money bulge in 2020 – precursor to inflation?

Households are now sitting on a massive amount of liquid assets accumulated since the start of the pandemic in March 2020. That accumulation of liquid assets reflects an exceptionally high personal saving rate out of disposable personal income. When confidence returns,

households will spend down those their liquid assets. The Fed is sanguine about that outcome. Because it views the economy as possessing significant excess capacity, a surge in spending is desirable. A one-time, measured increase in spending and prices will restore the unemployment rate to its prepandemic historically low value. A surge in spending will buoy firms' bottom lines and initially will also buoy equity prices. That will make monetary policy more expansionary with the funds rate at the ZLB.

The following discusses whether the surge in spending will be a controlled, transitory surge. The first part reviews the buildup in liquid assets. At issue is the role of the Fed in determining the extent to which the accumulation in liquid assets represents persistent money creation, which will produce inflation. The question is whether that money creation will dissipate with the spending surge or whether it will remain as "helicopter money" and stimulate spending until inflation erodes its real value. The answer depends upon the willingness of the FOMC to raise the funds rate and sell securities from its portfolio to extinguish the bank deposits underlying the surge in liquid savings in the form of bank deposits.

Figure 1 shows personal income starting in January 2018. The graph hardly suggests a recession. Yet, real GDP declined 3.5% (annual level) in 2020 from 2019. As shown in Figure 2, employee compensation at the end of 2020 remained near its prepandemic level. The boost to personal income came from government transfer payments in the form of unemployment benefits, Cares Act stimulus checks, and the Payroll Protection Program. For example, personal income was $18,973 billion in January 2020 and $21,093 billion in April 2020 when the Cares checks went out (annual rates, BEA National Income and Product Accounts).

Figure 1. *Personal Income*

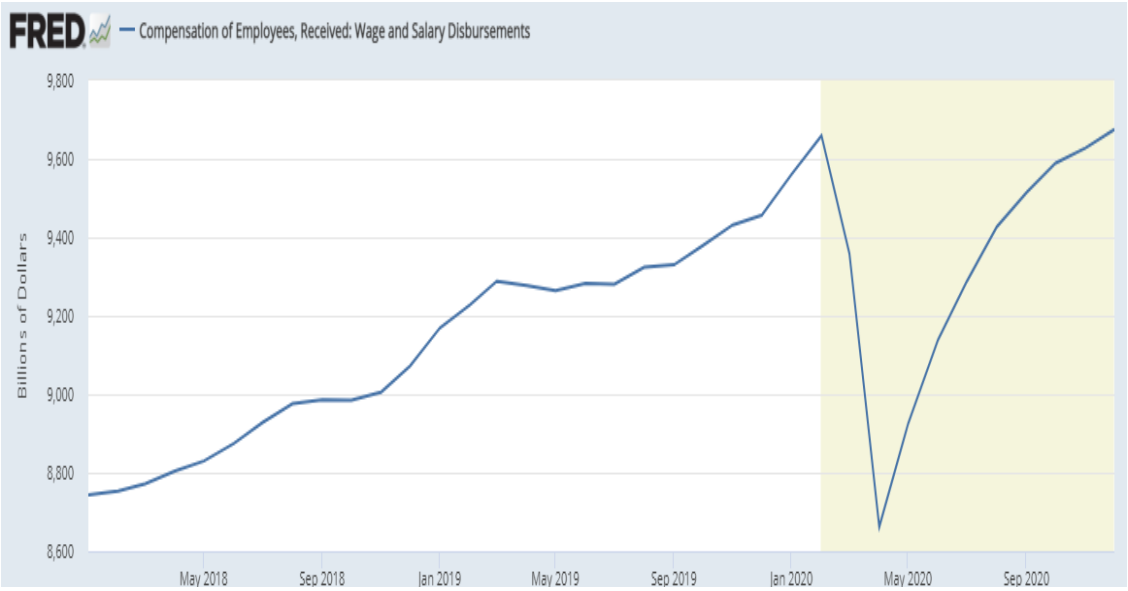

Figure 2. *Compensation of Employees, Received: Wage and Salary Disbursements*

Because of the virus, much of the service sector could no longer offer hygienically safe products. As shown in Figure 3, households cut back on their expenditures in the service sector, such as restaurants, leisure and hospitality, and sports events. The combination of expanded personal income and reduced consumption necessarily shows up in the personal saving rate (Figure 4).

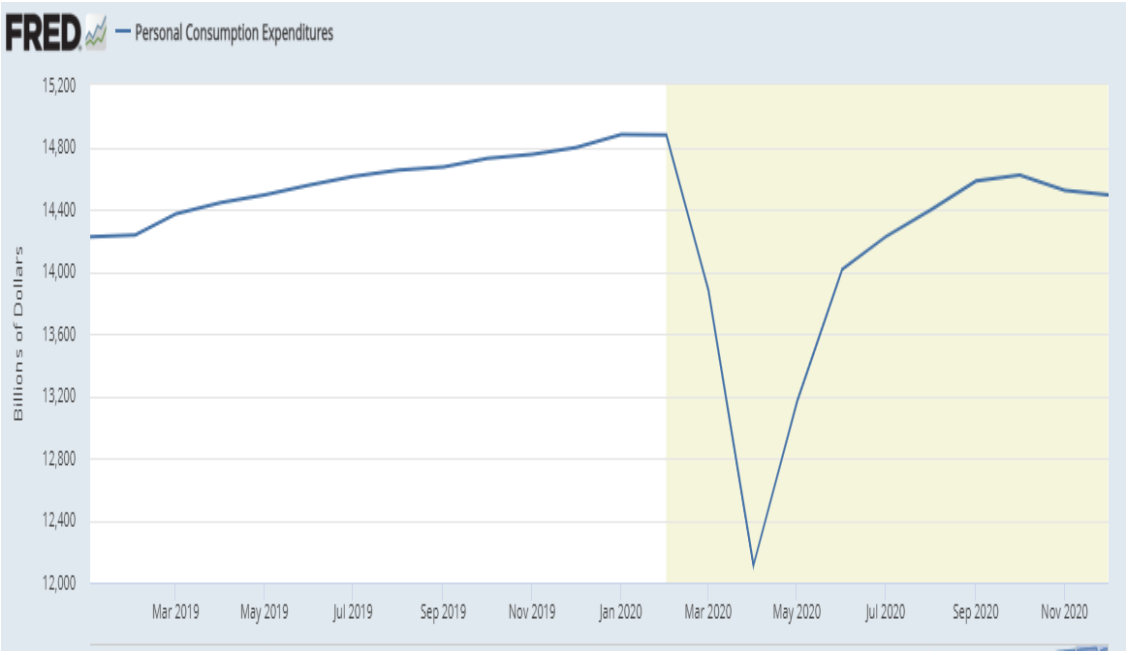

Figure 3. *Personal Consumption Expenditures*

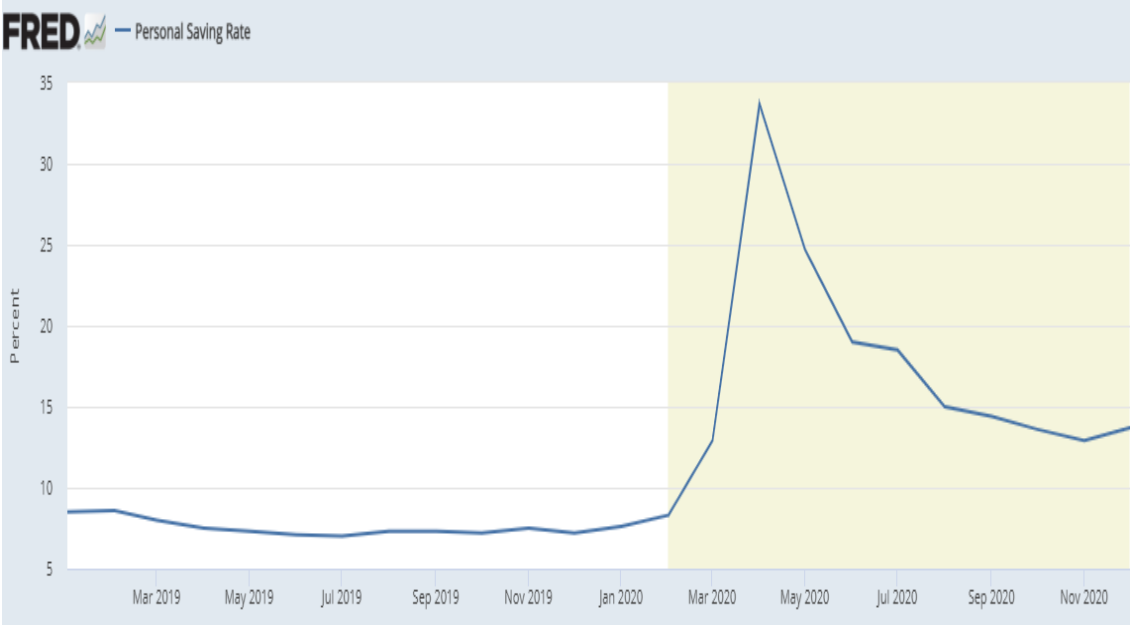

Figure 4. *Personal Saving Rate*

Households saved a large proportion of their stimulus checks. Opportunity Insights (Chetty, Friedman, & Stepner, 2021) used estimates of spending from the initial Cares stimulus checks showing that higher-income households saved most of their checks. They estimated for the COVID-Related Tax Relief Act of 2020 passed December 23, 2020 "that $200 billion of additional government expenditure will lead to only $15 billion of additional spending." However, households will spend down these savings accumulated since March 2020 on services not currently available when confidence returns with widespread vaccination.

An analogy to the current period is wartime. In World War II, given the unavailability of consumer durables with rationing, households saved for the end of the war and the renewed availability of consumer goods. Given low interest rates and the desire for liquid savings, households accumulated money balances in the form of the monetary aggregate M2. After the end of World War I and II, inflation surged. In 2020, M2 also surged. From January 2020 through January 2021, M2 rose by $4.0 trillion, or 26.2%. When confidence returns and the service sector reopens completely, households will attempt to run down the bulge in purchasing power represented by the M2 bulge.

The first way in which the bulge in purchasing power represented by the bulge in M2 can be reversed is through a reduction in the quantity of M2. For that reduction to happen, households and corporations must repay bank debt and thus extinguish deposits. An increase in interest rates would provide the incentive to pay down debt (save). The FOMC can limit the required increase in interest rates by selling securities thereby extinguishing the dollar value of deposits. The second way to undo the bulge in purchasing power represented by the bulge in M2 is through inflation.

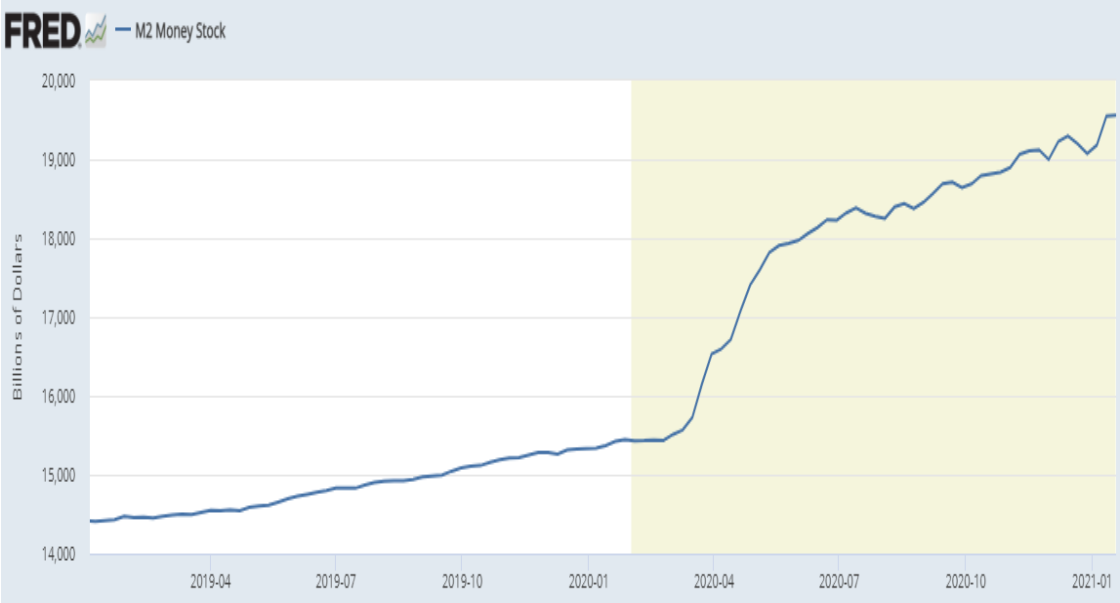

Figure 5. *M2*

To control money creation, the Fed must perform two tasks. First, it must provide a stable "nominal anchor." In a paper money standard, money possesses value because people expect it to have value in the future. The ideal is the expectation of price stability. Second, the Fed must let the price system work by setting the intemporal price of goods (the real interest rate) at a value (the natural rate of interest) that causes the contemporaneous demand for resources to equal available supply. When households are pessimistic about the future as in recession, the interest rate must be cyclically low to counter the desire to transfer resources from the present to the future to provide for an uncertain future. A low interest rate should discourage savings. When households are optimistic about the future as in a boom, the interest rate must be cyclically high to counter the desire to transfer resources from the future to the present to bring forward the good times. (A high interest rate should encourage savings.)

Balance between supply and demand in the goods market implies balance between supply and demand in the bond market. On the one hand, this balance avoids a too high interest rate and the concomitant need to offset a lack of supply of bonds (debt), which the Fed meets by selling bonds and, in the process, extinguishing bank deposits, thereby requiring deflation. On the other hand, this balance also avoids a too low interest rate and the concomitant need to monetize an excess supply of bonds (debt), which the Fed meets by buying bonds and, in the process, creating an excess of bank deposits, thereby requiring inflation.

The advantage of the Fed setting an interest rate target (provided it follows a rule to track the interest rate that keeps aggregate demand equal to the ability of the economy to produce, the natural rate), is that it automatically accommodates changes in households' demand for bank deposits (money). The year 2020 experienced a huge increase in the demand for money and the banks met the demand through the magic of bookkeeping

entries. The question for 2021 is how the Fed reverses the bulge in money when the demand for money reverses. That reversal in demand will come with a return of confidence, a surge in spending, and renewed optimism about the future, and necessarily a higher natural rate of interest. With a higher natural rate of interest, to reverse the bulge in money, the Fed will need to implement some combination of raising the funds rate and returning the size of its portfolio to the prepandemic level.

To make the argument specific, imagine a counterfactual associated with a Cares Act payment made in March 2020 financed entirely by issuance of government debt. The household receives an electronic deposit, and its bank receives an equal amount of reserves held at the Fed. The payment reduces the Treasury's account at the Fed (the Treasury General Account or TGA). By assumption, the Treasury issues a security to the public to replenish the account. Bank deposits and reserves then decline to their original level while the public holds more Treasury debt, presumably at the prevailing low level of interest rates as the demand for savings increased. When confidence returns in the post-pandemic world, households will attempt to increase their spending by selling the Treasury securities they acquired. For those sales to find public buyers, interest rates will have to rise. Dissaving requires saving, which moderates the spending spree and restrains inflation.

As actually happened, however, to replenish the TGA, in 2020, the Treasury effectively sold securities to the Fed because of the Fed's large open market purchases. Bank deposits and reserves then increased. The portfolios of investors became more liquid with the replacement of an MBS or Treasury bond with a deposit. Through portfolio rebalancing, investors then bid up the prices of assets like houses and equities. When confidence returns and households want to spend down their pandemic-augmented deposits, the analogue to the above of households selling Treasury securities is for the Fed to sell securities from its portfolio. Some households must save to buy those securities. Again, dissaving is countered by saving, which moderates the spending spree and restrains inflation. If the Fed does not unwind its portfolio, it will have to compensate by raising interest rates to a greater extent than assumed in the above counterfactual example to match an increase in the natural rate of interest.

As of early 2021, monetary policy was stimulative, just as the FOMC intended. Sustained Fed purchases of MBS and Treasury securities of $120 billion a month continued to make investors' portfolios more liquid causing them to rebalance their portfolios by demanding long-term assets and bidding up their prices. House prices and stock markets boomed, commodity prices rose sharply, and the dollar depreciated. Activity outside the service sector was extremely strong. A measure of expected inflation (the 10-year Treasury Constant Maturity Rate minus the 10-year Treasury Inflation Indexed Security Rate) rose back to its 2018 level of 2%.

With no increase in interest rates, monetary policy will become more stimulative when confidence returns with widespread vaccination and the service sector reopens. As long as the FOMC does not allow the funds rate to rise to give households an incentive to save and pay down debt, money

balances (the deposits at banks, M2) will pass around like a hot potato. The purchasing power from the 2020 money bulge will be eliminated by inflation.

The FOMC believes that it can run the economy "hot" and reduce the unemployment rate to a low level while engineering a controlled increase in inflation moderately above 2%. It believes that it can move the unemployment rate down a flat Phillips curve to achieve low unemployment and moderate inflation. Whether the Fed can exercise this degree of control over the economy and balance off the competing goals of unemployment and inflation comprised the heart of the monetarist-Keynesian debate in the 1970s. The chances for mistakes increase because of the discretion inherent in a policy of trying to juggle low unemployment and low inflation.

The question is what happens to interest rates and inflation when confidence returns and the public runs down the liquid assets accumulated during the pandemic. That spending surge should occur by early summer. Initially, there will likely be a feeling of euphoria and an increase in inflation believed to be a one-time-phenomenon. That will be positive for markets and the natural rate of interest will rise.

The question then is whether the anticipated rise in prices will be a one-time event. For that to happen, the FOMC will have to raise interest rates to extinguish the bulge in deposits that occurred in 2020. That preemptive move seems unlikely given the FOMC's pursuit of an inclusive goal for maximum employment. If so, the FOMC will be unable to achieve the moderate increase in inflation it desires but will overshoot significantly.

3. A monetary standard organized around monetary control

The monetary standard explains how the actions of the central bank translate into the behavior of firms and households. To understand the nature of the monetary standard, one must explain how the central bank varies its instrument in response to incoming information on the economy given its objectives—the reaction function. One must then explain how the reaction function works to produce the desired collective behavior of firms and households given the structure of the economy.

In particular, the monetary standard elucidates the influence of the central bank over the nominal (dollar) expenditure of agents. That influence must be indirect rather than one of direct control. There is no wartime rationing or centralized control of production. There are no wartime price controls. The central bank does not directly control the nominal expenditure of agents and the price-setting of firms. That is, it must work through the operation of the price system and through expectations of the future behavior of the central bank.

A monetary standard that provides for macroeconomic stability incorporates a rule that disciplines the consistency of the behavior of the central bank over time (its reaction function). Implicit in the choice of an

optimal rule is an understanding of the structure of the economy. The monetarist-Keynesian debate advanced competing visions.

Monetarists place monetary control at the center of monetary policy. The responsibility of the central bank is to discipline the bookkeeping operations of banks that create bank deposits (money). The implication of controlling something nominal rather than real is letting the price system work to control real variables. In contrast, Keynesians place nominal-real trade-offs at the center of monetary policy. The responsibility of the central bank is to vary nominal expenditure to balance off achievement of competing goals between a real variable (unemployment) and a nominal variable (prices). The Phillips curve expresses the relevant trade-offs. Keynesians believe that the central bank should supersede the working of the price system to achieve a desirable balance between inflation and unemployment.

One needs a model to understand the monetary standard both in terms of how the actual standard has evolved over time and in terms of an optimal standard by which to assess the impact of the different actual standards. The big tent model used by economists is the New Keynesian (NK) model. However, such models are completely general. The issue is how to choose between competing versions under the assumption that formal methods of estimation will fail to distinguish between alternative versions but rather will fit all versions to the time series.

4. From monetarism to the basic New Keynesian DSGE model

Friedman (1960) is famous for his advocacy of a rule for steady money growth. What does the rule say about the monetarist underlying model of the economy? A core principle of monetarism is that the ideal monetary standard implements a "classical dichotomy." The central bank should provide a stable nominal anchor and then turn the determination of real variables over to the operation of the market economy. The price system works well to stabilize the economy provided the central bank operates with a rule that supplies a stable nominal anchor.

Friedman's steady money growth rule would provide a nominal anchor. At the time of its formulation, given the stability and interest insensitivity of real money demand and given steady growth in potential real output, the rule would have ensured steady trend growth in nominal expenditure and in inflation. That is, it would have supplied a stable nominal anchor. The rule would have allowed the price system to determine relative prices and real variables. The separation of the determination of relative prices from the behavior of the absolute price level has always been the desideratum of quantity theorists. Of course, controversy arose from the challenge by the Keynesian consensus that a free-market economy was inherently unstable and left alone would yield long periods of unemployment above full employment.

Friedman proposed his rule as an alternative to Keynesian aggregate demand management in which the Fed would set an explicit target for a

macroeconomic variable and then use a feedback rule to eliminate deviations of the variable from its targeted value. In the 1970s, although the FOMC never articulated explicit values for targets for unemployment and inflation, it understood policy as targeting the competing goals of price stability and full employment (4 percent unemployment) subject to the trade-offs embodied in the Phillips curve. Friedman illustrated his critique using an explicit value for a stable price level as the target variable. The critique later gained the moniker of "long and variable lags."

Friedman (1960, 87-88) wrote:

> The Federal Reserve System does not control the price level. It controls the volume of its own earning assets and, at one remove… the stock of money. [T]he link between the stock of money and the price level … is not direct and rigid, nor is it fully understood. While the stock of money is systematically related to the price level *on the average*, there is much variation in the relation over short periods of time…. [T]here is much evidence that monetary changes have their effect only after a considerable lag and over a long period and that the lag is rather variable. (italics in original)

The basic New Keynesian (NK) model as exposited by Goodfriend & King (1997) makes price-level stability the optimal policy. This model is taken as embodying the "classical dichotomy" advanced by monetarists. It will then be necessary to explain how the FOMC can implement a rule that provides for price-level stability without running afoul of the Friedman critique.

5. The NK model

Understanding the monetary standard requires a model to separate causation from correlation. That is, a model is about identification. A model organizes variables into those that are endogenously determined as part of the working of the working of the price system and those that are exogenously determined outside of it. One of the great intellectual achievements of modern macroeconomics is the DSGE (dynamic, stochastic, general equilibrium model) model. Such models with their forward-looking agents are ideal for studying monetary economics. One reason is that money possesses value in exchange because people expect it to possess value in the future.

At the same time, NK models are completely general. An NK model is not identified in that one can take it to the data and reject it or evaluate it relative to other models. All models fit the data in the sense of explaining the historical time series. The model builder (econometrician) chooses equations with an eye to the data. For consumption, there is habit persistence, for investment there is time to build, for inflation there are rule-of-thumb price setters, and so on. Most important, because each sector of a DSGE model comes with its own shock, there will always be some constellation of shocks that will make the model fit the historical time series. An illustration used by Chari, Kehoe, & McGrattan (2009) is that the Great Contraction from 1929 to 1933 can be explained equally well in DSGE models by an increased preference for leisure or by increased monopoly power of wage setters

(unions). In the absence of a supportive narrative (increased demand for resorts or increased unionization), they regard neither explanation as credible.

Moreover, the reaction functions chosen for the central bank by the econometricians who construct models are reduced forms not structural equations. The reactions functions assume a knowledge of the structure of the economy not possessed by policymakers. In real time, policymakers do not know the output gap. They do not know the values of any natural variables, that is, the market-determined values of real variables in the absence of nominal price rigidities. By default, in actual practice, a central bank reaction function must constitute a search procedure to discover the natural rate of interest.

One way to choose between versions of the NK model is to determine which one is most useful in organizing a historical narrative explaining when the behavior of the central bank has been stabilizing and when it has been destabilizing. A historical narrative imposes a discipline that shocks cannot be completely ad hoc but must correspond to a variety of information contemporaneously available. The version of the NK model exposited by Goodfriend & King (1997) usefully organizes a monetarist narrative. It supports the monetarist hypothesis that the optimal rule is one in which the central bank maintains a stable nominal anchor in the form of the expectation of price stability and allows the price system to work to determine real variables.

In the Goodfriend-King version, there exists only one nominal friction. Namely, firms can only reset dollar prices at infrequent intervals. If the central bank follows a rule that implements price stability, it neutralizes the friction. As shown in equation (3) of footnote 1, with actual and expected inflation equal to zero, the output gap, which is the difference between actual and potential output, is zero.[2] Relative prices and the value of real variables then are determined solely by the real business cycle core of the economy.

[2] The exposition here uses the notation in Barsky *et al* (2014). The real rate of interest, r_t, is $r_t = i_t - E_t\pi_{t+1}$, where i_t is the market rate of interest and $E_t\pi_{t+1}$ is expected inflation. The natural rate of interest, r_t^n, equals (1).

(1) $r_t^n = \rho_t + s^{-1}E_t(\Delta y_{t+1}^n)$

where y_t^n is the natural rate of output, ρ_t is the subjective rate of time preference, and s is the intertemporal elasticity of substitution in consumption. The output gap equals $\tilde{y}_t \equiv y_t - y_t^n$. Using (1) and its counterpart for actual values and solving forward yields (2).

(2) $\tilde{y}_t = -s\sum_{k=0}^{\infty} E_t(r_{t+k} - r_{t+k}^n)$

That is, the output gap equals the sum of future interest-rate gaps. Finally, (3) expresses the NK Phillips curve.

(3) $\pi_t = \beta E_t[\pi_{t+1}] + k\tilde{y}_t$

The term "classical dichotomy" refers to this characteristic of the model. The empirical assumption that the price system works well to mitigate the impact of real shocks on the output gap given such a rule makes the model monetarist in spirit.

As shown in equation (2) of the footnote, a rule that maintains the output gap equal to zero through price stability is equivalent to a rule that maintains actual and expected real rates of interest equal to their natural counterparts. As Barsky *et al.* (2014, 38) note, "[An] interest rate path in which the actual real rate is always equal to the natural rate achieves both an output gap of zero … and zero inflation." Because the Fed does not literally target a constant price level, one must explain when its procedures do and do not work to track the natural rate of interest. Since the 1951 Treasury-Fed Accord, the Fed has followed lean-against-the-wind (LAW) procedures.

Giving empirical content to the Barsky *et al.* (2014) statement requires an empirical generalization identifying a baseline LAW procedure that is consistent with economic stability and that flags departures from the baseline that predict instability. When do LAW procedures track the natural rate of interest and when do they fail? Addressing this question explains how the Fed can pursue price stability while avoiding Friedman's long-and-variable-lag critique.

6. LAW with credibility and LAW with trade-offs (cyclical inertia)

Formula (4) serves as a benchmark for the FOMC's LAW procedures. They can be understood as a search procedure for discovering the natural rate of interest.[3]

$$i_t = i_{t-1} + 0.5(\pi_{t+3|t} - \pi^*) + 0.5(y_{t+3|t} - y^*_{t+3|t}) + 0.5og_{t+3|t} \quad (4)$$

i_t is the funds rate for quarter t. $\pi_{t+3|t}$ is forecasted inflation three quarters ahead, and π^* is the inflation target. $(y_{t+3|t} - y^*_{t+3|t})$ is the forecasted three-quarter ahead GDP growth minus potential GDP growth. Real GDP and potential GDP (in logarithms) are q_t and q^*_t. (The logarithmic differences are percentage changes.) Quarterly annualized real GDP growth is $y_t = (q_t - q_{t-1})x400$, and the potential growth counterpart is $y^*_t = (q^*_t - q^*_{t-1})x400$. $y_{t+3|t} - y^*_{t+3|t}$ is forecasted three-quarters-ahead quarterly real GDP growth relative to potential growth. The output gap is $og_t = (q_t - q^*_t)x100$.

Formula (4) captures the character of LAW procedures, which are in practice based on forecasts of the behavior of the economy. Although forecasting is a problematic exercise, what is important is that LAW procedures possess the characteristic of "guess and correct" as new information on the economy arrives. Financial markets understand FOMC

[3] See Orphanides (2019) for a discussion of such first-difference rules.

procedures and continually respond to incoming news on the economy in a way that moves the yield curve based on forecasts of the FOMC's anticipated funds rate path. In this way, if the FOMC reaction function is stabilizing, the yield curve moves continually in a way that stabilizes economic activity. A sympathetic way to understand rejection by FOMC participants of "mechanical rules" is that the forecasting effort involves an exhaustive review of economic data supplemented by anecdotal information about the economy gleaned by regional Bank presidents from their business contacts. Only such extensive discussion can allow the FOMC to reach a consensus over the extent to which fluctuations in output represent sustained or transitory movements.

As expressed in (4), with LAW, the FOMC moves the funds rate relative to its current value to counter sustained changes in the economy's rate of resource utilization. It moves the funds rate to maintain $(y_{t+3|t} - y^*_{t+3|t}) = 0$. Implicitly, sustained changes in rates of resource utilization indicate a real interest rate that differs from the natural rate of interest. Output cannot grow indefinitely above trend without raising inflation; conversely, output cannot grow indefinitely below trend without causing disinflation. Translating that assumption into practice leads to two different versions of LAW: LAW with credibility and LAW with trade-offs. Those different versions form the basis for the identification scheme used to determine when FOMC procedures are stabilizing (track the natural rate of interest) and destabilizing (fail to track the natural rate of interest).

Consider how LAW with credibility works in practice starting from the trough of a recession. When the FOMC feels assured that the recovery is sustainable, that is, the second right-hand term in (4) will remain positive despite measured, persistent increases in the funds rate, it begins to raise its funds rate target. With $(y_{t+3|t} - y^*_{t+3|t}) > 0$, the FOMC begins to raise the funds rate. In the background, the FOMC has an estimate of the magnitude of the output gap, og_t but measured only with great imprecision. As the recovery proceeds and when the FOMC sees signs of stress on rates of resource utilization, especially, overheating in the labor market, it forecasts inflation, that is, $(\pi_{t+3|t} - \pi^*) > 0$. With both terms in (4) positive, the FOMC raises the funds rate in a decided way to avoid the actual realization of inflation. The intention is to achieve a glide path that causes real output to move to potential without an overshoot and then for output to grow at potential.

In the contrasting monetary standard, the FOMC believes that it can manage inflation-output trade-offs. In practice, LAW with trade-offs is the equivalent of LAW with cyclical inertia in the funds rate target. In an economic recovery, the FOMC's behavior is different in response to signs of stress on rates of resource utilization. Now, the FOMC acts not based on forecasts of inflation but rather based on actual inflation. During economic recovery, the predominant concern is with raising the funds rate too strongly and slowing the recovery before attaining full employment (the go phases).

The FOMC becomes willing to raise the funds rate significantly only with the actual appearance of inflation.

In practice, it has then raised the funds rate until recession developed (the stop phases). Out of fear of sending the wrong signal about the inflation rate it would tolerate and thus risking a permanent rise in expected inflation, the FOMC began to lower the funds rate only when a serious recession became evident. The narrative here associates LAW with credibility with the Volcker-Greenspan era known as the Great Moderation. It associates LAW with trade-offs with the stop-go era when the FOMC attempted to balance off objectives for inflation and an output gap.

LAW with credibility emerged during the Volcker-Greenspan era. The objective of policy changed to maintaining low, stable expected inflation—that is, to the restoration of the nominal expectational stability lost with the prior go-stop monetary policy. LAW with credibility imposed two kinds of discipline. The first came from the need to eliminate the market's association between cyclical strength in the economy and the later emergence of inflation. To eliminate this association, the FOMC had to remove from its interest rate target the cyclical inertia that had characterized the earlier period. The second kind of discipline came from the need to eliminate the extrapolation by financial markets of actual inflation to expected inflation. The FOMC moved therefore to a policy of preemptive funds rate increases so that the inflation did not emerge. During economic recoveries, it raised rates in response to cyclically tight labor markets, treating them as a harbinger of inflation and a disappearing negative output gap. In the Volcker-Greenspan era, the FOMC also treated "inflation scares," discrete rises in bond rates, as evidence of positive future inflation, $(\pi_{t+3|t} - \pi^*) > 0$.

The optimal monetarist rule is that the FOMC should provide a stable nominal anchor and then allow markets to determine real variables like unemployment. To understand why the FOMC can treat the inflation and output terms in (4) as determined independently, it is useful to supplement the basic NK model as exposited by Goodfriend-King (1997) with the Aoki (2001) version containing a sticky-price sector and a flexible-price sector. Firms in the sticky-price sector are constrained to change prices only infrequently. Firms in the flexible-price sector operate in auction markets in which prices are determined continuously. To allow the price system to determine relative prices, the central bank should focus on inflation in the sticky-price sector and allow inflation originating in the flexible-price sector to pass through to headline inflation.

The central bank does not trade off between inflation and output (unemployment) gaps. In this Goodfriend-King/Aoki world, the optimal rule provides a stable nominal anchor in the form of nominal expectational stability and then allows the price system to determine real variables—a classical dichotomy. It turns the determination of real variables over to the operation of the price system through procedures that cause the real funds rate to track the natural rate of interest, where the latter is the real interest rate (actual and expected) that maintains real aggregate demand equal to

potential output (the output gap equal to zero). In this way, LAW with credibility avoids the Friedman long and variable lags critique. Because the rule causes the real funds rate to track the natural rate, it does not introduce monetary policy actions as a distinct source of disruption to the operation of the price system.

In this monetary standard, the FOMC controls trend inflation through its control of the difference between nominal and real expenditure. The price system determines real expenditure. The FOMC controls trend inflation through a credible rule that causes firms in the sticky-price sector to coordinate on the same expectation of inflation in setting prices for multiple periods. Nominal expenditure is determined as the sum of real expenditure and the inflation set by this expectation (plus the noise in the inflation series). The control of inflation does not require that the FOMC exercise control over the real-nominal trade-offs summarized in Phillips curves.

With the classical-dichotomy version of the NK model, monetary stability eliminates the correlations of the Phillips curve. The revision to the FOMC's Statement on Longer-Run Goals and Monetary Policy Strategy announced August 27, 2020 by chair Powell (8/27/2020), however, made a flat Phillips curve a key element of FOMC strategy. The FOMC interpreted the decline in unemployment without a corresponding increase in inflation in the recovery from the Great Recession as evidence of a flat Phillips curve with an upward-sloping section starting at an historically low unemployment rate. The issue is whether the correlations expressed in such a Phillips curve are structural. That is, do they represent a relationship between unemployment and inflation that the policymaker can use as the basis for a controllable and predictable trade-off between the two variables?

The alternative to a flat Phillips curve as an explanation for the disappearance of a predictable relationship between falling unemployment and rising inflation is that monetary instability produced the correlations formerly observed in the data (Friedman 1968 [1969]). A policy of price stability removed those correlations. Atkeson & Ohanian (2001) made this point when they observed that lagged inflation did a better job of predicting inflation than did Phillips curves, which include resource slack as an explanatory variable. In terms of the Lucas (1976 [1981]) critique, the empirical correlations captured by Phillips curves are a reduced form that depends upon the behavior of monetary policy. The disappearance of an upward sloping Phillips curve emerged from the monetary policy pursued in the period known as the Great Moderation.

Robert Lucas (2007, 92) expressed the idea:

> We now understand that there is no tradeoff [between inflation and employment] and periods of price stability are not periods of high unemployment or low growth. There is no systematic connection between these two variables. So when it comes down to the central bank, central bankers can and should be and mostly are focusing on the control of inflation. That is their job. That is their only job.

In terms of the classical-dichotomy New Keynesian model, in the Great Moderation, the nominal expectational stability that stabilized inflation in

the sticky-price sector meant that the real sector would operate based on the real business cycle core of the economy. The prior relationship between inflation and unemployment would disappear. That changing relationship did not reflect an evolving economy but rather an evolving monetary policy.

7. Adding money to the NK model

In the NK model, money is a veil. With the assumption of rational expectations, households, firms, and the central bank understand the structure of the economy and know the natural values of real variables. The central bank will follow a rule that causes the real rate of interest to track the natural rate of interest. Excess demand in the goods market will not depart from zero and consequently excess demands in the bond market and in the market for the quantity of money will be negligible. One can ignore these markets. It follows that the NK model by itself cannot explain serious monetary disturbances. To explain phenomena like the Great Depression and the Great Inflation, for example, it is necessary to resort to the earlier monetarist literature, for example, Friedman & Schwartz (1963a and 1963b) and Poole (1978).

8. An alternating monetary standard: back to the 1970s?

LAW with credibility, which enables a classical-dichotomy monetary standard, characterized the Volcker-Greenspan era. The discipline required to restore nominal expectational stability lost in the prior era required abandonment of the policy of activist aggregate demand management in which the FOMC tried to balance off the two assumed competing goals of price stability and full employment. That discipline required the FOMC to allow the price system to determine real variables like employment and output through moving the real funds rate in a way that tracked the natural rate of interest.

In a way reminiscent of the 1970s, in August 2020, the FOMC committed to achieving a level of inclusive unemployment defined as unemployment low enough to achieve the socially desirable goal of low unemployment in minority neighborhoods. A flat Phillips curve will allow the FOMC to push the unemployment rate down to such a low level without inflation. After inflation has persistently exceeded the FOMC's 2% inflation target, monetary policy becomes "flexible" (discretionary). That is, the FOMC will balance off the competing goals of low unemployment and low inflation.

Two related factors motivated the change in the Fed's strategy. The first was an expansion of the Fed's mandate to achieve "maximum employment" to include a strong labor market in minority and low-income communities. That expansion came from the Fed Listens program to reach out to these communities. The second was the experience in the recovery from the Great Recession in which the FOMC raised the funds rate and yet inflation remained below its 2% objective. The FOMC drew the lesson that increases in the funds rate to prevent the emergence of inflation prevented achievement of its more inclusive definition of maximum employment.

9. Summary

The New Keynesian (NK) model is the big tent model used by macroeconomists today. It is the starting point for clarifying one's views about how the world works but must be supplemented by empirical generalization. The reason is that the assumption of rational expectations rules out monetary instability as a cause of real instability. All the agents (households, firms, and the central bank) know the structure of the economy. The result is built in that money is basically a veil.

A central bank with a target for price stability does not literally have a simple feedback rule with which it moves its instrument (the funds) rate in response to deviations of the price level from a fixed value. The basic NK model needs to be supplemented with the Aoki (2001) version containing a sticky-price sector and a flexible-price sector. Firms in the sticky-price sector are constrained to change prices only infrequently. Firms in the flexible-price sector operate in auction markets in which prices are determined continuously.

To allow the price system to determine relative prices, the central bank should control inflation in the sticky-price sector and allow inflation originating in the flexible-price sector to pass through to headline inflation. It can do so indirectly through a credible rule that conditions the price setting of firms in the sticky-price sector. The central bank then turns the determination of real variables over to the operation of the price system through procedures that cause the real funds rate to track the natural rate of interest, where the latter is the real interest rate (actual and expected) that maintains real aggregate demand equal to potential output (maintains the output gap equal to zero).

This monetary policy characterized the Volcker-Greenspan era. In that era, the discipline required to restore nominal expectational stability lost in the prior era required abandonment of the policy of activist aggregate demand management in which the FOMC tried to balance off the two assumed competing goals of price stability and full employment. That discipline required the FOMC to follow a rule to restore nominal expectational stability while allowing the price system to determine real variables like employment and output. The FOMC controls trend inflation through a credible rule that causes firms in the sticky-price sector to coordinate on the same expectation of inflation in setting prices for multiple periods. Trend inflation emerges as the difference between nominal and real expenditure while the price system determines real expenditure. The control of inflation then does not require that the FOMC exercise control over the real-nominal trade-offs summarized in Phillips curves.

10. FOMC Commentary

Chair Powell (1/14/2021) explained how the new strategy is based on a structural Phillips curve that is flat down to a very low level of unemployment and that lacks inflation persistence:

> [W]e have a flat Phillips curve, meaning there's still a small connection but you need a microscope to find it between slack in the labor market and inflation. We've also got low persistence of inflation, so that if inflation were to go up for any reason it doesn't follow – inflation doesn't stay up.… Remember, we're a long way from maximum employment. There's plenty of slack in the labor market. [It is] unlikely that wage pressures are going to be reaching a level that would create/support higher inflation.

An implication of a flat Phillips curve is that an expansionary monetary policy can push the unemployment rate to low levels without danger of an undesirably large increases in inflation. Richard Clarida (2021), Board of Governors vice chair, explained how this assumption meant that the FOMC would not raise the funds rate off the ZLB in response to declines in the unemployment rate. He highlighted the change in the wording of the FOMC's "Statement on Longer Run Goals and Monetary Policy Strategy" of " '*shortfalls*' of employment from its maximum level'—not 'deviations.' This language means that going forward, a low unemployment rate, in and of itself, will not be sufficient to trigger a tightening of monetary policy…." (italics in original)

Specifically, the FOMC rejected the Volcker-Greenspan policy of preemptive increases in the funds rate to prevent the emergence of inflation. As summarized by Larry Meyer (LHM 11/20/2020): "The switch to a maximum employment threshold reflects that, while a *rise* in the unemployment rate is always 'bad' in the normal [new] regime, a *decline* in the unemployment rate is always 'good.' Given that a lower unemployment rate is recognized as *always good*, there is no preemptive rise in the funds rate when the unemployment rate falls…." (italics in original)

Lael Brainard (1/31/2021) made clear that the FOMC treats inclusive employment as an independent goal:

> Two years ago, the Federal Reserve began an in-depth review of its monetary policy framework…. Our review was prompted by changes in key long-run features of the economy: The recognition that price inflation is much less sensitive to labor market tightness than historically—that is, a flat Phillips curve…. In response, we have made changes to monetary policy that can be expected to support fuller and broader-based employment than in earlier recoveries, improving opportunities for workers who have faced structural challenges in the labor market…. The new policy approach, by avoiding the need to tighten preemptively, could support labor market conditions that help to reduce persistent disparities.

Mary Daly (2021), president of the San Francisco Fed, reiterated the abandonment of preemption:

> We are not going to … take the punch bowl away from the economy when we have inflation running consistently below 2 percent … just because we get to the levels of unemployment that have traditionally, historically meant that wage inflation would push up and that price inflation would be right behind it…. In an era when we have a pretty flat Phillips curve, and I want to add for full disclosure I still believe in

> the Phillips curve, … what we have learned [is that] the labor market is far more elastic than we thought.

Lael Brainard (2020) of the Board of Governors repeated the same argument:

> And with inflation exhibiting low sensitivity to labor market tightness, policy should not preemptively withdraw support based on a historically steeper Phillips curve that is not currently in evidence. Instead, policy should seek to achieve employment outcomes with the kind of breadth and depth that were only achieved late in the previous recovery.

LHM (7/21/2020) noted, "That's fully in line with what Powell has previously said."

The new strategy builds in the committed forward guidance that makes monetary policy expansionary at the ZLB. In a June 10, 2020, press conference, Powell (Board of Governors 6/10/2020) noted that in the pre-pandemic period the unemployment rate was extremely low (3.5 percent in February 2020) and inflation never exceeded 2 percent. The implication was that the FOMC could maintain the funds rate at the ZLB at least until the unemployment rate approached its pre-pandemic level. Powell (Board of Governors Press Conference 6/10/2020, 9–10) stated:

> We saw a lot of great things happening in the [pre-pandemic] labor market, things that we'd love to get back to. We didn't see any problems with price inflation.. . . [W]e'd. . . welcome very low readings . . . on unemployment just based on what we . . . saw . . . in the last expansion. . . . We're not even thinking about thinking about raising rates.

Charles Evans (2021, 7-8), president of the Chicago Fed, explained the strategy:

> The first prong calls for the federal funds rate to remain at the effective lower bound until our employment mandate is met and inflation reaches 2 percent and is on target to overshoot. Then, the second prong involves increasing the federal funds rate slowly enough to maintain the accommodation needed to achieve moderate overshooting for some time, so that inflation actually averages 2 percent. And last month we augmented this with guidance saying we will maintain our current pace of asset purchases until substantial further progress has been made toward our maximum and inclusive employment and price stability goals. For this approach to be successful, economic agents must have strong confidence that policy will remain sufficiently accommodative to generate these outcomes.

Evans (2021, 8) also wrote:

> It will take years to get average inflation up to 2 percent, which means that monetary policy will be accommodative for a long time. This translates into low-for-long policy rates, and indicates that the Fed will be continuing our current asset purchase program for a while as well. So economic agents should be prepared for a period of very low interest rates and an expanding Fed balance sheet….

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