Panel on The Interaction of Fiscal and Monetary Policy: Shifting Policy Norms and Policy Interactions

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I. Introduction

We often treat monetary and fiscal policies as independent influences on the macroeconomy. That independence is a fiction. At times, it is a convenient fiction. But the fiction conflicts with both basic economic reasoning and with even a cursory look at the world we live in. When a fiction becomes ingrained and unquestioned, it becomes risky. It can interfere with thinking clearly about policy options and policy impacts.

Alexander Hamilton understood the intrinsic interdependence of monetary and fiscal policies. He sought to place American fiscal and monetary arrangements on a firm foundation. First, his January 1790 *Report on Public Credit* (1790b) argued forcefully for fully-funded permanent public debt. That *Report* envisioned that securely-backed public debt, together with commodity money, could underpin the American financial system. Second, in December of that year, he proposed creating a Bank of the United States. It was not a central bank in the modern sense. But Hamilton saw it as integral to establishing federal government credit and a stable national currency. Not coincidentally, Hamilton (1790a) titled his proposal *The Second Report on the Further Provision Necessary for Establishing Public Credit*

(Report on a National Bank), suggesting policy arrangements were connected in his mind.

Over many years, stable democracies have developed certain norms for policy behavior. In the United States and elsewhere, monetary norms have emerged largely from the legislative process. Central banks' responsibilities and powers have adjusted, sometimes rapidly, to prevailing economic conditions. But they are lodged in law.

American fiscal norms, in contrast, are not codified. They have evolved informally over the country's history and owe much to Hamilton's understanding of dynamic economic behavior.[1,2] For example, the United States has earned a reputation for repaying, rather than inflating away or defaulting on its public debt. This reputation is sustained without formal commitments of a gold standard, collateral or other recourse, specific streams of revenues tied to repayment, or other devices common through history.

Despite their informal nature, fiscal norms have imposed constraints on fiscal institutions in the sense that North (1990) describes. Today Hamilton's monetary vision has been realized: U.S. Treasuries possess the unique status as the world's go-to safe asset and perform a central role in global financial markets. Treasuries serve many of the functions of money throughout the world.

Since the 2008 financial crisis, Federal Reserve policy increasingly acknowledges the critical need for a stable, well-functioning Treasury market. This has led to substantial shifts in monetary policy norms, on which this comment elaborates.

There are troubling signs that American fiscal norms may be eroding. Recurring nibbling away at fiscal norms is bound eventually to affect what people expect of fiscal policy. Those expectations feed directly into bond prices, inflation, and real economic activity. They can also undermine the desired impacts of monetary policy.

These comments begin by using a simple analytical framework to describe a key aspect of monetary-fiscal policy interactions. Interactions are ubiquitous. They arise in any dynamic equilibrium, but unfortunately, they typically enter only in an implicit and untested

manner in conventional monetary models, including those that central banks employ.

Shifts in monetary policy norms have introduced a host of new, often quite direct, interactions between policies. These new interactions are in addition to the ubiquitous, more indirect ones.

Here are the salient fiscal facts that the Fed faces: federal debt is 100% of GDP and rising; the Fed and the Treasury have chosen to fund the debt by rolling over short-term bonds. These facts mean that any increase in interest rates will quickly explode the federal budget. Rates at 5% will add $1 trillion to the deficit. Will this constrain the Fed? Will higher debt service lead to more growth in debt or to fiscal consolidation? The fiscal response is the difference between a Brazilian-style interest rate and inflation spiral and a successful reigning in of inflation. It is tempting to look to recent experience for answers, but the Volcker disinflation isn't a useful guide today. In 1980 debt was 25% of GDP and, though rarely mentioned by monetary economists, Reagan's famous tax cuts in 1981 were followed by five tax bills between 1982 and 1987 that raised substantial revenues (Department of the Treasury 2013). Can we expect similar fiscal dynamics to play out today? Answers rest on prevailing policy norms.

II. Policy Interactions Before 2008

Policy interactions arise because monetary policy, by influencing interest rates and economic conditions, necessarily has fiscal consequences. How the fiscal authority reacts to those consequences determines monetary policy impacts. Tobin's (1980) and Wallace's (1981) insights about policy interactions can be summarized as: "monetary policy impacts always depend on the sense in which fiscal policy is held constant." Sargent and Wallace (1981) is a dramatic example of this point.

I characterize policy in completely conventional terms. Although simple, the model serves two purposes. First, it makes policy interactions transparent. Second, because many central bank models nest this simple one, the mechanisms at work apply to the models used to project monetary policy impacts. The central bank sets a path for

the short-term nominal interest rate, $\{i_t\}$, in order to achieve its twin objectives of inflation, π_t, and output-gap, y_t, stabilization.[3]

II.i. Illustrative Conventional Model

Private-sector behavior is literally textbook (Woodford 2003, Walsh 2010, Galí 2015). A representative household makes consumption, saving and work choices; firms are monopolistically competitive and cannot freely adjust the prices of their output goods every period. Household behavior delivers an aggregate demand relation

$$\begin{aligned} y_t &= E_t y_{t+1} - \sigma^{-1}(i_t - E_t \pi_{t+1} - r_t^n) \\ &= -\sigma^{-1} \sum_{k=0}^{\infty} E_t [i_{t+k} - \pi_{t+k+1} - r_{t+k}^n] \end{aligned}$$

where r_t^n is the natural rate of interest, which depends on exogenous disturbances, and σ^{-1} is the intertemporal elasticity of substitution that determines households' willingness to move consumption across time. Aggregate demand is low whenever the real interest rate, $i_t - E_t \pi_{t+1}$ is above the natural rate or households expect low future demand.

Firm behavior and household labor decisions deliver an aggregate supply relation

$$\begin{aligned} \pi_t &= \beta E_t \pi_{t+1} + \kappa y_t \\ &= \kappa \sum_{k=0}^{\infty} \beta^K E_t y_{t+k} \end{aligned}$$

where $\beta \in (0,1)$ is the household's discount factor and $\kappa \geq 0$, the slope of the supply function, depends on a host of private-sector behavioral parameters, the most prominent being the degree of price stickiness. Inflation is low when the output gap is low or when future inflation is expected to be low.

Monetary policy analysis specifies a path for the nominal interest rate, directly specified or implemented through a rule, and solves for equilibrium paths of $\{y_t, \pi_t\}$ conditional on the nominal rate path, exogenous shocks, and model parameters.

Textbook presentations of monetary policy treat the two aggregate relations and a specification of monetary policy that implies a path

for nominal rates as a complete description of the aggregate economy. The two highly-compressed supply and demand relations are taken as complete representations of private behavior. They embed optimality conditions for households and firms, technologies for producing goods and setting prices, and equilibrium in the goods market.

But there is something missing: the private sector's budget constraint. What ensures that the allocations and equilibrium prices are feasible?

Here enters fiscal policy and its interactions with monetary policy.

We require some fiscal details. Fiscal policy, to keep things very simple, chooses a path for lump-sum taxes net of transfers, $\{T_t\}$, to ensure a feasible path for the debt-GDP ratio. Algebra is most transparent when all bonds mature in one period, though adding a maturity structure enriches the model is ways that matter for policy.[4] Abstracting from government purchases keeps things simple without altering the message.

We can write the private sector's intertemporal budget constraint, which describes all feasible choices from time t onward as

$$\sum_{k=0}^{\infty} \beta^k E_t c_{t+k} = \sum_{k=0}^{\infty} \beta^k E_t \left[y_{t+k} - \tau_{t+k} + \delta(i_{t+k} - \pi_{t+k+1}) \right] + b_{t-1} - \frac{\delta}{\beta} \pi_t$$

where most lower-case letters denote percentage deviations from steady state values, τ_t is the deviation of taxes net of transfers from steady state, $b_t = B_t/P_t$ is real debt, and δ is the long-run debt-GDP ratio. The nominal interest rate is the return on bonds.

Because this intertemporal constraint lies at the heart of policy interactions, I interpret each term. Discounting by β converts future variables into their time-t values. On the left is the expected present value of consumption. This equals the expected present value of after-tax income, $y - \tau$, plus the expected present value of interest payments on bond holdings, $i - \pi$. Added to those income flows is financial wealth: the value of bonds households carry into period t, b_{t-1}, adjusted for realizations of time-t inflation, which may raise or lower the real value of those initial bonds.[5]

Fiscal policy enters the households' budget in four ways. First, taxes net of transfers directly affect disposable income, $y-\tau$. Second, the private sector holds government bonds as part of their financial wealth, whose real value depends on bond holdings and inflation. Third, bond holders receive interest payments whose real return depends on $i-\pi$. Finally, the steady-state debt-output ratio, δ, scales the magnitudes of the second and third channels.

Equilibrium sequences of $\{y_t, \pi_t, i_t\}$ restrict fiscal behavior in particular ways. Impose goods market clearing on the private sector's intertemporal budget and solve for the expected present value of taxes net of transfers

$$\sum_{k=0}^{\infty} \beta^k E_t \tau_{t+k} = \delta \sum_{k=0}^{\infty} \beta^k E_t (i_{t+k} - \pi_{t+k+1}) + b_{t-1} - \frac{\delta}{\beta} \pi_t.$$

If households expect that the present value of taxes always adjusts to exactly offset changes in interest payments or the real value of their nominal bond holdings, then the household's budget constraint imposes no restrictions on equilibrium allocations and prices. Aggregate demand and supply, along with a specification of how monetary policy chooses the path of nominal interest rates determine equilibrium.

Leeper (1991) labels this fiscal behavior "passive" because, taking as given private-sector and monetary policy behavior, it ensures an equilibrium exists. The economic content is that fiscal policy reacts to the central bank's choice of nominal interest rates by offsetting the impacts that choice has on household income and financial wealth.

Suppose the central bank raises nominal rates temporarily to reduce demand and inflation. A higher path for $\{i_t\}$ raises the path of real rates, $i_{t+k} - \pi_{t+k+1}$, when prices are sticky. This reduces the output gap, y_t, and inflation, π_t. Higher real interest receipts raise household income flows. Lower current inflation raises the real value of household financial wealth. Both channels act to *raise* demand for goods at a time when the central bank seeks to reduce demand. Higher prevailing levels of debt, larger δ, amplify the channels. With no adjustment in the present value of taxes, monetary and fiscal policies conflict. Passive fiscal behavior resolves the conflict in favor of

monetary policy: higher current and future taxes offset the two positive demand channels.

II.ii. Importance of Fiscal Adjustment

How much does the fiscal adjustment matter? Caramp (2021) applies some good old-fashioned microeconomic analysis to this model to decompose the effects of monetary policy on output and inflation into substitution and wealth effects. Chart 1 plots typical impacts of a temporarily higher nominal rate on the output gap and inflation. Both variables decline on impact and then smoothly return to their pre-shock levels.

The usual story is that monetary contraction raises the real interest rate, which makes current consumption costly relative to future consumption, to induce households to increase saving and reduce consumption demand.[6] This story recognizes the real interest rate is an intertemporal price; in isolation, its variations affect the timing of demand, but not total demand. Chart 1 shows that total demand is lower, so monetary contraction must have more than just an intertemporal substitution effect. If households are net lenders to the government, then higher real interest rates create a positive wealth effect. That wealth effect is reinforced if lower inflation raises the real value of household financial assets.

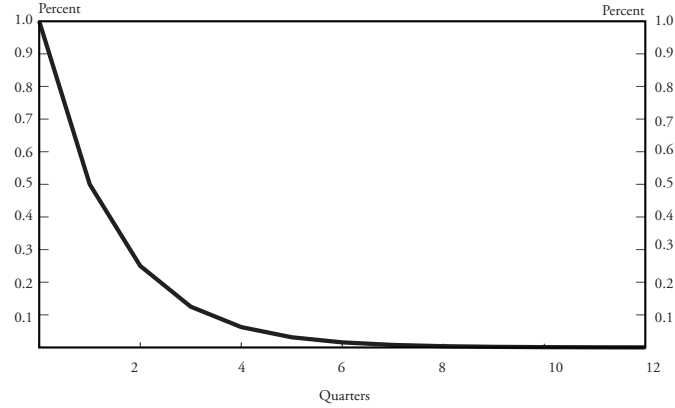
This takes us to Caramp's decomposition. The pure intertemporal substitution effect delivers the Hicksian demand for consumption, c_t^S, whose present value cannot change, so $\Delta\left(\sum_{t=0}^{\infty}\beta^t c_t^S\right)=0$ The change in total consumption, $\Delta\left(\sum_{t=0}^{\infty}\beta^t c_t\right)<0$ that the figure depicts must arise from a wealth effect. Chart 2 plots the components of the decomposition

Total Effect = Substitution Effect +Wealth Effect

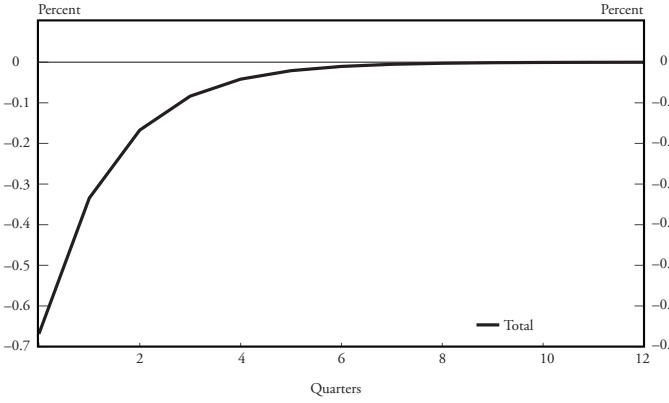
The middle panel plots the substitution effect as a dashed line that falls initially, but then rises above steady state; there is no change in the present value of consumption. Negative wealth effects, which make consumption lower at all points than does the substitution effect alone, generate much of the contraction in demand.

Chart 1

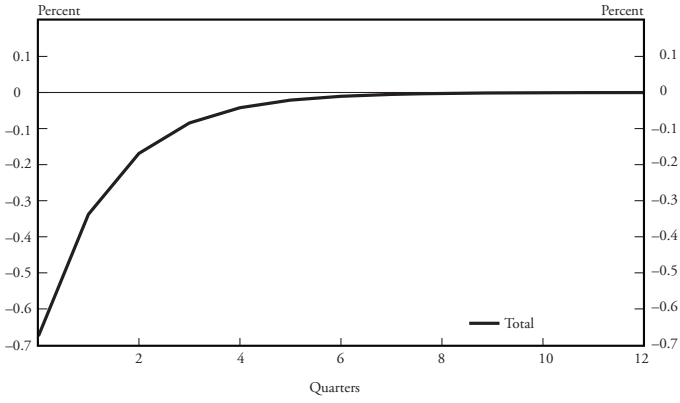
Nominal Interest Rate



Output

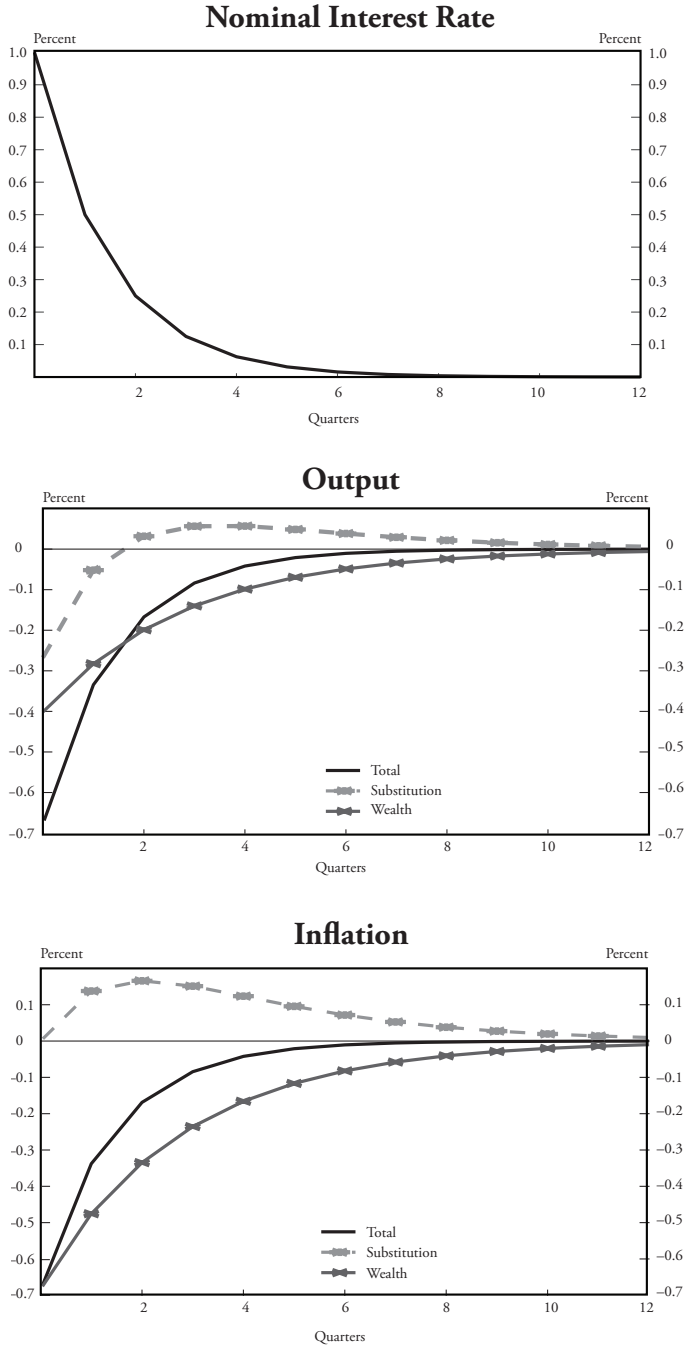


Inflation



Notes: Monetary contraction temporarily raises nominal interest rate, top panel, and reduces the output gap and inflation, middle and bottom panels. Using Caramp's (2021) calibration: $\beta = 0.99$; $\sigma = 1$; $\kappa = 0.1275$, interest rate decays at rate 0.5.

Chart 2



Notes: Monetary contraction temporarily raises nominal interest rate, top panel, and reduces the output gap and inflation, middle and bottom panels. Using Caramp's (2021) calibration: β = 0:99; σ = 1; κ = 0:1275, interest rate decays at rate 0.5.

The decomposition translates into wildly different inflation paths (bottom panel). In the absence of the wealth effect, inflation would actually rise after a monetary contraction. Evidently, routine impacts of monetary policy—for example, that higher interest rates reduce inflation—rest heavily on wealth effects. Even qualitative outcomes depend on wealth.

II.iii. What About Fiscal Policy?

Caramp's decomposition precisely characterizes the *implicit* policy interactions buried in conventional monetary policy analyses. We saw through the household's budget constraint that higher real interest rates raise household interest receipts and lower inflation raises the value of household financial assets. Both factors raise wealth and should raise consumption demand. But Chart 2 shows the wealth effect—lines with *x* markers—reduces consumption below its original level. How does this happen?

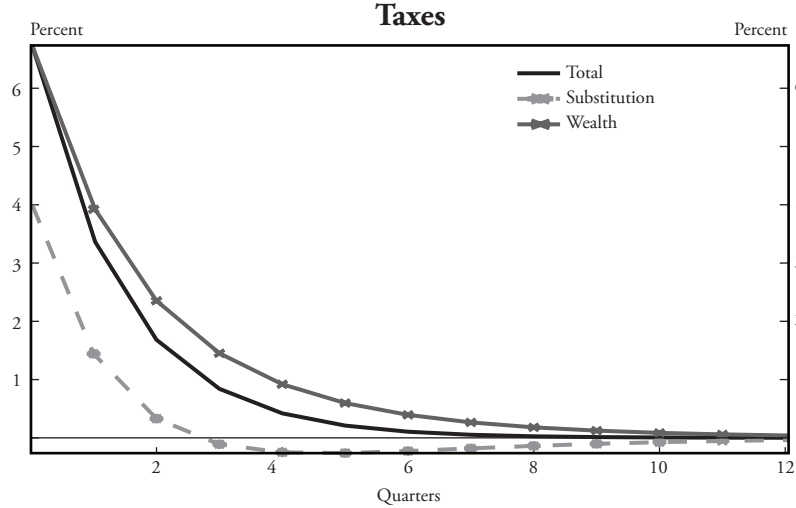
Fiscal policy contracts sharply *by assumption*. To generate the persistent declines in consumption and inflation—solid lines in Chart 2—taxes must rise substantially. First, taxes must eliminate any positive wealth effects that monetary policy may generate. Then taxes must reduce private-sector wealth. Chart 3 plots the implicit paths of taxes net of transfers that support the monetary policy impacts in Chart 2.[7]

Higher inflation in Chart 2—labeled "Substitution" —arises because an initial fiscal contraction in Chart 3 is followed by a persistent fiscal expansion. Persistently lower inflation—labeled "Total" and "Wealth" —occurs along with persistently higher taxes. Fiscal responses are fundamental, even *indispensable*, to monetary policy impacts on inflation.

This is *not* monetary-fiscal policy independence. Equilibrium requires particular forms of dependence between policies. What makes the thought experiment tick is not independence of monetary from fiscal policy. It is complete subjugation of fiscal behavior to the desires of monetary policy.

Chart 3

Taxes



Notes: Implicit fiscal contraction associated with the total, substitution, and wealth effects in Chart 2. Using Caramp's (2021) calibration: $\beta = 0.99$; $\sigma = 1$; $\kappa = 0.1275$, interest rate decays at rate 0.5. Debt-GDP ratio is 100%.

Central bank models make "monetary policy" king. Fiscal policy is merely a pawn. Or maybe "fiscal policy" rules the macroeconomy.

II.iv. Implications of Interactions

Conventional models hardwire fiscal reactions to produce the monetary policy effects we have grown accustomed to seeing. Do we see these fiscal reactions in data? What fiscal policy reacts differently?

Monetary policy projections are always conditional on a range of assumptions. Policymakers need to know how sensitive projections are to the assumptions. Projections need to condition explicitly on alternative assumptions about fiscal responses. That need is all the more urgent today. Directly before COVID hit, the U.S. government debt was rising in the midst of the longest economic expansion in history. As of July 2021, COVID-related revenue declines and spending increases have added $2.3 trillion in debt since January 2020. Current spending proposals working their way through Congress portend further debt expansion. Growth in government debt amplifies the fiscal consequences of monetary policy actions.

These points have been made before. Sims (2011, pp. 55-56) concludes:

There is no excuse for econometric models intended for monetary policy analysis to continue to omit serious treatment of fiscal behavior. It is clear from theoretical analysis that fiscal policy can be a primary transmission mechanism or a primary source for changes in the inflation rate. We are in 2010 entering into a period of remarkable shifts in fiscal policy and remarkable uncertainty about fiscal policy. Central bank balance sheets have expanded to the point that possible effects of monetary policy on the fiscal situation cannot be ignored. A central bank that is seriously considering the full range of impacts of its actions and the actions of fiscal authorities on future output growth and inflation should be using a quantitative model that treats explicitly and realistically the potential impacts of fiscal policy on the price level.

Eleven years later, Sims' observations still apply.

III. Policy Interactions Since 2008

To understand policy interactions, I was able to adapt a consensus monetary model to my illustrative purposes. Since 2008, monetary policy norms have changed so dramatically, that no consensus model exists. Instead, I will discuss the fresh aspects of policy interactions that have sprouted from the new monetary norms. In the absence of a formal model, my discussion will necessarily be more speculative, framed in terms of the questions the new norms raise.

Financial market developments in recent decades, together with two unusually powerful shocks to financial and real sectors of economies worldwide, induced central banks to adopt new monetary policy tools. Today monetary and fiscal policies interact directly, while continuing to interact in the indirect ways that Section II describes.

III.i. Background: Growth in Demand for Treasuries

Disparate global factors have generated strong growth in demand for U.S. Treasuries since the 1980s. Aldolfatto (2021) lists: steady growth in demand for Treasuries as collateral for credit derivative markets and repo markets; foreign demand for safe assets in the wake of financial crises in the 1990s; the 2008 global financial crisis both reduced supply of private substitutes and increased demand for Treasuries, as did the European sovereign debt crisis in 2010; regulatory

changes due to the Dodd-Frank Act and Basel III further increased demand by raising capital requirements; an additional flight to safety was triggered by the COVID-19 pandemic.

Associated with growth in demand has been expansion in the size of the repo market. Going into the 2008 crisis, total primary dealers' repos reached $7 trillion, a 280% increase in a decade (Gorton 2010).

Primacy of the repo market, together with worldwide demand for U.S. Treasuries for money market transactions, would naturally lead to important changes in monetary policy activities. Then two large global shocks hit to drive U.S. monetary policy norms into new territory. Federal Reserve holdings of Treasury securities grew from $770 billion in December 2007 to $5.3 trillion in August 2021, almost a seven-fold increase.

III.ii. Interest on Reserves

Although many central banks have long paid interest on banks' deposits, the Fed began to do so only in October 2008, in the midst of the global financial crisis. Paying interest on reserves amounts to banks lending to the Fed, a notable departure from earlier norms in which the Fed was always on the lending side.[8]

These interest payments have immediate fiscal implications: some of the Fed's earnings on its portfolio holdings get channeled to banks, rather than returned to the Treasury. Reduced remittances mean that taxpayers must make up the difference. Although the sums that flow to banks are not large, they further intertwine monetary and fiscal policies.

With reserves as a form of Federal Reserve debt and, therefore, a U.S. government obligation, a question naturally arises. Who backs this debt? Although the present value of seigniorage revenues likely assures backing, resorting to that source of backing can threaten the Fed's inflation target (Del Negro and Sims 2015). Assured fiscal backing would relieve this threat to the Fed's ability to control inflation.

From the perspective of policy interactions, interest on reserves makes bank reserves and short-term Treasuries closer substitutes in banks' portfolios. This makes liabilities of the Fed—reserves—and

liabilities of the Treasury—Treasury securities—better substitutes, blurring one demarcation between monetary and fiscal policy. Only a legal restriction prevents these money market instruments from being perfect substitutes: reserves cannot serve as collateral in the repo market.[9]

Financial markets adeptly innovate around legal restrictions. Some innovations seem designed to permit institutions that do not have access to accounts with the Fed to mimic the positions they would hold if they did have access. These innovations make the two government liabilities even closer substitutes.

III.iii. Federal Reserve Lending Facilities

A plethora of new lending facilities have emerged since the financial crisis. I briefly highlight two: the Standing Repo Facility (SRF) and the Overnight Reverse Repo Facility (ON RRP). SRF addresses the problem of too little cash in money markets, while ON RRP addresses the opposite problem of too much cash.

These facilities underscore the high degree of substitutability between reserves and Treasury securities and the increasing "moneyness" of Treasuries. Although the Fed has been using repos and reverse repos for routine monetary policy operations, these facilities recognize that both types of government liabilities play a central role in the smooth functioning of money markets and, by extension, financial markets generally.

Ultimately, the value of Treasuries and their capacity to serve as safe assets depends on expected fiscal backing. That backing is the expected present value of primary budget surpluses, an object that reflects both monetary norms—interest rates—and fiscal norms—surpluses. Stability of the Treasury market is as much a monetary as a fiscal responsibility.

III.iv. Large-Scale Asset Purchases

Large-scale purchases of Treasuries are distinct from open-market operations. The latter are, by construct, temporary. Even if not executed by repurchase agreements, over the business cycle they roughly cancel out, leaving the size of the central bank's balance sheet little changed.

LSAPs are a different animal, in their magnitude and in their lasting impacts on central bank and private sector balance sheets.

Is a large purchase of Treasuries with newly created bank reserves a monetary expansion? Conventional analysis would certainly answer, "Yes:" an LSAP is just a big open-market purchase. But textbook open-market operations do not account for the current nature of reserves and Treasuries. Textbooks treat reserves as the only "money" and Treasuries serve no transactions purposes. If anything, today the characteristics are reversed: in some ways, Treasuries are more money-like than reserves because Treasuries can be used to settle a wider array of payments than can interest bearing reserves. This is why Treasuries trade at a premium relative to reserves.

Recent evidence suggests that banks now seem to have more reserves than they desire. This is one reason the Fed created the ON RRP facility. This suggests that on the margin, an increase in reserves is unlikely to have much stimulative effect. Removing Treasuries from the market, though, may matter a great deal. If Treasuries are scarce, money markets will substitute less-safe private assets and on the margin the level of transactions will fall.[10] This could be contractionary.

During the Jackson Hole panel discussion, Gita Gopinath observed that further expansion of reserves is "pushing on a string." I agree. But there are two sides to the transaction: the Fed pushes out reserves by pulling in Treasuries. To argue that continued LSAPs are ineffectual, we need also to believe that the quantity of Treasuries in the hands of the public is irrelevant.

Does the LSAP trigger any fiscal response? In principle, if fiscal policy systematically reduces taxes whenever publicly-held debt declines, as many simple models assume, the LSAP generates an increase in the public's after-tax income. This would tend to stimulate demand, balanced by lower demand from potential shortages of collateral in credit markets. Once again, fiscal policy plays a key role in determining the impacts of monetary actions.

III.v. Debt Management

Central bank purchases of Treasuries change the duration of government debt in the hands of the public. From 1961 to 2008, the Fed largely maintained its Treasury securities portfolio with the same maturity composition as did the public. That changed with quantitative easing and other asset purchase programs the Fed adopted after hitting the effective lower bound on the federal funds rate.

Some observers argue that since 2008, Treasury and Federal Reserve debt management objectives conflict (Greenwood et al. 2015, Anderson 2021). At the same time that the Treasury was extending maturity of publicly-held debt, the Fed was shortening it. Greenwood et al.'s calculations suggest that the combined effects of the conflicting policies had been to increase the quantity of long-term debt held by the public over the 2009-14 period.

A quotation from Tobin (1987, p. 449) neatly encapsulates the tension:

The Federal Reserve cannot make rational decisions about monetary policy without knowing what kind of debt the Treasury intends to issue. The Treasury cannot rationally determine the maturity structure of the interest-bearing debt without knowing how much debt the Federal Reserve intends to monetize.

The Treasury and the Fed have long communicated about a host of issues. But Tobin is calling for something closer to coordination.[11]

IV. Policy Norms

In light of economic and policy developments, it is useful to step back to ask what policy norms now exist. If we can agree on today's norms, we can then ask if the norms will serve us well going forward.

What is a "norm?" It is *not* a policy objective. Monetary policy objectives have not changed recently. They remain full employment, stable prices and well-functioning financial markets. But central bank behavior has changed markedly. Section III touches on several dimensions along which monetary policy norms have shifted since 2008.

Fiscal policy objectives in the United States have always been anyone's guess. Fiscal priorities vary with the party in power, as they

should in a democracy. But it's not clear what, if any, macroeconomic objectives have remained constant across time.

In the absence of consistent macroeconomic fiscal objectives, norms take on greater importance. Norms are patterns of behavior that are relatively stable or change in predictable ways over time.

IV.i. American Fiscal Norms

I emphasize three norms that have guided fiscal decisions in the United States. Alexander Hamilton's (1790b) *Report on Public Credit* established America's primary fiscal norm:

Fiscal Norm #1: Deficits beget surpluses to repay debt in full.

Hamilton's *Report* lists several benefits that flow from this norm; for our purposes I highlight two. The first is that "proper provision for the public debt" arises when it is "well funded" and "has acquired an *adequate* and *stable* value" (p. 3, emphasis in original). This ensures that a government that borrows will be able to borrow again, should the need arise. The norm anchors fiscal expectations, a point that Sargent (2012) emphasizes.[12]

A second benefit, particularly relevant today, was to establish a robust market for government debt to grow the financial system. Hamilton foresaw the advantages of public debt as a "*substitute* for money" (p. 3, emphasis in original). Because money then was commodity money, it was fully backed. Any substitute for money would have to be similarly backed, requiring confidence that new debt issuances would ultimately bring forth higher taxes.

The history of government debt in the United States is one of run ups, usually due to wars, and retirements (Hall and Sargent (2021). This is even true in the past 75 years under a fiat currency regime (Hall and Sargent (2011). Since 2008, government debt in advanced economies looks more like a step function, as Table 1 shows. And in the United States there seem to be no plans for returning government debt to pre-2008 levels.

Is Hamilton's norm on shaky ground? Do doubts that the norm will be maintained affect the moneyness of public debt?

Table 1
General Government Gross Debt as a Percentage of GDP

	2006	2016	2021
Canada	69.4	91.7	116.3
France	63.6	98.0	115.2
Germany	67.6	69.3	70.3
Japan	191.3	232.5	256.5
United Kingdom	43.1	86.8	107.1
United States	61.1	106.6	132.8
Advanced countries	73.8	105.5	122.5

Source: IMF, *Fiscal Monitor*, various issues.

A second norm, supported by modern macroeconomic theory, has been applied off and on in the United States:

> **Fiscal Norm #2:** Ordinary and emergency spending may be differently financed.

Emergency spending usually applies to wars, but the argument can be extended to any emergency that calls for substantial, but temporary, deficit spending. Hall and Sargent (2021) examine 10 historical episodes of emergency spending to understand how it was financed, contrasting the prescriptions of Barro (1979) and Lucas and Stokey (1983). Barro's policy leaves *ex-post* returns on government bonds unchanged, while Lucas and Stokey's policy adjusts *ex-post* returns to bond holders.[13]

One interpretation of the norm is that ordinary spending—what would occur without the emergency—should be financed by taxes, while emergency spending may be financed in part by surprise changes in inflation and bond prices, which reduce *ex-post* real returns on the debt. Franklin D. Roosevelt adopted this norm when he took office in 1933. Roosevelt's Treasury maintained a dual budget, which differentiated between ordinary spending and the emergency spending that aimed to fight the Great Depression. Roosevelt balanced the ordinary budget, but pledged to run debt-financed deficits on the emergency budget until the economy recovered. Jacobson et al. (2019) argue that differently financed emergency spending raised the price level and output by more than would tax-financed spending.

Over the past year, the United States has spent over $3 trillion in COVID-19 related programs (see *usaspending.gov*) and appropriated $4.7 trillion. This is not unlike fighting a temporary war. Although there has been extensive political debate about how to pay for proposed infrastructure spending, little discussion of financing accompanied the COVID-19 bills.

This is a missed opportunity. COVID bonds could have been issued to support the spending, along with a clear statement from policymakers that taxes will not rise to finance the debt until the crisis is well passed and the economy has recovered. With FDR's experiment as a guide, this approach would have delivered larger stimulus to demand. Should we assume the norm is operative?

A third fiscal norm comes from an observation based on American fiscal behavior since World War II:

> **Fiscal Norm #3:** Fiscal consolidation occurs when interest payments on outstanding debt become a sufficiently large fraction of federal expenditures.

Three major consolidations—late 1940s, second half of 1980s, mid-1990s—were prompted by high debt service. Political dynamics behind the reforms are easy to understand. Elected officials don't feel the bite of debt service until it crowds out spending programs that observably benefit their constituents.

Secretary of the Treasury Janet Yellen sought to tamp down inflation concerns by reassuring people that "The Federal Reserve has the tools to address inflation, should it arise."[14] To be sure, Paul Volcker showed a doubting world that a central bank with sufficient resolve can wring inflation out of the economy. But today's fiscal setting is very different. In 1980, the debt-GDP ratio was about 25%; now it is 100%. Today a 5 percentage-point increase in interest rates raises debt service about $1 trillion. If rates have to rise to around 20%, as they did under Volcker, debt service rises about $4 trillion.

Fiscal consequences of these magnitudes require large consolidations that will put the third fiscal norm to the test.

IV.ii. Fragility of Fiscal Norms

For better or worse, fiscal policy decisions are inherently political. Broad acceptance of norms limits the range of possible fiscal outcomes. Norms arise from clear consensus about how to conduct policy. As consensus erodes, so too do the norms. Legislation to raise the American debt ceiling or even to keep the federal government running have become political footballs, battled over for reasons unrelated to fiscal policy. The "fiscal cliff" in 2013 grew from a confluence of fiscal choices based on political expediency, rather than sound policy. In 2016 one presidential candidate floated a muddled idea that some observers interpreted as renegotiating Treasury securities contracts. Some elected officials at the other end of the political spectrum have embraced Modern Monetary Theory's key prescription to print money to pay for government spending. Viewed as a pattern, these factors cast doubt on the durability of America's most venerable fiscal norm.

In an era when political leaders seem nonchalantly to discard norms of all sorts, can we expect fiscal norms to be upheld? Uncertain norms destabilize expectations. Eusepi et al. (2020) depart from rational expectations to consider the implications of drifting long-run expectations of inflation and nominal interest rates. They reach the stark conclusion that unanchored expectations can undermine the central bank's ability to offset demand disturbances: unanchored expectations eliminate divine coincidence, a central tenet of modern monetary models.

Long-run expectations of inflation depend on fiscal norms. When norms drift, expectations become untethered, undermining central bank control of inflation. Section II highlights that fiscal responses to a monetary contraction map directly into inflation outcomes. If people do not expect monetary contraction to be followed by fiscal contraction, inflation could rise.

V. Fiscal Food for Thought

I conclude with some further thoughts about monetary-fiscal interactions and how interactions can affect our understanding of policy issues.

1. Success or failure of central banks to achieve their goals—price, economic and financial stability—hinge on fiscal policy behavior. This needs to be communicated to elected officials and the public. Before COVID hit, many European countries ran tight fiscal policies geared toward reducing public debt. Long-term nominal bond yields were negative, while central banks maintained negative policy rates and expanded their balance sheets. Conflicting policies delivered inflation rates chronically below target (Leeper (2016, 2018)). Fiscal authorities acted as though inflation targeting is solely the central bank's responsibility and inflation outcomes are independent of fiscal policy. Central banks are partly responsible for this misunderstanding. It grows from a tendency in both policy and academic circles to equate operational independence of monetary policy to economic independence. A central bank can continue to make decisions without regard to their political ramifications while being fully aware of how *the fiscal consequences of the decisions may affect macroeconomic outcomes*. Failure to account for these fiscal consequences is bad economics.

2. For a few glorious years after the financial crisis, monetary economists could convince themselves that policy rates at the effective lower bound is an aberration from which economies would rapidly escape. The federal funds rate has now sat at the lower bound for two-thirds of the months since December 2008. Conventional monetary models have nothing to tell us about how inflation is determined when the policy rate is pegged near zero (or at any other level) and fiscal policy is passive, as those models maintain. Engineering marvels like the shadow policy rate, which permit the interest rate to become as negative as a fixed-coefficient Taylor rule dictates, break any connection between the model and actual policymaking. How can interest rates that cannot occur in any well-defined equilibrium inform policy choice? Thirty years ago this problem was solved theoretically by positing fiscal behavior much like what we have observed (Leeper (1991), Sims (1994), Woodford (1995)). Cochrane (2011, 2021a, c) extends and applies insights from that fiscal behavior to interpret policy actions and time series data. Policies at the lower bound are likely to recur and our models need to confront the issues that the lower bound constraint raises.

3. Mario Draghi's 2012 speech "… to do whatever it takes to preserve the euro" was not a monetary promise (Draghi (2012)). It was a fiscal commitment. Markets understood it as such, which is why 10-year sovereign bond yields fell across the euro area. That commitment has now morphed into the Pandemic Emergency Purchase Programme, which can target specific countries facing fiscal problems.[15] Monetary policy is substituting for the absence of a union-wide fiscal authority. Can central banks solve fiscal problems and remain true to their mandates?

4. Monetary policy can exacerbate fiscal uncertainty. Between March 2020 and August 2021, the Fed bought over $2.7 trillion worth of Treasury securities. Are these purchases temporary or persistent? If bonds are removed from the public, but everyone expects the purchases to be reversed before the bonds mature, there is little disturbance to private sector budget constraints. But if lower earning reserves permanently replace Treasuries, the consolidated net indebtedness to the public falls. How this affects aggregate demand and inflation depends on whether the decline in indebtedness is offset by lower taxes. Central banks can alleviate fiscal uncertainty by being clear about their longer-term balance sheet plans. This is not an easy task, but even enunciating the contingencies under which treasury holdings will be shrunk or expanded would be helpful.

5. Sims (2011) observed that theoretical analysis points to fiscal policy as a source of inflation. A growing body of empirical work confirms the theory.[16] Key findings relevant for monetary policy analysis include:

   (a) The conventional mix of active money/passive fiscal and the alternative of passive money/active fiscal can fit U.S. time series data equally well in models with sufficient fiscal detail. Because policy shocks have very different macroeconomic impacts in the two mixes, policy analyses need to reflect this uncertainty about prevailing policy regimes.

   (b) Fiscal expansions have similar short-run impacts across monetary-fiscal mixes, but very different long-run output and inflation effects, depending on the policy regime. Fiscal estimates that fail to account for monetary and future fiscal policy reactions may be poor guides to policy.

(c) Fiscal behavior is integral to the transmission of monetary policy. We cannot understand how monetary actions will affect the aggregate economy without fully integrating fiscal reactions. At a minimum, monetary policy projections should condition on alternative fiscal responses that reflect uncertain fiscal norms of behavior.

(d) U.S. primary budget surpluses exhibit *s*-shaped dynamics—deficits followed by surpluses—across monetary-fiscal mixes: Hamilton's norm shows up in data. This feature is critical to understanding the macroeconomic implications of policy interactions. Failure to incorporate the feature in theoretical analyses conflicts with data to produce anomalous fiscal impacts.

(e) Volker's disinflation success relied on fiscal contraction through the decade of the 1980s. While this point is apparent from the theory in Section II, empirical work confirms that a switch to passive fiscal behavior was essential to success. Counterfactual analysis also finds the disinflation could instead have been achieved primarily through fiscal policy. This evidence undermines the common "go it alone" view of monetary policy control of inflation.

Last, and perhaps toughest to do, central bank economists and policymakers should try to understand (i) the current framework of monetary and fiscal norms and (ii) the impact of these norms on future changes in policy and on private-sector responses to policy. Do the changes in monetary norms we have witnessed call for compatible changes in fiscal norms? If so, what are the appropriate new norms?

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Endnotes

[1]A large number of countries have adopted formal and informal, frequently explicit, rules to govern fiscal behavior. The IMF maintains a dataset on fiscal rules (International Monetary Fund 2017).

[2]Sargent (2012) makes closely related points, but in more detail and with greater eloquence.

[3]Central bank actions that underlie setting the nominal rate are seldom made clear in models, but those actions also matter for the nature of policy interactions.

[4]See, for example, Cochrane (2001, 2021c), Sims (2011), or Leeper and Leith (2017).

[5]In the budget constraint, real financial wealth at the beginning of t is $B_{t-1}=P_t$. To focus on policy interactions, government bonds are the sole source of financial wealth.

[6]In this model, consumption demand is also total demand for goods and, in equilibrium, it is total output.

[7]Lump-sum taxes imply that only their present value matters for private choices. Chart 3 is drawn under the assumption that taxes adjust each period to ensure there is no change in real debt outstanding.

[8]As of the end of July 2021, this rate is called "interest on reserve balances."

[9]Though it is beyond my remit, that interest on reserves also blurs the line between "money" and "credit," points to an interesting avenue for research.

[10]More precisely, treasury bills and notes, rather than bonds, get used as collateral, so the impact depends on exactly which maturity Treasuries the central bank purchases. But, of course, how and which Treasury securities get used is endogenous.

[11]Greenwood et al. (2015) document central bank-Treasury cooperation among G-7 countries.

[12]See also Gordon (1997) for further discussion of the *Report*.

[13]Recent work in models with nominal rigidities finds that jointly optimal monetary and fiscal policies finance fiscal needs with a combination of taxes and surprise inflation and bond prices that create capital gains and losses to bond holders (Sims (2013), Leeper et al. (2021), Leeper and Zhou (2021)). In that work, optimal fiscal finance depends explicitly on the maturity structure of government debt.

[14]On "Meet the Press," May 2, 2021.

[15]The ECB says it will be "flexible" in applying the capital-key requirement that member country bonds must be purchases in fixed proportions.

[16]This draws on a small subset of existing work: Bianchi and Ilut (2017) Bianchi and Melosi (2014), Chen et al. (2021), Cochrane (2011, 2021a, b), Davig and Leeper (2006), Leeper et al. (2017), Traum and Yang (2011).

References

Aldolfatto, D. 2021. "Is It Time for Some Unpleasant Monetarist Arithmetic?" *Federal Reserve Bank of St. Louis Review*, 103, 315-332.

Anderson, J. 2021. "Institutional Strategies and Debt Maturity," manuscript, University of Virginia, August.

Barro, R.J. 1979. "On the Determination of the Public Debt," *Journal of Political Economy*, 87, 940-971.

Bianchi, F., and C. Ilut. 2017. "Monetary/Fiscal Policy Mix and Agents' Beliefs," *Review of Economic Dynamics*, 26, 113-139.

Bianchi, F., and L. Melosi. 2014. "Dormant Shocks and Fiscal Virtue," in *NBER Macroeconomics Annual 2013*, ed. by J.A. Parker and M. Woodford, Chicago: University of Chicago Press, vol. 28, 1-46.

Caramp, N. 2021. "Fiscal Policy and the Monetary Transmission Mechanism," manuscript, U.C. Davis, June.

Chen, X., E.M. Leeper and C. Leith. 2021. "U.S. Monetary and Fiscal Policy: Conflict or Cooperation?" Forthcoming in *Quantitative Economics*.

Cochrane, J.H. 2021a. "The Fiscal Roots of Inflation," manuscript, Hoover Institution, May 27.

_____. 2021b. "A Fiscal Theory of Monetary Policy with Partially-Repaid Long-Term Debt," manuscript, Hoover Institution, June 20.

_____. 2021c. "The Fiscal Theory of the Price Level," manuscript, March 18.

_____. 2011. "Understanding Policy in the Great Recession: Some Unpleasant Fiscal Arithmetic," *European Economic Review*, 55, 2-30.

_____. 2001. "Long Term Debt and Optimal Policy in the Fiscal Theory of the Price Level," *Econometrica*, 69, 69-116.

Davig, T., and E.M. Leeper. 2006. "Fluctuating Macro Policies and the Fiscal Theory," in *NBER Macroeconomics Annual 2006*, ed. by D. Acemoglu, K. Rogofi, and M.Woodford, Cambridge: MIT Press, vol. 21, 247-298.

Del Negro, M., and C.A. Sims. 2015. "When Does a Central Bank's Balance Sheet Require Fiscal Support?" in *Monetary Policy: An Unprecedented Predicament*, ed. by M. Goodfriend and S.E. Zin, Amsterdam, vol. 73 of Carnegie-Rochester-NYU Conference Series on Public Policy, 1-19.

Department of the Treasury. 2013. "Revenue Effects of Major Tax Bills," Office of Tax Analysis, February.

Draghi, M. 2012. "Verbatim Remarks," Speech at the Global Investment Conference, London, July 26.

Eusepi, S., M. Giannoni and B. Preston. 2020. "On the Limits of Monetary Policy," manuscript, University of Melbourne, October.

Galí, J. 2015. *Monetary Policy, Inflation, and the Business Cycle*, Princeton, N.J.: Princeton University Press, second ed.

Gordon, J.S. 1997. *Hamilton's Blessing: The Extraordinary Life and Times of Our National Debt*, New York: Walker and Co.

Gorton, G.B. 2010. *Slapped by the Invisible Hand: The Panic of 2007*, Oxford: Oxford University Press.

Greenwood, R., S.G. Hanson, J.S. Rudolph and L.H. Summers. 2015. "Debt Management Conflicts Between the U.S. Treasury and the Federal Reserve," in *The $13 Trillion Question*, ed. by D. Wessel, Washington, D.C.: Brookings Institution Press, 43-75.

Hall, G.J., and T.J. Sargent. 2021. "Debt and Taxes in Eight U.S. Wars and Two Insurrections," in *The Handbook of Historical Economics*, ed. by A. Bisin and G. Federico, New York: Academic Press, chap. 27, 825-880.

_____. 2011. "Interest Rate Risk and Other Determinants of Post-WWII U.S. Government Debt/GDP Dynamics," *American Economic Journal: Macroeconomics*, 3, 1-27.

Hamilton, A. 1790a. "Report on Establishing Public Credit," Presented to Congress, Dec. 14, *https://founders.archives.gov/documents/Hamilton/01-07-02-0229-0003*

_____. 1790b. "Report on Public Credit," Presented to Congress, Jan. 9, *https://founders.archives.gov/documents/Hamilton/01-06-02-0076-0002-0001*

International Monetary Fund. 2017. "Fiscal Rules Dataset: 1985-2015," *https://www.imf.org/external/datamapper/fiscalrules/map/map.htm, March.*

Jacobson, M.M., E.M. Leeper and B. Preston. 2019"Recovery of 1933," NBER Working Paper No. 25629, March.

Leeper, E.M. 2018. "Sweden's Fiscal Policy Framework and Monetary Policy," *Sveriges Riksbank Economic Review*, 2, 1-33.

_____. 2016. "Why Central Banks Should Care About Fiscal Rules," *Sveriges Riksbank Economic Review*, 3, 109-125.

_____. 1991. "Equilibria Under 'Active' and 'Passive' Monetary and Fiscal Policies," *Journal of Monetary Economics*, 27, 129-147.

Leeper, E.M., and C. Leith. 2017. "Understanding Inflation as a Joint Monetary-Fiscal Phenomenon," in *Handbook of Macroeconomics*, ed. by J.B. Taylor and H. Uhlig, Amsterdam: Elsevier Press, vol. 2B, 2305-2416.

Leeper, E.M., C. Leith and D. Liu. 2021. "Optimal Time-Consistent Monetary, Fiscal and Debt Maturity Policy," *Journal of Monetary Economics*, 117, 600-617.

Leeper, E.M., N. Traum and T.B. Walker. 2017. "Clearing Up the Fiscal Multiplier Morass," *American Economic Review*, 107, 2409-2454.

Leeper, E.M., and X. Zhou. 2021. "Inflation's Role in Optimal Monetary-Fiscal Policy," forthcoming in *Journal of Monetary Economics*.

Lucas, Jr., R.E., and N.L. Stokey. 1983. "Optimal Fiscal and Monetary Policy in an Economy without Capital," *Journal of Monetary Economics*, 12, 55-93.

North, D.C. 1990. *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.

Sargent, T.J. 2012. "Nobel Lecture: United States Then, Europe Now," *Journal of Political Economy*, 120, 1-40.

Sargent, T.J., and N. Wallace. 1981. "Some Unpleasant Monetarist Arithmetic," *Federal Reserve Bank of Minneapolis Quarterly Review*, 5, 1-17.

Sims, C.A. 2013. "Paper Money," *American Economic Review*, 103, 563-584.

_____. 2011. "Stepping on a Rake: The Role of Fiscal Policy in the Inflation of the 1970's," *European Economic Review*, 55, 48-56.

_____. 1994. "A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy," Economic Theory, 4, 381-399.

Tobin, J. 1987. "An Essay on the Principles of Debt Management," in *Essays in Economics. Volume 1: Macroeconomics*, Cambridge, MA: The MIT Press, 378fi455.

_____. 1980. *Asset Accumulation and Economic Activity*, Chicago: University of Chicago. Press.

Traum, N., and S.-C.S. Yang. 2011. "Monetary and Fiscal Policy Interactions in the Post-War U.S." *European Economic Review*, 55, 140-164.

Wallace, N. 1981. "A Modigliani-Miller Theorem for Open-Market Operations," *American Economic Review*, 71, 267-274.

Walsh, C.E. 2010. *Monetary Theory and Policy*, Cambridge, MA: MIT Press, second ed.

Woodford, M. 2003. *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton, N.J.: Princeton University Press.

_____. 1995. "Price-Level Determinacy Without Control of a Monetary Aggregate," Carnegie-Rochester Conference Series on Public Policy, 43, 1-46.