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Comment Jordi Galí

Anchoring Inflation: Three Views

How is inflation determined? What can policymakers do to guarantee price stability? These questions are central to macroeconomics, current and past. The traditional monetarist view, synthesized by Milton Friedman's famous dictum that "inflation is always and everywhere a monetary phenomenon," has been overshadowed in recent years by the New Keynesian approach to monetary policy analysis, which has downplayed the role of monetary aggregates and emphasized instead the importance of *good* interest rate rules as a way of anchoring inflation. A third way, often referred to as the *fiscal theory of the price level,* has also been the focus of considerable attention (and controversy) among macroeconomists. The *fiscalist* approach, as originally developed by Leeper (1991), Sims (1994), and Woodford (1995), has pointed to the possibility of an independent role for fiscal policy in determining inflation. The chapter by Leeper and Walker provides a useful primer on the fiscalist view, as well as an insightful discussion of some implications of that view that may be seen as particularly relevant to the current environment, characterized by large fiscal deficits and growing debt/GDP ratios in most advanced economies.

The Basic Dichotomy

Consider an infinite horizon economy where the government's intertemporal budget contraint is given by

$$\frac{R_{t-1}B_{t-1}}{P_t} = \sum_{k=0}^{\infty} \beta^k E_t\{\tau_{t+k} - z_{t+k}\}, \tag{1}$$

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where B_{t-1} is the amount of one-period nominally riskless government debt issued in period $t-1$ and yielding a gross nominal rate of R_{t-1}, and where τ_t and z_t denote government taxes and transfers, respectively. Variable P_t is the price level, and β is the representative consumer's discount factor. Under risk neutrality or, as assumed by Leeper and Walker, in a constant endowment economy, the ex ante gross real interest rate $R_t E_t\{P_t/P_{t+1}\}$ is equal to β^{-1}.

Note that equation (1) can be derived by combining an infinite sequence of period budget constraints

$$\frac{B_{t+k}}{P_{t+k}} + \tau_{t+k} = z_{t+k} + \frac{R_{t+k-1}B_{t+k-1}}{P_{t+k}}$$

for $k = 0,1,2, \ldots$, together with two maintained assumptions: (a) no default and (b) a transversality condition of the form $\lim_{T\to\infty}\beta^T E_t\{B_T/P_T\} = 0$.

Intertemporal budget constraint (1) is usefuly for conveying the basic policy regime dichotomy described in the Leeper-Walker chapter. Under regime *M* (for "monetary," and using the Leeper-Walker terminology) fiscal policy is *passive,* meaning that taxes and/or transfers are endogenously adjusted so that (1) is satisfied for *any* price level path. In that environment (1) does not constrain the evolution of the price level. Instead, the latter—and, hence, inflation—will be uniquely determined by a suitable choice of an *active* monetary policy rule (e.g., an interest rate rule satisfying the Taylor principle). Alternatively, under regime *F*, fiscal authorities adopt an *active* fiscal policy by choosing an exogenous path for transfers and taxes. Any shock to current or anticipated values of those variables that changes the right-hand side of (1) will have an immediate impact on the price level, since $R_{t-1}B_{t-1}$ is predetermined. In that context, a unique nonexplosive equilibrium arises, as long as the monetary authority accommodates such price changes through the adoption of a *passive* rule; that is, one that adjusts the nominal interest rate weakly in response to inflation.

Having described that basic regime dichotomy, Leeper and Walker (a) clarify the relation between Regime *F* and Sargent and Wallace's (1981) unpleasant monetarist arithmetic, and (b) discuss how its implications for the determination of inflation carry over to an economy with multiple debt maturities. Later on, Leeper and Walker push the fiscalist view somewhat further, by describing two environments in which monetary policy may not be able to control inflation despite the fact that the economy is under a Regime M (at least apparently). Those environments include (a) the case in which a possible future switch to Regime F is anticipated (as when the economy reaches its "fiscal limit"), and (b) when government debt is subject to the risk of default *and* the interest rate on short-term debt is set by the central bank according to a Taylor-type rule. In addition, they show how an (arbitrarily) small economy that is part of a monetary union may determine the latter's aggregate price level if its fiscal authority follows an active rule. Finally, Leeper and Walker discuss, by means of a simple example, some of

the difficulties in establishing empirically the nature of the policy regime in place.

Questions to Ask a Fiscalist

In this section I raise a number of questions provoked by my reading of the Leeper and Walker chapter. These questions are relevant to the fiscalist literature more generally. Questions more specific to their chapter are raised in subsequent sections.

Where Is Inflation?

A stark consequence of the financial and economic crisis of 2008 and 2009 has been the large increase in budget deficits and debt/GDP ratios in a large number of advanced economies, as Leeper and Walker themselves report in their introductory section. The deterioration of public finances has been a natural consequence of the operation of automatic stabilizers during the crisis, though many countries have also made use of countercyclical discretionary fiscal measures. Yet, despite the huge fiscal imbalances observed in recent years, and independently of their ultimate nature, a rise in inflation is nowhere to be found. Thus, average annual inflation among advanced economies over the period 2009 to 2011 has remained at the subdued level of 1.4 percent, and it is only projected to rise to 1.8 percent by 2016.[1] Furthermore, monetary policy has remained extremely accommodative, with policy rates in many countries behaving as if pegged, due to the zero lower bound. All in all, one would think the recent fiscal episode would constitute the ultimate natural experiment for the fiscal theory of the price level. Viewed under that lens it is hard to avoid the conclusion that the recent episode offers no evidence in support of some of the basic predictions of the fiscal theory.

On the (Im)Possibility of Default

One of the maintained assumptions underlying the derivation of the government's intertemporal constraint (1) is the absence of sovereign default. Default events, however, are not just a theoretical curiosity; in fact, as documented by Reinhart and Rogoff (2009), episodes of sovereign default are far from rare, even after World War II. At the time of writing these lines Greece is negotiating with its creditors a bond swap that reduces significantly the former's liabilities and thus amounts to a partial default.

In the real world, when a government comes close or reaches its fiscal limit (as defined by Leeper and Walker), default becomes a likely outcome, and one that would render unnecessary any price level adjustment in order to satisfy (1).

1. IMF (2011).

Multiple Equilibria?

In much of the literature, the passive or active nature of fiscal policy is given exogenously. Once we allow for an endogenous regime decision the possibility of multiple equilibria may emerge. That possibility would seem worth exploring. Thus, if agents expect the government to switch endogenously to a passive fiscal policy in the face of large primary deficits, there will not be a need for a large price adjustment in order to meet the intertemporal budget constraint. As a result public liabilities will remain large, and the government will feel pressure to switch to a policy that stabilizes those liabilities. On the other hand, if agents expect the government to remain stubbornly commited to an active fiscal policy, the price level will rise in response to current or future primary deficits, wiping out the real value of outstanding liabilities and releasing the pressure for a regime change.

The Role of the Transversality Condition

In addition to the no default assumption, a transversality condition of the form $\lim_{T\to\infty}\beta^T E_t\{B_T/P_T\}=0$ is needed in order to derive intertemporal budget constraint (1). That transversality condition is justified—as an implication of utility maximization—in models with an infinite-lived representative agent, but not more generally. Thus, as shown in Diamond (1965), in a neoclassical economy with overlapping generations equilibria may arise that are characterized by a permanent rollover of government debt, with the latter's discounted asymptotic value remaining positive. In such an environment, an increase in current or future primary deficits does not necessarily have to be offset by a reduction in the real value of current debt. Instead it may just lead to permanently higher debt in the future. The possible role of fiscal policy as an anchor for inflation in such an environment would seem more limited.

Normative Issues

Which policy regime is more desirable, Regime *M* or Regime *F*? Leeper and Walker, and the fiscalist literature in general, tend to eschew normative aspects of policy design. Strictly speaking, normative considerations are irrelevant in the context of the simple endowment economy used as a reference framework throughout the Leeper-Walker chapter, but they will not be in the context of a richer, more realistic model with embedded monetary nonneutralities and explicit welfare costs of inflation.[2] Can one make a case for Regime *F* based on its implications for welfare? An issue of particular interest in that analysis is the seeming robustness of global indeterminacy in the equilibrium that arises under Regime *M* when the central bank follows a Taylor-type rule, but which seems absent under Regime *F*.

2. See, for example, Woodford (1996).

Next I focus on the analysis of two specific issues dealt with by Leeper and Walker; namely, the role played in the determination of the price level by (a) the risk of default and (b) country-specific fiscal policies in the context of a monetary union.

Default Risk and Inflation

Leeper and Walker provide an example of an economy where one-period nominal government debt is subject to some default risk. They show that, even though the central bank follows an active monetary policy, it cannot fully control inflation, which is shown to fluctuate with the risk of default.

Here I present a simplified version of their model to make clear that their result is unrelated to the fiscal theory of the price level, and can be viewed instead as a particular case of a well-known aspect of the design of interest rate rules in a conventional (Regime *M*) environment.

The risk of default is assumed to be reflected in the yield on government debt, i_t, which is given by

$$i_t = r + E_t\{\delta_{t+1}\} + E_t\{\pi_{t+1}\}, \tag{2}$$

where δ_{t+1} is the exogenous stochastic haircut at maturity, π_{t+1} is the rate of inflation between t and $t+1$, and r is the required expected real return (which is assumed to be constant for simplicity). The central bank follows an *active* monetary policy, in the form of the simple interest rate rule

$$i_t = r + \alpha\pi_t, \tag{3}$$

where $\alpha > 1$. Fiscal policy is passive.

Combining (2) and (3) we can derive the following closed-form expression for inflation

$$\pi_t = \sum_{k=1}^{\infty} \left(\frac{1}{\alpha}\right)^k E_t\{\delta_{t+k}\},$$

which makes clear that fluctuations in sovereign default risk lead to fluctuations in inflation.

But the latter conclusion is unrelated to the fiscal theory of the price level. Instead it is an illustration of the limitations of overly simplistic Taylor-type rules to stabilize inflation, in the presence of a time-varying real rate. It is straightforward to show how the assumed Taylor rule can be modified in order to guarantee full price stability, even in the presence of stochastic variations in the risk of default. To see this, assume that the central bank follows instead the interest rule

$$i_t = r + E_t\{\delta_{t+1}\} + \alpha\pi_t. \tag{4}$$

Combining (2) and (4) yields the locally unique solution:

$$\pi_t = 0$$

for all t. Thus, the presence of time-varying debt default risk does not prevent the central bank from fully stabilizing inflation, and from insulating that variable from the impact of fiscal policy.

Monetary Union and Inflation: A Reductio ad Absurdum?

Leeper and Walker consider a model of a monetary union with fiscal policy descentralized at the country level. The (common) central bank follows a passive monetary policy while the fiscal authorities in all but one country adopt a passive fiscal policy. There is a single homogenous good, traded at price P_t. Leeper and Walker show that the union-wide price level is determined by the intertemporal budget constraint of the government that has adopted an active fiscal policy (and whose variables are denoted by an asterisk):

$$\frac{R_{t-1}B^*_{t-1}}{P_t} = \sum_{k=0}^{\infty} \beta^k E_t\{\tau^*_{t+k} - z^*_{t+k}\}.$$

Thus, in the Leeper-Walker example the (active) fiscal policy of a single country determines the union-wide price level independently of the size of that country and its weight in the union![3]

The implications of the fiscalist view uncovered by the previous example seem clearly unrealistic. In fact, one is tempted to carry them to an extreme by applying the same logic to individuals as opposed to governments. Consider, thus, an infinite-lived household whose intertemporal budget constraint is given by

$$\frac{R_{t-1}A_{t-1}}{P_t} = \sum_{k=0}^{\infty} \beta^k E_t\{c_{t+k} - y_{t+k}\}, \tag{5}$$

where A_{t-1} is the amount of one-period nominal bonds purchased in period $t-1$ and yielding a gross nominal rate of R_{t-1}, and where c_t and y_t denote, respectively, consumption and labor income (where the latter is taken to be exogenous, for simplicity). Again, P_t is the price level and β is the constant discount factor.

Note that the derivation of that constraint makes use of the same ingredients as its government counterpart; namely, it combines an infinite sequence of period budget constraints with the maintained assumptions of no default and a transversality condition.

3. The same will be true if instead each country is specialized in the production of a differentiated good and one of the country's primary surplus is exogenous in terms of its domestic good. In that case, the country's domestic price level will be pinned down by its government's intertemporal budget constraint. When combined with the equilibrium relative price (determined separately by fundamentals), that will determine the union aggregate price level.

The standard analysis of the household's problem involves the utility maximizing choice of consumption subject to an income path $\{y_{t+k}\}$ and the earlier intertemporal budget constraint. Alternatively, however, the household may be assumed to choose an exogenous consumption path. In that case, and by analogy with the case of an exogenous primary deficit under an active fiscal policy, the price level *will have to adjust* in response to a consumption shocks, and in order to satisfy (5), which can now be interpreted as an equilibrium condition rather than a constraint facing the consumer. Few economists, even among those who advocate the fiscalist approach to price determination, are likely to sponsor such a view of aggregate price level determination. Its logic, however, seems to correspond to that underlying the fiscal theory.

Concluding Remarks

The Leeper-Walker chapter provides a useful primer on the fiscalist approach to inflation determination, focusing on examples that appear to be relevant to the current economic environment. I have raised a number of concerns, some about the fiscalist approach and its implications in general, others about specific details of the Leeper-Walker chapter. Those critical remarks notwithstanding, I think this is an excellent chapter, and one that clearly belongs to any reading list on the fiscal theory of the price level.

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