The Taylor principle fights back, Part I

CrossMark

Edward F. Buffie *

Department of Economics, Indiana University, Bloomington, IN 47405, United States

ABSTRACT

New Keynesian models with limited asset market participation assert that under plausible conditions higher real interest rates increase aggregate demand, the Taylor principle leads to indeterminacy, and passive policy ensures a unique equilibrium. These striking results stem from the assumption that the real wage is highly flexible. Relaxing this assumption slightly brings back the normal world where higher real interest rates reduce aggregate demand and where the Taylor principle is effectively necessary and sufficient for a unique, stable equilibrium.

© 2013 Elsevier B.V. All rights reserved.

1. Introduction

The celebrated Taylor principle is the cornerstone of monetary policy in countries that practice inflation targeting. The principle calls for the central bank to combat higher inflation by raising the nominal interest rate enough to increase the real interest rate. In the canonical New Keynesian (NK) model, this policy rule ensures that the rational expectations equilibrium is unique.[1] Sunspot equilibria are not possible because the public knows that the central bank will counter arbitrary expectations of higher inflation by increasing the real interest rate to contract aggregate demand; when output falls, marginal costs and inflation then decline, invalidating the original expectation. A credible commitment to the Taylor rule thus anchors private expectations and overall macroeconomic stability.

Although the Taylor principle has been widely embraced in the policy world, recent research questions its validity outside of simple, illustrative models. The latest refinement of the NK model poses an especially dangerous threat to the principle. Both macroeconomic estimates and microeconomic studies suggest that 30–60% of households in the United States and the Euro zone live check to check.[2] Models with limited asset market participation (LAMP) respect this stylized fact by designating a fraction of agents to be non-savers who consume all of their wage income each period. Surprisingly, this injection of extra realism profoundly alters the monetary transmission mechanism and greatly increases the risk of indeterminacy under a forward-looking Taylor rule. In a LAMP model that abstracts from capital accumulation, Bilbiie (2008) showed that the redistributive effects of higher interest rates cause aggregate demand to *increase* when the share of

---

* Tel.: 812 339 8682; fax: 812 855 3736.
  E-mail address: ebuffie@indiana.edu
  [1] While the Taylor principle "generally constitutes the appropriate criterion" (Gali et al., 2004, p. 754), it is not valid for all interest rate rules. The statement in the text refers to rules that target contemporaneous or future inflation.
  [2] See the estimates collected in Table 2 in Section 5.1.

non-savers exceeds a critical threshold level. Naturally, in this region of "inverted aggregate demand logic," the Taylor principle is also inverted—passive policy (allowing higher inflation to reduce the real interest rate) is necessary and sufficient for a unique equilibrium. Employing a similar model, GLV (short for Gali et al., 2004) demonstrate that LAMP also imperils Taylor rules that target contemporaneous inflation: as the fraction of non-savers approaches a critical threshold, the coefficient on the interest rate in the Taylor rule has to rise to absurd levels (6–50) to stave off indeterminacy. What is distressing is that the threshold fraction of non-savers is not especially high in either Bilbiie's or GLV's model. In Bilbiie's model, for example, the threshold fraction is only .19–.55 when the markup rate is 20% and the elasticity of labor supply lies between .2 and unity. Empirical estimates of labor supply are imprecise, so it is not clear whether the Taylor principle is dead or just badly wounded. Either way, its prospects for survival do not look good.

In this paper the Taylor principle fights back. The models of Bilbiie and GLV assume perfect wage flexibility and continuous full employment. The indeterminacy problem that bedevils the Taylor principle stems from this strong assumption. In the pure flex-wage model, arbitrary surges in aggregate demand become self-fulfilling when *sharp* increases in the real wage reduce profits and redistribute income from savers to non-savers. Importantly, the redistributive effect must be first-order large so that consumption by savers declines. By contrast, when the real wage is perfectly rigid and all adjustment occurs through variations in employment, consumption rises in both saving and non-saving households because both wage and profit income increase. The interdependence of employment, aggregate demand, and real output generates textbook multiplier effects. In the absence of a large redistribution of income toward non-savers, however, the multiplier effects do not threaten either the stability or uniqueness of the equilibrium path. Consequently, the Taylor principle is valid regardless of the share of non-savers in the economy.

In the general model presented here, the real wage adjusts gradually to clear the labor market. Since this specification nests the flex- and rigid-wage models, it is possible to ascertain the precise threshold level of real wage flexibility at which the forward-looking Taylor principle become inverted when the share of non-savers is high (i.e., above the share that gives rise to IADL in Bilbiie's model). Consistent with the intuition that quantity adjustment is much more stable than price adjustment, inversion of the Taylor principle occurs only at very high levels of wage flexibility. Inversion is most likely when the elasticity of labor supply is unusually small (.1) and the share of non-saving households is unusually large (70%). But even then the threshold level of real wage flexibility implies that the real wage decreases at an annual rate of 5% following a one percentage point increase in the unemployment rate.[3] This is incompatible with the stylized fact that the real wage is weakly procyclical over the business cycle in the United States and other developed countries. Most empirical estimates conclude that a one percentage point increase in the unemployment rate decreases the real wage by less than 1%; none put the number above 2%.[4]

The distinction between very high and near-perfect wage flexibility also radically changes the nature of the monetary transmission mechanism. In flex-wage LAMP models, the normal relationship between aggregate demand and the interest rate gets inverted when the share of non-savers exceeds a critical threshold level. Moreover, the transition from normal to perverse outcomes is highly discontinuous. The absolute value of the coefficient relating aggregate demand to the interest rate increases monotonically, rising without limit, as the share of non-savers approaches the threshold level from either direction. Moving from slightly below to slightly above the threshold, the coefficient changes from negative and infinitely large to positive and infinitely large.

LAMP models with a small degree of real wage rigidity behave very differently. Outside the zone of near-perfect wage flexibility, higher interest rates always depress aggregate demand and the efficacy of monetary policy either declines or increases very slightly as the share of non-savers rises. The monetary transmission mechanism is stable and reassuringly dull.

This is not the only paper that defends the forward-looking Taylor principle by appeal to some type of wage rigidity. Ascari et al. (2010) argue that inverted aggregate demand logic holds with sticky nominal wages only for "extreme parameterizations" and, by extension, that the Taylor principle is necessary for determinacy "for all the plausible parameterizations of the share of liquidity-constrained agents" (p. 13). For at least two reasons, these claims are overly strong. First, the claims about "extreme parameterizations" and "all plausible parameterizations" are restatements of the result in the benchmark calibration that standard aggregate demand logic prevails as long as the share of non-saving households is less than 71%. But for other reasonable parameter values the borderline share of non-saving households is much smaller: when the average price quote lasts two quarters, the borderline share drops to 50%; when the intertemporal elasticity of substitution equals .25, it decreases further to 41.8%. Second, the results are highly sensitive to the assumption that the capital stock is fixed.[5] In a similar model that incorporates capital accumulation, Colciago (2011) concludes that forward-looking rules "should be implemented with care" as the determinacy region is "severely restricted with respect to the case of a contemporaneous rule." And the existence of even a severely restricted region of determinacy depends on the

---

[3] See Table 1 in Section 5.1. In the spirit of Bilbiie's results, it should also be noted that in a few cases the upper bound on the coefficient on inflation in the forward-looking Taylor rule is 1.4–1.5 at a lower degree of real wage flexibility. This occurs when unusually short-lived price quotes (4 months or less) combine either with an unusually low value for the elasticity of substitution between capital and labor (.25) or with an unusually high value for the intertemporal elasticity of substitution (2). See Table 2 in Section 5.3.

[4] Table 3 in Section 5.1 summarizes the findings of empirical studies.

[5] This is not a problem when the real wage is temporarily rigid. For believable speeds of adjustment in the labor market, indeterminacy does not become a threat until the q-elasticity of investment exceeds fifteen (Buffie, 2012). Compare this with the comments that follow in the text.