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Alternative Public Spending Rules and Output Volatility

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Abstract

One of the central lessons learned from the Great Depression was that adjusting government spending each year to balance the budget increases the volatility of output. We compare this policy with one that involves running temporary deficits and surpluses and an average budget balance of zero. Our analysis allows monetary policy to adjust to a change in fiscal regime, and the specifications for aggregate demand and supply are consistent with the "new neoclassical synthesis." Our results give only limited support to the conventional wisdom on fiscal rules and stability of output.

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1. Introduction

For many years following World War II, macroeconomists have taught students the advice of John Maynard Keynes: that we should use fiscal policy as a mechanism to help balance the economy, not the budget, each year. The idea is to run deficits during years when actual output is less than the natural rate and to run surpluses in the years when output exceeds the natural rate. It is thought that this counter-cyclical policy can be pursued—without causing an explosion in the debt-to-GDP ratio—as long as the natural rate of output is measured in such a way that we witness "overheated" periods about as often as we do periods of "excess capacity."

This strategy has been hailed as one of the truly central and important lessons that we have learned from the Great Depression. At that time, unbalanced annual budgets were assumed to be evidence of irresponsible policy. But, since then, we have come to consider a fixation with annual targets for balanced budgets an irresponsible approach. After all, if private demand falls, lowering overall output and therefore tax revenue, a cut in government spending would further reduce demand and therefore magnify the size of the initial recession. The Keynesian message is that the budget should be balanced over the duration of one full business cycle, not in each and every year. The widespread acceptance of this view is indicated by a recent editorial in the *Economist* magazine (25 August 2001, p13), in which Europe's stability pact which sets a binding ceiling of 3 per cent of GDP on euro-area countries' budget deficits, is criticized. The editorial states that "as the euro area faces the possibility of its first recession . . . the stability pact must not only preclude any fiscal easing but even trammel the operation of fiscal 'automatic stabilizers.' That could mean that these countries are required to increase taxes or cut public spending even as their economies slow. That smacks of 1930s-style self-flagellation."

Given the widespread acceptance of the standard view, it is surprising that evidence to support it has been fairly hard to find. Some empirical work focuses on the efficacy of built-in stabilizers in structural models of national economies (Gorbet and Helliwel 1971, Hairault, Henin, and Portier 1997), and other work considers the relative performance of U.S. states that have stringent rules for balanced budgets (Alesina and Bayoumi 1996, Millar 1997). Some recent research has reassessed the empirical work. For example, Levinson (1998) considers just large U.S. states, on the assumption that changes in fiscal regime can matter only for large economies. The evidence is that flexibility in the budget deficit reduces the volatility of output by very little. Others—for example, Christiano (1984), Cohen and Follette (2000), and Auerbach and Feenberg (2000)—have reassessed the theory behind (and empirical support for) Ricardian equivalence, since it is important for understanding whether the tax system can be expected to impart "built-in stability" to the macroeconomy. In this paper, we focus on the expenditure side of the budget; we assess whether recent advances in macro modelling practices support or threaten the Keynesian view that spending should not be adjusted over the cycle to balance the budget at each point in time.

To make this comparison stark, we investigate two cases that are polar opposites: Keynesian and Hoover. In the Keynesian case, both taxes and program spending are held constant forever (as proportions of GDP) at levels that would balance the budget if it were not for the stochastic shocks and the model's short-run dynamic features. This fiscal set-up ensures that there is no long-run trend in the debt-to-GDP ratio, and that the temporary budget deficits and surpluses are financed entirely by short-run variations in the quantity of government bonds outstanding. Macroeconomic instability is avoided on the assumption that the underlying (exogenously determined) trend growth rate in real output exceeds the after-tax real interest rate paid on government bonds.

In the Hoover case, the budget is balanced at every instant, so the bond stock never changes, even in the short run. The government allows the level of program spending to vary by whatever it takes to meet this rigid rule for a balanced budget. One might argue that our comparison involves a “straw man,” since the Hoover case involves more rigidity than what is typically contemplated in actual economies. For example, the fiscal rule passed by legislatures is often limited to a stipulation that the government never incur a deficit. Such a rule can be obeyed, with fiscal policy still playing what is intended to be a stabilizing role, if the government runs a surplus on average (with a higher surplus during booms and a lower surplus in recessions). But such a strategy is not likely to be observed, since an ongoing budget surplus implies a negative government debt in the steady state. In any event, by relying on the strong polar case (and thereby “stacking the cards” against the non-Keynesian option), we have made it all the more interesting that, often, we find no increase in the volatility of output in the Hoover case.

What makes this unconventional result possible? One possible explanation is that our model involves a standard propagation mechanism: temporarily sticky prices. With this dynamic feature, a change in the fiscal regime can affect the speed of adjustment in the overall economy. In particular, shocks can involve increased persistence when the Keynesian approach is followed. Thus, while the Keynesian strategy can reduce the size of a recession initially, it can make the recession last longer. With forward-looking behaviour in the determination of both private demand and price-setting behaviour, the negative dimension of this dynamic trade-off becomes important.

A second feature in our models that could explain this unconventional result involves the interaction between fiscal and monetary policy. Monetary policy is modelled by deriving the rule for setting the interest-rate that is appropriate for meeting the central bank's goal, taking the rest of the macro model as the bank's constraint. Because the operation of fiscal policy is part of the system, monetary policy adjusts when the fiscal regime changes. The central bank’s *objective*—assumed here to be either an expected future inflation rate of zero or an expected price level that is constant—is *independent* of changes in the fiscal regime. But, given this independence, the central bank’s period-by-period decision rule is *dependent* on the fiscal regime. In particular, because the Hoover approach to fiscal policy avoids the longer-term, slower adjustment speed noted in the last paragraph, the central bank finds it appropriate to react less aggressively to expected short-term developments in the economy. Traditional analyses of government spending rules have not allowed for such an endogenous reaction of monetary policy. Again, forward-looking agents with model-consistent expectations magnify the importance of this adjustment in monetary policy.

The rest of this paper is organized as follows. In section 2, we explain the structure of our standard “new synthesis” model. The results and two sensitivity tests are described in sections 3 and 4 respectively. Concluding remarks are offered in section 5.

2. The Macro Model

In this section, we explain the structure of the closed-economy macroeconomic model that we use to defend the points made in section 1. The model involves rational expectations, and reasonable microeconomic foundations have been provided. It represents the current mainstream framework for analytical work on stabilization policy. The model is defined below with the variables explained immediately following equation (9).

$$Y_t = E_t(Y_{t+1}) - \alpha(1-\tau)(r_t - (E_t(p_{t+1}) - p_t) - \bar{r}) + (G_t - E_t(G_{t+1})) + (1-\rho)u_t, \tag{1}$$

$$p_t - p_{t-1} = \theta(Y_t - \overline{Y}_t) + (E_t(p_{t+1}) - p_t) + v_t, \tag{2}$$

$$E_{t-1}(p_{t+1} - p_t) = 0, \tag{3a}$$

$$E_{t-1}(p_t) = 0, \tag{3b}$$

$$G_t = \overline{G}, \tag{4a}$$

$$G_t = \tau Y_t - \left(1 - \tau - \left(\frac{\phi}{\bar{r}}\right)\right)\overline{B}, \tag{4b}$$

$$B_t - B_{t-1} = \bar{r}(G_t - \tau Y_t) + [\bar{r}(1-\tau) - \phi]B_{t-1}, \tag{5a}$$

$$B_t = \overline{B}, \tag{5b}$$

$$\overline{Y}_t = (1 + x_t), \tag{6}$$

$$u_t = \rho u_{t-1} + \varepsilon_t, \tag{7}$$

$$v_t = \eta v_{t-1} + \xi_t, \tag{8}$$

$$x_t = \gamma x_{t-1} + \delta_t. \tag{9}$$

The variables are:

B stock of indexed government bonds outstanding at the end of each period, measured as a proportion of trend GDP, $z_t = (1 + \phi)z_{t-1}$; because each bond is a promise to pay one unit of purchasing power per year, B also denotes real interest payments on the debt (measured as a proportion of trend GDP).

E expectations operator, based on information available at the point in time denoted by the time subscript

G government spending on goods and services, measured as a proportion of trend GDP

τ proportional income tax rate

t time subscript

p logarithm of the price level; the first difference of p is the inflation rate

r nominal interest rate ($\bar{r}$ is the full-equilibrium value of both the nominal and real interest rates, since full-equilibrium inflation is zero)

u, v, x stochastic demand and supply shocks; the ε, ξ, and δ parts have zero means, constant variances, no serial correlation, and no covariance

Y real output, measured as a proportion of trend GDP

$\bar{Y}$ the natural rate—the level of real output that is sustainable in full equilibrium (measured as a proportion of trend GDP)

The slope coefficients (the Greek letters) are all positive; ρ, η, and γ lie between zero and one.

Equation (1) is the expectational *IS* relationship. In addition to a demand shock, aggregate demand depends inversely on the real rate of interest and the expected change in government spending, and positively on expected future output. McCallum (1995), McCallum and Nelson (1999), and Kerr and King (1996) have argued that the traditional

IS relationship should be replaced by this one because it embodies an explicit theory of household behaviour—the Ramsey (1928) consumption function:

$$E_t(C_{t+1}) - C_t = \alpha[(1-\tau)(r_t - (E_t(p_{t+1}) - p_t)) - \beta].$$

If the rate of time preference for the representative agent is β (which makes the full-equilibrium pre-tax interest rate, $\bar{r}$, equal $\frac{\beta}{(1-\tau)}$) and the instantaneous utility function involved in the intertemporal optimization is $[lnC + \omega lnG]$, this equation is a linear approximation of the appropriate first-order condition, as long as α is interpreted as the mean value of consumption. It is common (see, for example, Clarida, Gali, and Gertler 1999 and Woodford 1999) to base the demand side of policy-oriented macro models on this theory.

If the production side of the economy is ignored (that is, if we consider an endowment economy, as in McCallum and Nelson 1999 and Kerr and King 1996), this consumption function can be combined with the standard resource constraint:

$$Y_t = C_t + G_t + u_t.$$

Equation (1) follows from substituting equation (7) and the Ramsey consumption function into the forward first-difference of the resource constraint.

Equation (2) defines the supply side of the model. It follows the preferences of many modern business-cycle analysts by assuming Calvo's (1983) specification of sticky prices (see for example, Goodfriend and King 1997, Clarida, Gali, and Gertler 1999, and King 2000). Calvo's model involves forward-looking firms that face a constant probability of being able to adjust prices. Equation (2) involves a common simplification (see, for example, Roberts 1995) that the coefficient on expected future inflation is unity.

By combining the expectational *IS* relationship and this “New Keynesian Phillips Curve,” we ensure that our analysis embraces what Clarida, Gali, and Gertler (1999) call the new paradigm. The new paradigm retains much of the empirical applicability of the traditional expectations-augmented *IS*-curve/Phillips-curve structure, yet it has the added advantage of being more thoroughly grounded in dynamic general equilibrium theory. King (2000), who is among the pioneers of this new approach, has warned that, given the compact nature of this new generation of *IS*-curve/Phillips-curve models, it may still be prudent to restrict their use to illustrating already-known results, rather than use them to derive new results. Nevertheless, many researchers (such as Clarida, Gali, and Gertler 1999, McCallum and Nelson 1999, Svensson 1999, Walsh 1998, 2002, and Woodford 1999) disagree, arguing that the new generation of compact macro models involves structural, not reduced-form, relationships. For this reason, we feel comfortable investigating the Hoover-vs.-Keynes question within this framework.

Monetary policy is defined in equation (3). In the first case (equation (3a)), the central bank's target is zero inflation; in the second (equation (3b)), it is a constant price level. More specifically, in the first case, the central bank targets the expected *future* inflation *rate*. Batini and Haldane (1999) and others have argued that this approach is “real output encompassing,” because it involves the central bank putting some weight on real output gaps in the short run. At each point in time, the central bank sets the nominal interest rate to ensure that, at least expectationally, the zero future inflation target is met.

Fiscal policy is defined in equations (4) and (5). Because the tax rate is constant, the options for the government are at two polar extremes, as described in section 1. With the Keynesian option, the government maintains a constant level of spending (as defined in equation (4a)). This policy means that the government runs budget deficits and surpluses, letting the amount of bonds outstanding adjust according to equation (5a). (Note that bonds are specified as long-term consols, not one-period bonds.) With the Hoover option, the government adjusts the level of spending at each point in time to preclude a budget deficit or surplus from ever emerging (as defined in equation (4b)). This policy ensures that the debt ratio is constant (equation (5b)). The Keynesian fiscal policy is feasible because it is assumed that the long-run average growth rate, ϕ, exceeds the after-tax real interest rate. This assumption ensures that the dynamic process defined in equation (5a) is stable. This last relationship is a linear approximation of the non-linear government financing identity. We start with the proposition that $\frac{1}{r}$ (the bond price), times the change in the number of bonds, equals the current deficit. Then we divide by trend GDP, substitute in the time derivative of the $B = \frac{debt}{z}$ definition, and take a linear approximation at full-equilibrium values ($r = \bar{r}$ and $\Delta\bar{B} = 0$).

Standard specifications of the stochastic shocks are given in equations (7), (8), and (9).

The expectational *IS* relationship can be combined with either specification for government spending. We have:

$$Y_t = E_t(Y_{t+1}) - \Omega(r_t - (E_t(p_{t+1}) - p_t) - \bar{r}) + \lambda u_t, \qquad (1a)$$

with $\Omega = \alpha(1-\tau)$ and $\lambda = 1-\rho$ in the Keynesian case, and $\Omega = \alpha$ and $\lambda = \frac{1-\rho}{1-\tau}$ in the Hoover case. The values for both aggregate demand parameters, Ω and λ, rise as the government shifts from a Keynesian policy to the Hoover policy. We next examine the model defined in equations (1a), (2), either (3a) or (3b), and equations (6) to (9), to determine the effects of changes in parameters Ω and λ on the volatility of real output.

3. Results

To explore the built-in stability implications of the alternative rules for setting government spending, we must derive the solution equation for the variance of real output, and use it to determine the effects of changes in parameters Ω and λ. To do this, we use the undetermined-coefficients solution method. Three trial solutions are assumed: that current output, current price, and the end-of-period bond stock are linear functions of the previous values of Y, p, B, u, v and x, the three current white-noise error terms, and a constant. There are 30 reduced-form parameters to identify, but, given the recursivity that accompanies Ricardian equivalence, fairly straightforward reduced forms emerge. (Scarth 1996 gives a detailed explanation of the undetermined coefficient solution technique, and of the derivation of asymptotic variances.)

To explain the derivations in the simplest case, we focus on inflation-rate targeting with no supply shocks. The solution proceeds as follows. Solve equation (1a) for r_t; take the E_{t-1} operator through the result; use (3a) to set $E_{t-1}(p_{t+1} - p_t)$ equal to zero; and set r_t equal to the result. What emerges is the central bank's rule for setting the interest rate, which we use in two ways. First, to identify the reduced-form coefficients, we follow McCallum and Nelson (1999) and substitute this interest-rate expression back into equation (1a), and proceed with the undetermined coefficient solution method. In general, the following reduced form for real output emerges:

$$Y_t = aY_{t-1} + b\varepsilon_t. \tag{10}$$

In this case, $a = 0$ and b is larger in the Hoover case. Specifically, we have:

$$Var(Y) = [1 - \rho]^2 \sigma_\varepsilon^2 \quad \text{in the Keynesian case, and} \tag{11a}$$

$$Var(Y) = \left[\frac{1-\rho}{1-\tau}\right]^2 \sigma_\varepsilon^2 \text{ in the Hoover case.} \tag{11b}$$

Because expression (11b) exceeds (11a), this version of the model supports the conventional wisdom that the Keynesian approach involves lower output volatility in the face of demand shocks.

Before considering supply-side shocks and price-level targeting, we focus directly on the equation used to set the interest rate, described above. It is given by

$$r_t = \bar{r} + \left(\frac{1}{\Omega}\right) E_{t-1}[Y_{t+1} - Y_t] + \left(\frac{\lambda\rho}{\Omega}\right) u_{t-1}. \tag{12}$$

According to reaction function (12), if we ignore the error term, we see that the central bank raises the interest rate to dampen demand whenever it expects output to be rising, even when output is below the natural rate. This policy is motivated by the bank's desire to limit future inflation, but this behaviour can prolong a recession. Because parameter Ω is larger in the Hoover regime, we see that the central bank reacts less forcefully in this regard when a rigid fiscal policy is in place. This endogeneity of monetary policy—with the bank becoming more passive as the fiscal authority becomes less Keynesian—is one of the reasons that can make it sensible for the fiscal authority to reject the basic lesson of the 1930s. This analysis verifies that the monetary policy reaction function *is* dependent on fiscal policy, as stressed in section 1. Nevertheless, this effect is not always strong enough to threaten the applicability of conventional wisdom on this topic. Indeed, as we have just seen, for demand shocks and inflation-rate targeting, conventional wisdom is definitely supported.

The results change when we examine supply-side shocks. For example, with price-setting (cost-push) shocks, we find

$$Var(Y) = \left[\frac{\eta^2(2-\eta^2)}{\theta^2(1-\eta^2)}\right]\sigma_\xi^2$$

in *both* the Keynesian and Hoover cases.

Similarly, with natural-rate shocks, we find

$$Var(Y) = \left[\frac{\gamma^2}{1-\gamma^2}\right]\sigma_\delta^2$$

in *both* the Keynesian and Hoover cases. Thus, for supply shocks and inflation-rate targeting, the endogenous response of the central bank to changes in the fiscal policy regime is *just sufficient* to remove the model's support for the conventional wisdom in favour of the Keynesian approach.

Our findings are very similar when we consider a central bank that targets the price level. In the case of demand shocks,

$$Var(Y) = \left[\frac{5(1-\rho)^2}{(3+\theta\alpha(1-\tau))^2}\right]\sigma_\varepsilon^2 \tag{13a}$$

with the Keynesian fiscal policy, and

$$Var(Y) = \left[\frac{5(1-\rho)^2}{(1-\tau)^2(3+\theta\alpha)^2}\right]\sigma_\varepsilon^2 \tag{13b}$$

with the Hoover approach. Since expression (13a) is smaller than expression (13b), the Keynesian approach is definitely supported.

The results are messier for supply shocks when the central bank targets the price level. With price-setting shocks,

$$Var(Y) = \left[\left[\frac{1}{\theta^2}\right]\left[\frac{1-\eta}{3+\theta\alpha(1-\tau)}\right]\left[\frac{5(1-\eta)}{3+\theta\alpha(1-\tau)}-4\right]+\left[\frac{1}{\theta^2(1-\eta)^2}\right]\right]\sigma_\varepsilon^2 \qquad (14a)$$

in the Keynesian case, and

$$Var(Y) = \left[\left[\frac{1}{\theta^2}\right]\left[\frac{1-\eta}{3+\theta\alpha}\right]\left[\frac{5(1-\eta)}{3+\theta\alpha}-4\right]+\left[\frac{1}{\theta^2(1-\eta)^2}\right]\right]\sigma_\varepsilon^2 \qquad (14b)$$

in the Hoover case. Nothing can be said about the relative size of these expressions of the volatility of output without recourse to illustrative parameter values.

Similarly, with natural-rate shocks, we find that

$$Var(Y) = \left[\left[\frac{\gamma-1}{3+\theta\alpha(1-\tau)}\right]\left[\frac{5(\gamma-1)}{3+\theta\alpha(1-\tau)}+4\right]+\left[\frac{1}{1-\gamma^2}\right]\right]\sigma_\delta^2 \qquad (15a)$$

in the Keynesian case, and

$$Var(Y) = \left[\left[\frac{\gamma-1}{3+\theta\alpha}\right]\left[\frac{5(\gamma-1)}{3+\theta\alpha}+4\right]+\left[\frac{1}{1-\gamma^2}\right]\right]\sigma_\delta^2 \qquad (15b)$$

in the Hoover case.

We evaluate expressions (14) and (15) by considering representative parameter values. We assume a value of unity for $\bar{Y}$ (measured as a proportion of trend GDP) so that a plausible value for α, the mean value of private consumption, is 0.8. We assume 0.25 for the tax rate, τ, and (for an annual calibration of the model) we follow standard practice by assuming a mean value for θ equal to 0.5. We sensitivity test by varying θ between 0.25 and 0.75, and we consider values between 0.1 and 0.9 for the serial correlation parameters, η and γ. We find that, for all parameter values, the variance expressions are almost the same. When the ratios of expressions (14a) to (14b) and (15a) to (15b) are calculated, the results are almost unity. The typical outcome is 0.99. We conclude that the Keynesian policy is very marginally supported, but it is essentially a tie (which was the precise result reported above for supply-side shocks with inflation-rate targeting). We conclude that no significant differences result from changing the analysis from inflation-rate to price-level targeting.

The intuition behind our results is straightforward. Consider an adverse demand shock—a leftward shift in the aggregate demand curve in price-output space. Without a response from either the fiscal or monetary policy-maker, there would be a fall in the price level. Both a Keynesian fiscal authority and a central bank that is committed to price stability will react by shifting the aggregate demand curve back to the right, and these reactions help to limit the temporary shortfall in output. The central bank cannot do a perfect job providing this insulation in this setting, because the interest rate must be set *before* the current-period shock is known. In contrast, the fiscal built-in stabilizers do *not* require the fiscal policy-maker to form any expectations in advance. As a result, the Keynesian approach provides real output with additional insulation from demand shocks—beyond what can be expected from monetary policy. That is why conventional wisdom is supported for demand shocks.

With an adverse supply shock (a leftward shift of the aggregate supply curve), monetary policy faces a trade-off. The pursuit of price stability requires a policy-induced leftward shift in aggregate demand, and this accentuates the fall in real output. As long as the central bank pursues price stability, the fiscal authority is left with an instrument that cannot accomplish what is desired (a move back to the right in the position of the aggregate supply curve). In this instance, little is lost by adopting the Hoover strategy.

4. Sensitivity Tests

Some macroeconomists are uncomfortable with the Calvo specification of sticky prices. In particular, it has been observed that there is more inflation inertia in the data than is implied by the Calvo structure. One reaction is to follow Fuhrer and Moore (1995) by including a lagged actual inflation rate in the aggregate supply function. Another reaction—one which facilitates the derivation of explicit analytical solutions in the present setting, and which introduces more sticky prices in a way that involves explicit microfoundations (see Mussa 1981 and McCallum 1980)—is to replace the Calvo supply function with McCallum's "p-bar" specification. Thus, as a sensitivity test, we replace equation (2) with

$$p_t - p_{t-1} = \theta(Y_{t-1} - \bar{Y}_{t-1}) + (E_{t-1}(\bar{p}_t) - \bar{p}_{t-1}) + v_t . \qquad (2a)$$

With this specification, except for price-setting shocks, prices are completely pre-determined at each point in time. $\bar{p}_t$ is that value of price that would make current demand equal to the natural rate of output.

It turns out that, with this specification for price setting, the results for inflation-rate targeting and price-level targeting are identical. However, straightforward analytical expressions emerge only for demand shocks. The reduced form for real output is again given by equation (12). In this case, $b = \frac{(1-\rho)}{\alpha\theta(1-\tau)}$, whichever fiscal policy is adopted. But the persistence parameter, *a*, does depend on fiscal policy. With the Keynesian approach, $a = 1 - \alpha\theta(1-\tau)$, while in the Hoover case, $a = 1 - \alpha\theta$. Because there is higher persistence with Keynesian policy, the volatility of output is accentuated by following the Keynesian approach, and conventional wisdom is *not* supported in this case. As stated in section 1, to provide intuition in this case, it is helpful to think of a shift from the Keynesian policy to the Hoover regime as involving two components: an impact effect and a persistence effect. In our core model (described in section 3) the Keynesian approach involves a favourable impact effect (in the face of demand shocks). In this instance (with McCallum's supply function), the private sector's nominal variable (the price level) is just as pre-determined going into each period as the central bank's nominal variable (the interest rate). It appears that this precludes the Keynesian fiscal regime from delivering any favourable impact effect. Also, because the Hoover policy induces the central bank to be less aggressive in the short run, while pursuing price stability, it is this regime that has a favourable persistence effect. That is why conventional wisdom is not supported in this case. It is not that the impact effect of pursuing the Keynesian strategy is "perverse," it is that this policy involves an unfavourable persistence effect via its influence on monetary policy. We conclude that, as in many questions in macroeconomics, the verdict concerning a major issue (in this case, whether output volatility is higher when the Keynesian message is ignored) is sensitive to variations in the specification of the short-run aggregate- supply relationship.

Thus far, our reporting of results with the "p-bar" supply function has been limited to the implications of demand shocks. The variance expressions for the supply shocks are very messy and not reported. However, numerical analysis (involving the same representative parameter values described in section 3) confirms that the volatility of output is lower with the Hoover policy when there are price-setting shocks, and the result can go either way when there are natural-rate shocks. Overall, we conclude this sensitivity test by noting that it offers much less support for conventional wisdom.

Why is there more support for the Keynesian approach with Calvo's model of price setting? This is probably because prices are less sticky, and agents are more forward looking, in the Calvo specification. In this environment, output is less affected by demand shocks, so the revision in the central bank's rule for setting the interest-rate (as the fiscal regime changes) is less important. As a result, one of the key mechanisms in the model—which provides competition for the traditional tendency of the Keynesian approach to lead to more built-in stability—is made less powerful. This ensures that conventional wisdom has a better chance of being supported.

On the basis of one additional sensitivity test, we conclude that it is not appropriate to conjecture that the Keynesian approach will always receive more support when private agents are more forward looking (as they are in Calvo's specification). We have examined a traditional descriptive *IS* relationship (as a replacement for the micro-based expectational *IS* function), and when the resulting model is analyzed, we find more, not less, support for conventional wisdom (see Lam 2002). Taking a wider view, then, the verdict concerning the Keynesian versus the Hoover approach to fiscal policy very much depends on whether the model allows for both private agents and the monetary authority to adjust their expectations and revise behaviour in the light of a change in the fiscal regime.

The fact that, overall, the results are somewhat mixed makes our analysis consistent with earlier studies. The early modelling exercises (for example, Gorbet and Helliwell 1971 and Smyth 1974) stressed significant skepticism concerning the efficacy of the Keynesian approach. Our analysis provides an update (which respects the conventions of modern work) and it suggests that there is a firmer basis for this skepticism if analysts embrace the new neoclassical synthesis. Thus, it may not be so surprising after all that

U.S. states with stringent rules for balanced budgets do not have higher variability of output than states without such stringent rules.

5. Conclusions

With the adoption of firm annual targets for balanced budgets, fiscal policy in many countries has become more rigid in recent years. This change has been motivated by the desire to bring long-term viability and credibility to fiscal policy. But with the prospect of this rigid approach being extended into the indefinite future, some analysts—including the editors of the *Economist*—are beginning to express concern that long-term credibility is being gained at the expense of increased short-term volatility in real output and employment.

To investigate this question, we have used what is now the mainstream model for examining issues regarding stabilization policy. In the core model, we find support for the conventional wisdom but only as far as demand shocks are concerned. For supply shocks, however, we find that a Keynesian policy does not reduce the volatility of output. This result may explain the rather limited support for the Keynesian approach that has emerged from the empirical literature. As sensitivity tests, we have considered varying degrees of price stickiness and forward-looking behaviour. The results are mixed. With less forward-looking behaviour involved in aggregate demand, support for the Keynesian approach rises. But when the expectational *IS* specification is retained, the sensitivity tests lessen the support for the Keynesian approach. With particularly sticky prices (McCallum's specification of aggregate supply), the Keynesian approach is essentially rejected; in most cases, the Hoover approach to fiscal policy—which specifies an annual target for balanced budgets target *whatever* the state of the cycle—is supported.

More definite conclusions for actual policy-making must await two developments: empirical work that can allow better discrimination between the alternative specifications of aggregate supply and between the alternative sources of disturbances, and analytical work that poses this question in an open-economy environment. The current paper has identified the key questions for future work, and demonstrated that models that reflect the new paradigm in the analysis of stabilization policy may threaten the support macroeconomists can offer for the widespread view that the Keynesian approach to fiscal policy brings lower volatility of output.

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