When is monetary policy all we need?

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Abstract

As events in the United States at the beginning of 2008 have shown, there remain occasions in which policy makers wish to supplement monetary policy with fiscal action to control the business cycle. Macroeconomists appear divided on whether and when such action is warranted. This paper attempts to clarify some aspects of this debate. We consider a baseline model that combines what are generally regarded as core features of New Keynesian models: imperfectly competitive firms subject to Calvo contracts, households making optimal, intertemporal choices over consumption and labour supply, and a social welfare function derived from their utility. In addition, we include nominal wage rigidity, as this adds both realism and removes the ability of monetary policy to completely offset the adverse impacts of technology and preference shocks. Analytical results show that, in a closed economy version of this model, aggregate demand management through changes in the government spending gap should not be used to supplement optimal monetary policy under commitment, whether the economy faces technology, preference or cost-push shocks. This is not true in an open economy, but only because changes in the government spending gap can partially offset an externality associated with consumer choice and the exchange rate. In an open economy optimal government spending moves procyclically.

A number of recent papers have undertaken numerical analyses of optimal monetary and fiscal policy using calibrated models that represent variations or extensions of our baseline model. Interpreting these papers in the light of the above, we argue that the undesirability of using fiscal policy for demand management will hold (at least to first order) in many models that add additional rigidities or complexity to our baseline model. In particular, we show that variations in the government spending gap will not improve welfare in closed economy models that add a simple form of inflation inertia to the Calvo set-up. In addition, allowing for debt in the absence of lump sum taxes is likely to have little impact on our results, as long as a commitment technology exists.

Finally we note the extent to which these results apply only to government spending as an instrument, representing a demand management role for fiscal policy. We note a number of situations in which variations in tax rates, by changing relative prices, can play a complementary role to monetary policy.
1 Introduction

Since Rotemberg and Woodford (1997), New Keynesian analysis of optimal stabilisation policy has based policy objectives on a second order approximation to social welfare derived from agents’ utility. This has a particular advantage in considering countercyclical fiscal policy, as it allows business cycle costs to be compared with the costs of distortionary taxation or the sub-optimal allocation of public goods using the same metric. At the same time, analysis coming from the dynamic optimal taxation literature has started to analyse Ramsey policies in a world where there are costs in adjusting prices (see Schmitt-Grohe and Uribe (2004) in particular).

In this paper we draw on this recent work, and present some new results of our own, to address the issue of whether fiscal policy should be used as a demand management tool when monetary policy is set in an optimal and unconstrained manner. (In particular, we restrict ourselves to analysis of policy where a commitment mechanism allows time inconsistent solutions.) As events in the United States at the beginning of 2008 have shown, there remain occasions in which policy makers wish to supplement monetary policy with fiscal action to control the business cycle, but these actions remain controversial among macroeconomists. In the main part of this paper we focus on fiscal policy as a tool for influencing aggregate demand, as opposed to a means of changing relative prices. To do this we use government spending as our fiscal instrument, although we note towards the end how some results would change if taxes were the fiscal instrument.

We begin by setting out a baseline model that combines what are generally regarded as core features of New Keynesian models: imperfectly competitive firms subject to Calvo contracts, households making optimal, intertemporal choices over consumption and labour supply, and a social welfare function derived from their utility. In addition, we add nominal wage rigidity, as this adds both realism and removes the ability of monetary policy to completely offset the adverse impacts of technology and preference shocks. Analytical results show that, in a closed economy version of this model, aggregate demand management through fiscal policy in the form of changes in government spending should not be used to supplement optimal monetary policy under commitment, whether shocks come from technology, changes in preferences or are cost-push shocks. (For the case where wages are fully flexible, this result is implicit in Gali and Moncelli, 2005, and is the focus of the analysis in Eser, 2006.)

Optimal government spending varies pro-cyclically in an open economy, but only because government spending can partially offset an externality associated with consumer choice and the exchange rate. We also show that in an open economy, monetary policy is only able to fully offset the impact of technology and preference shocks on the output gap and inflation in the special case that wages are fully flexible.

We then consider how robust these results might be to two extensions of the model. A common theme of empirical studies is that the economy is subject to some degree of inflation inertia, in the sense that lagged inflation appears
alongside expected inflation in the Phillips curve. We indicate why this extension has no impact on the results outlined above. Our baseline model also ignores debt. Once we allow shocks to change the stock of government debt in the absence of lump sum taxes, then we can no longer derive clear analytical results. However numerical simulations and results from other recent papers in the literature indicate that optimal government spending is unlikely to play any significant demand stabilisation role.

Finally we discuss the extent to which these results apply only to government spending as an instrument, representing a demand management role for fiscal policy. We note a number of situations in which variations in tax rates, by changing relative prices, can play a complementary role to monetary policy.

It is important to restate that we restrict ourselves to settings where monetary policy is completely unconstrained and is set in an optimal manner assuming some commitment technology. We ignore the possibility of interest rates hitting a zero lower bound, a consideration that might well justify a fiscal response to severe deflation. In addition if, for some reason, monetary policy was constrained to follow a simple form of Taylor rule, then this might reprise a role for fiscal demand management (see Eser, 2006, but also Schmitt-Grohe and Uribe, 2007). We also ignore any uncertainty about the transmission mechanism of monetary policy. While all these considerations may be important in practice, the case where monetary policy is optimal and unconstrained seems like a natural starting point for analysis.

2 The Baseline Model

This section outlines our baseline model. It is for a small open economy where consumers have a bias to purchase domestically produced goods, which has the advantage that a closed economy is a special case of the model where this home bias is complete. The model is similar in structure to Gali and Moncelli, 2005, with the main addition being the presence of sticky wages as well as sticky prices. The core ingredients of the closed economy version of the model - intertemporal optimisation by consumers over goods and leisure and Calvo contracts - are common to a large number of papers in the literature. A more detailed derivation of the model is contained in Leith and Wren-Lewis (2007a).

2.0.1 Households

There are a continuum of households of size one, who differ in that they provide differentiated labour services to firms in their economy. However, we shall assume full asset markets, such that, through risk sharing, they will face the same budget constraint and make the same consumption plans even if they face different wage rates due to stickiness in wage-setting. We assume the typical household maximises the following objective function,

\[ E_0 \sum_{t=0}^{\infty} \beta^t (\ln C_t + \chi \ln G_t - \frac{(N(k_t)^{1+\varphi})}{1+\varphi}) \]  

(1)
where $C$, $G$ and $N$ are a consumption aggregate, a public goods aggregate, and labour supply respectively. Here the only notation referring to the specific household, $k$, indexes the labour input, as full financial markets will imply that all other variables are constant across households.

The consumption aggregate is defined as

$$C = \frac{C_H^{1-\alpha} C_F^\alpha}{(1-\alpha)(1-\alpha)\alpha}$$

(2)

where, if we drop the time subscript, all variables are commensurate. $C_H$ is a composite of domestically produced goods given by

$$C_H = (\int_0^1 C_H(j) \bar{\frac{dj}{\bar{\alpha}}} \frac{dj}{\bar{\alpha}})^{\frac{1}{\bar{\alpha}}}$$

(3)

where $j$ denotes the good’s type or variety. The aggregate $C_F$ is an aggregate across countries $i$

$$C_F = (\int_0^1 C_i^{\frac{\eta-1}{\eta}} \frac{di}{\eta})^{\frac{1}{\eta}}$$

(4)

where $C_i$ is an aggregate similar to (3). However, for tractability we assume $\eta = 1$. Finally the public goods aggregate is given by

$$G = (\int_0^1 G(j) \bar{\frac{dj}{\bar{\alpha}}} \frac{dj}{\bar{\alpha}})^{\frac{1}{\bar{\alpha}}}$$

(5)

which implies that public goods are all domestically produced. The elasticity of substitution between varieties $\epsilon > 1$ is common across countries.

The parameter $\alpha$ is (inversely) related to the degree of home bias in preferences, and is a natural measure of openness. If $\alpha = 1$ we have no home bias, and the only potential connection between domestic consumption and domestic output is through income, although this is in turn modified by international risk sharing, which we discuss below. If $\alpha = 0$ we effectively have a closed economy.

The budget constraint at time $t$ is given by

$$\int_0^1 P_{H,t}(j) C_{H,t}(j) dj + \int_0^1 P_{i,t}(j) C_{i,t}(j) di + E_t\{Q_{t,t+1} D_{t+1}\} = \Pi_t + D_t + W_t N(k) t (1 - \tau_t) - T_t$$

(6)

where $P_{H,t}(j)$ is the price of variety $j$ imported from country $i$ expressed in home currency, $D_{t+1}$ is the nominal payoff of the portfolio held at the end of period $t$, $\Pi$ is the representative household’s share of profits in the imperfectly competitive firms, $W$ are wages, $\tau$ is an wage income tax rate, and $T$ are lump sum taxes. $Q_{t,t+1}$ is the stochastic discount factor for one period ahead payoffs.

Households must first decide how to allocate a given level of expenditure across the various goods that are available. They do so by adjusting the share of a particular good in their consumption bundle to exploit any relative price differences - this minimises the costs of consumption. Optimisation of expenditure
for any individual good implies the demand functions,

\[ C_H(j) = \left( \frac{P_H(j)}{P_H} \right)^\varepsilon C_H \]  

\[ C_i(j) = \left( \frac{P_i(j)}{P_i} \right)^\varepsilon C_i \]  

where we have price indices given by

\[ P_H = \left( \int_0^1 P_H(j)^{1-\varepsilon} dj \right)^{\frac{1}{1-\varepsilon}} \]  

\[ P_i = \left( \int_0^1 P_i(j)^{1-\varepsilon} dj \right)^{\frac{1}{1-\varepsilon}} \]  

It follows that

\[ \int_0^1 P_H(j)C_H(j) dj = P_H C_H \]  

\[ \int_0^1 P_i(j)C_i(j) dj = P_i C_i \]  

Optimisation across imported goods by country implies

\[ \int_0^1 P_i C_i di = P_F C_F \]  

Optimisation between imported and domestically produced goods implies

\[ P_H C_H = (1 - \alpha)PC \]  

\[ P_F C_F = \alpha PC \]  

where

\[ P = P_H^{1-\alpha} P_F^\alpha \]  

is the consumer price index (CPI). (Note that if \( \alpha = 0 \) then consumer prices just consist of home produced goods.) The budget constraint can therefore be rewritten as

\[ P_tC_t + E_t\{Q_{t,t+1}D_{t+1}\} = \Pi_t + D_t + W_tN(k)\epsilon(1 - \tau_t) - T_t \]  

The first of the household’s intertemporal problems involves allocating consumption expenditure across time. This implies

\[ \beta R_t E_t\{\frac{C_t}{\Pi_{t+1}}(\frac{P_t}{P_{t+1}})\} = 1 \]  

where \( R_t = \frac{1}{E_t(Q_{t,t+1})} \) is the gross return on a riskless one period bond paying off a unit of domestic currency in \( t + 1 \). A log-linearised version of (18) can be written as

\[ c_t = E_t\{c_{t+1}\} - (r_t - E_t\{\pi_{t+1}\} - \rho) \]
where lowercase denotes logs, \( \rho = \frac{1}{\beta} - 1 \), and \( \pi_t = p_t - p_{t-1} \) is consumer price inflation.

We now need to consider the wage-setting behaviour of households. We assume that firms need to employ a CES aggregate of the labour of all households in the domestic production of consumer goods. This is provided by an ‘aggregator’ that aggregates the labour services of all households in the economy as,

\[
N = \left[ \int_{0}^{1} N(k) \frac{dk}{\epsilon_w} \right]^{1-\epsilon_w} \tag{20}
\]

where \( N(k) \) is the labour provided by household \( k \) to the aggregator. We allow the degree of labour differentiation to vary in response to iid shocks which introduce the possibility of wage mark-up shocks. Accordingly the demand curve facing each household is given by,

\[
N(k) = \left( \frac{W(k)}{W} \right)^{-\epsilon_w} N \tag{21}
\]

where \( N \) is the CES aggregate of labour services in the economy which also equals the total labour services employed by firms,

\[
N = \int_{0}^{1} N(j) dj \tag{22}
\]

where \( N(j) \) is the labour employed by firm \( j \). The price of this labour is given by the wage index,

\[
W = \left[ \int_{0}^{1} W(k)^{1-\epsilon_w} dk \right]^{1-\epsilon_w} \tag{23}
\]

The household’s objective function for the setting of its nominal wage is given by,

\[
E_t \left( \sum_{s=0}^{\infty} (\theta_w/\beta)^s \left[ \Lambda_{t+s} \frac{W(k)_t}{P_{t+s}} (1 - \tau_{t+s}) N(k)_{t+s} - \frac{(N(k)_{t+s})^{1+\varphi}}{1+\varphi} \right] \right) \tag{24}
\]

where \( \Lambda_{t+s} = C_{t+s}^{-1} \) is the marginal utility of real post-tax income and \( N(k) = \left( \frac{W(k)}{W} \right)^{-\epsilon_w} N \) is the demand curve for the household’s labour. The first order condition from this problem can be combined with the aggregate wage index to give a log-linearised expression for wage-inflation dynamics,

\[
\pi_{t}^w = \beta E_t \pi_{t+1}^w + \frac{\lambda_w}{(1+\varphi)}(\varphi n_t - w_t + c_t + p_t - \ln(1-\tau_t) + \ln(\mu_t^w)) \tag{25}
\]

where \( \lambda_w = \frac{(1-\theta_w/\beta)(1-\theta_w)^s}{(1+\varphi)} \) and \( \mu_t^w \) is the wage-markup in the absence of wage stickiness. Note that the forcing variable in this New Keynesian Phillips curve (NKPC) is a log-linearised measure of the extent to which wages are not at the level implied by the labour supply decision that would hold under flexible wages.
The allocation of government spending across goods is determined by minimising total costs,
\[ \int_0^1 P_H(j)G(j) dj. \] Given the form of the basket of public goods this implies
\[ G(j) = \left( \frac{P_H(j)}{P_H} \right)^{-\epsilon} G \] (26)

2.0.2 The exchange rate and risk sharing

The bilateral terms of trade are the price of country i’s goods relative to home goods prices,
\[ S_i = \frac{P_i}{P_H} \] (27)
The effective terms of trade are given by
\[ S = \frac{P_F}{P_H} = \exp \int_0^1 (p_i - p_H) di \] (28)
which can be rewritten in logs as
\[ p = p_H + \alpha s \] (29)
where \( s = p_F - p_H \) is the logged terms of trade.

There is assumed to be free-trade in goods, such that the law of one price holds for individual goods at all times. This implies,
\[ P_i(j) = \varepsilon_i P_i^i(j) \] (30)
where \( \varepsilon_i \) is the bilateral nominal exchange rate and \( P_i^i(j) \) is the price of country i’s good j expressed in terms of country i’s currency. Aggregating across goods this implies,
\[ P_i = \varepsilon_i P_i^i \] (31)
where \( P_i^i = \left( \int_0^1 P_i^i(j) \right)^{1/\epsilon} \). From the definition of \( P_F \) we have, in log-linearised form,
\[ p_F = \int_0^1 (e_i + p_i^i) di \] (32)
where \( e = \int_0^1 e_i di \) is the log of the nominal effective exchange rate, \( p_i^i \) is the logged domestic price index for country i, and \( p^* = \int_0^1 p_i^i di \) is the log of the world price index. For the world as a whole there is no distinction between consumer prices and the domestic (world) price level.
Combining the definition of the terms of trade and the result just obtained gives

\[ s = p_F - p_H \]

(33)

\[ = e + p^* - p_H \]

Equations for the effective exchange rate, which when logged is denoted by \( q \), are given in Leith and Wren-Lewis (2007a).

We assume perfect international insurance markets for national income risk, so international risk sharing holds. Assuming symmetric initial conditions (e.g., zero net foreign assets, structurally similar economies etc) and equating the first order conditions (foocs) for consumption between two economies yields,

\[ Q_{i,t+1} \left( \frac{C_{i,t+1}}{C_{i,t+1}} \right) = Q_{i,t} \left( \frac{C_i}{C_t} \right) \]

(34)

where the real exchange rate between home and country \( i \) is,

\[ Q_{i,t} = \epsilon_{it} P_{t}^* \]

implying

\[ C_t = z^i C_t Q_{i,t} \]

(35)

where \( z^i \) is a constant which depends upon initial conditions. Log-linearising and integrating over all countries yields,

\[ c = c^* + (1 - \alpha)s \]

(36)

where \( c^* = \int_0^1 c^i \, di \).

### 2.0.3 Firms

The production function is linear, so for firm \( j \)

\[ Y(j) = AN(j) \]

(37)

where \( a = \ln(A) \) is time varying and stochastic. The demand curve they face is given by,

\[ Y(j) = \left( \frac{P_H(j)}{P_H} \right)^{-1} \left[ (1 - \alpha) \left( \frac{P_C}{P_H} \right) + \alpha \int_1^0 \left( \frac{P^i C^i}{P_H} \right) \, di + G \right] \]

(38)

which we rewrite as,

\[ Y(j) = \left( \frac{P_H(j)}{P_H} \right)^{-\epsilon} Y \]

(39)

where \( Y = \left[ \int_0^1 Y(j) \, di \right]^\frac{1}{\epsilon} \). The objective function of the firm is given by,

\[ \sum_{s=0}^{\infty} (\theta)^s Q_{t,s} \left[ \left( 1 - \tau^{t+s}_{i+s} \right) \frac{P_H(j)}{P_{i+s}} Y(j)_{t+s} - \frac{W_{t+s} Y(j)_{t+s}(1 - \kappa)}{A_{t+s}} \right] \]

(40)
where $\kappa$ is an employment subsidy which can be used to eliminate the steady-state distortion associated with monopolistic competition and distortionary production and income taxes (assuming there is a lump-sum tax available to finance such a subsidy) and $\tau^r$ is a production tax. (As labour is the only factor of production in this model, the production tax is equivalent to a variable employment subsidy. In a closed economy, the production tax is equivalent to a sales tax.)

$1-\theta$ is the probability of a price change in a given period. Optimisation implies a New Keynesian Phillips Curve (NKPC) which is given by

$$\pi_{H,t} = \beta E_t \pi_{H,t+1} + \lambda (mc_t + \ln(\mu_t))$$ (41)

where $\lambda = \frac{(1-\theta \beta)(1-\theta)}{\theta}$ and $mc = -a + w - p_H - \ln(1-\tau^r) - v$ are the real log-linearised marginal costs of production, and $v = -\ln(1-\kappa)$. In the absence of sticky prices profit maximising behaviour implies $mc = -\ln(\mu)$ where $\mu$ is the price mark-up, which will be subject to iid shocks below.

### 2.0.4 Equilibrium

Goods market clearing requires, for each good $j$,

$$Y(j) = CH(j) + \int_0^1 C^i_H(j) di + G(j)$$ (42)

Symmetrical preferences imply,

$$C^i_H(j) = \alpha \left( \frac{P_H(j)}{P_H} \right)^{-\varepsilon} \left( \frac{P_H}{P_i} \right)^{-1} C^i$$ (43)

which, using the definition of aggregate output above, allows us to write

$$Y = CS^\alpha + G$$ (44)

Taking logs implies

$$\ln(Y - G) = c + \alpha s$$

$$= y + \ln(1 - \frac{G}{Y})$$

$$= y - h$$

where we define $h = -\ln(1 - \frac{G}{Y})$. We can use these relationships to rewrite (19) as

$$y_t = E_t \{ y_{t+1} - (r_t - E_t \{ \pi_{t+1} \} - \rho) - E_t \{ h_{t+1} - h_t \} - \alpha E_t \{ s_{t+1} - s_t \} \}

= E_t \{ y_{t+1} - (r_t - E_t \{ \pi_{H,t+1} \} - \rho) - E_t \{ h_{t+1} - h_t \} \}$$ (46)

Wage inflation dynamics are determined by,

$$\pi_{H,t} = \beta E_t \pi_{H,t+1} + \frac{\lambda_w}{(1 + \varphi_w)} (\varphi w_t - w_t + c_t + p_t - \ln(1 - \tau_t) + \ln(\mu_t^w))$$ (47)
Here the forcing variable captures the extent to which the consumer’s labour supply decision is not the same as it would be under flexible wages. Define this variable as \( mc^w = \varphi n_t - w_t + c_t + p_t - \ln(1 - \tau_t) \). This can be manipulated as follows,

\[
mc^w = \varphi n - w + p_H + c + p - p_H - \ln(1 - \tau) \\
= \varphi n - w + p_H + c + \alpha s - \ln(1 - \tau) \\
= \varphi y - (w - p_H) + c^* + s - \ln(1 - \tau) - \varphi a
\] (48)

From above we had

\[
y = c^* + h + s
\] (49)

so we can also write marginal costs appropriate to wage inflation as

\[
mc^w = (1 + \varphi)y - (w - p_H) - \ln(1 - \tau) - h - \varphi a
\] (50)

### 2.1 Summary of Model

We are now in a position to summarise our model. On the demand side we have an Euler equation for consumption,

\[
y_t = E_t\{y_{t+1}\} - (r_t - E_t\{\pi_{H,t+1}\} - \rho) - E_t\{h_{t+1} - h_t\}
\] (51)

On the supply side there are equations for price inflation,

\[
\pi_{H,t} = \beta E_t\{\pi_{H,t+1}\} + \lambda(mc_t + \ln(\mu_t))
\] (52)

where \( \lambda = \frac{(1 - \beta \theta)(1 - \theta)}{\theta} \) and \( mc = -a + w - p_H - \ln(1 - \tau) - v \). There is a similar expression for wage inflation,

\[
\pi_{w,t}^H = \beta E_t\pi_{w,t+1}^H + \frac{\lambda_w}{1 + \varphi c_w}((1 + \varphi)yt - (w_t - p_{H,t}) - \ln(1 - \tau_t) - h_t - \varphi a_t + \ln(\mu_{w,t}^H))
\] (53)

which together determine the evolution of real wages,

\[
w_t - p_{H,t} = \pi_{w,t}^H - \pi_{H,t} + w_{t-1} - p_{H,t-1}
\] (54)

The model is then closed by the policy maker specifying the appropriate values of the fiscal and monetary policy variables.

Although this represents a fully specified model it is often recast in the form of ‘gap’ variables which are more consistent with utility-based measures of welfare. Define the natural level of (log) output \( y^\nu \) as the level that would occur in the absence of nominal inertia and conditional on the optimal choice of government spending, steady-state tax rates and the actual level of world output. Define the output gap as

\[
y^\theta = y - y^\nu
\] (55)
With flexible prices and wages we have $mc^n = -\ln(\mu)$ and $mc^{w,n} = -\ln(\mu^w)$ which can be solved (see Leith and Wren-Lewis (2007a)) for the natural level of output,

$$y^n = a + h^n/(1 + \varphi) + (v + \ln(1 - \tau)) - \ln(\mu) - \ln(\mu^w))/(1 + \varphi) \quad (56)$$

where $\tau$ is the steady-state income tax rate. We can then write the forcing variable for wage inflation in ‘gap’ form as,

$$mc^{w,g} = mc^w + \ln(\mu^w_t) \quad (57)$$

where $\ln(1 - (1 - \tau)^g = \ln(1 - (1 - \varphi)) - \ln(1 - \tau)^g - \ln(1 - \tau)^g + u^w_t$ is the tax gap, $u^w_t = \ln(\frac{w}{P})$ is the wage mark-up shock and real wages are defined as $rw = \ln(\frac{W}{P})$. Substituting this into the Phillips curve for wage inflation gives,

$$\pi^w_{H,t} = \beta E_t \pi^w_{H,t+1} + \frac{\lambda^w}{(1 + \varphi^w)}((1 + \varphi)\pi^w_t - h^q_t - rw_t^q - \ln(1 - \tau_t)^g + u^w_t) \quad (58)$$

A similar expression for price inflation is given by,

$$\pi_{H,t} = \beta E_t \{\pi_{H,t+1} + \lambda[rw^q_t - \ln(1 - \tau_t)^g + u^p_t] \quad (59)$$

where the ‘gapped’ real wage evolves according to,

$$rw^q_t = \pi^w_{H,t} - \pi_{H,t} + rw^q_{t-1} - \Delta a_t \quad (60)$$

We can also write (46) for natural variables as

$$y^n_t = E_t \{y^n_{t+1} - (r^n_t - \rho) - E_t \{h^n_{t+1} - h^n_t \} \quad (61)$$

so

$$r^n_t = \rho + E_t \{y^n_{t+1} - y^n_t \} - E_t \{h^n_{t+1} - h^n_t \} \quad (62)$$

This allows us to write (46) for gap variables as

$$y^q_t = y_t - y^n_t = E_t \{y^q_{t+1} - (r_t - E_t \{\pi_{H,t+1} \} - r^n_t) - E_t \{h^q_{t+1} - h^q_t \} \quad (63)$$

Note that, given (56), the real natural rate of interest depends - like natural output - only on the productivity shock, the steady-state levels of distortionary taxation and the optimal level of government spending.

### 3 Optimal policy

#### 3.1 The Social Planner’s Problem in a Small Open Economy.

In deriving welfare it is helpful to begin by considering the social planner’s problem. The social planner simply decides how to allocate consumption and
production of goods within the economy, subject to the various constraints implied by being a small open economy. Since they are concerned with real allocations, the social planner ignores market prices and, therefore, nominal inertia and distortionary taxes in describing optimal policy. The social planner’s optimisation therefore provides a natural benchmark for considering optimal policy in the presence of nominal inertia. Gali and Monocelli (2005) demonstrate that the solution to the social planner’s problem is given by,

\begin{align*}
N &= (1 - \alpha + \chi)^{1/\tau} \\
G &= \frac{N A \chi}{1 - \alpha + \chi} = \frac{Y \chi}{1 - \alpha + \chi}
\end{align*}

which implies the optimal value for \( h \),

\[ h = \ln\left(1 + \frac{\chi}{1 - \alpha}\right) \]  

3.2 Flexible Price Equilibrium

Having considered the social planner’s problem we now proceed to compare this to the decentralised equilibrium in our economy assuming there is no nominal inertia. We do this for two reasons. Firstly, it allows us to define the subsidy required to eliminate the distortions that would otherwise render our steady-state inefficient. Imposing this subsidy eliminates the usual inflationary bias problems that would otherwise emerge and allows us to focus on stabilisation policy. Secondly, by then contrasting the outcome under nominal inertia with this flex price solution we can derive a measure of welfare which captures the extent to which such frictions have been overcome by stabilisation policy.

Profit-maximising behaviour, under flexible prices and wages, implies that firms will operate at the point at which marginal costs equal marginal revenues,

\[ \left(1 - \frac{1}{\epsilon}\right) \left(1 - \frac{1}{\epsilon_w}\right) = \frac{(1 - \kappa)}{(1 - \tau')(1 - \tau)} (N^n)^{(1+\nu)} (1 - \frac{G^n}{Y^n}) \]  

(66)

Now if \( G^n \) is given by the optimal rule (65), then

\[ 1 - \frac{G^n}{Y^n} = \frac{1 - \alpha}{1 - \alpha + \chi} \]  

(67)

and if the subsidy \( \kappa \) is given by

\[ (1 - \kappa) = (1 - \frac{1}{\epsilon})(1 - \frac{1}{\epsilon_w})(1 - \tau')(1 - \tau)/(1 - \alpha) \]  

(68)

then

\[ N^n = (1 - \alpha + \chi)^{1/\tau\nu} \]  

(69)

and employment is identical to the optimal level of employment above. Here the subsidy has to overcome the distortions due to monopoly pricing in the goods and labour markets, as well as any distortionary income and production taxes.
3.3 Social Welfare

Leith and Wren-Lewis (2007a) derive the quadratic approximation to utility for the small open economy as

\[
\Psi = -\frac{1}{2}(1 - \alpha + \chi) + \sum_{t=0}^{\infty} \beta^t \left( \frac{\varepsilon}{\lambda_w} \pi_t^2 + \frac{\varepsilon_w}{\lambda_w} (\pi_t^w)^2 + (y_t^g)^2(1 + \varphi) + \frac{1}{\chi} (h_t^g)^2 \right)
\]

\[+ t + o (\|a\|^3) \quad (70)\]

Social welfare depends on both price inflation and wage inflation, as well as the output gap and a term related to the government spending gap.

3.4 Precommitment in the Small Open Economy

The lagrangian associated with the policy problem is given by,

\[
L_t = E_0 \sum_{t=0}^{\infty} \beta^t \left( \frac{\varepsilon}{\lambda_w} \pi_t^2 + \frac{\varepsilon_w}{\lambda_w} (\pi_t^w)^2 + (y_t^g)^2(1 + \varphi) + \frac{1}{\chi} (h_t^g)^2 \right)
\]

\[+ \lambda_t^\pi (\pi_t - \beta \pi_{t+1} - \tilde{\lambda}_w ((1 + \varphi) y_t^g - h_t^g - (rw_t^g) - \ln(1 - \tau_t)^g + u_t^w))
\]

\[+ \lambda_t^w (y_t^g - h_t^g - y_{t+1}^g + h_{t+1}^g - \beta \pi_{t+1} - \pi_t + (r_t - r_t^g))
\]

\[+ \lambda_{r_t}^w (rw_t^g - \pi_t^w + \pi_t - rw_{t-1}^g + \Delta a_t)] \quad (71)\]

where the langrange multipliers \( \lambda_t^\pi, \lambda_t^w, \lambda_t^y \) and \( \lambda_{r_t}^w \) are associated with the constraints given by the NKPC for wage inflation, the NKPC for price inflation, the euler equation for consumption and the evolution of real wages, respectively.

The first-order condition for the interest rate is

\[\lambda_t^y = 0 \quad (72)\]

This tells us that in effect the monetary authorities have control over consumption such that the consumption Euler equation ceases to be a constraint.

The remaining focs, applying the above, are for real wages,

\[-\lambda_t^y + \tilde{\lambda}_w \lambda_t^w + \lambda_t^{rw} - \beta \lambda_{t+1}^{rw} = 0 \quad (73)\]

inflation,

\[\frac{2\varepsilon}{\lambda} \pi_t + \lambda_t^y - \lambda_{t-1}^y + \lambda_{t+1}^{rw} = 0 \quad (74)\]

wage inflation,

\[\frac{2\varepsilon_w}{\lambda_w} \pi_t^w + \lambda_t^{rw} - \lambda_{t-1}^{rw} - \lambda_{t+1}^{rw} = 0 \quad (75)\]

the 'government spending' gap,

\[\frac{2}{\chi} h_t^g + \tilde{\lambda}_w \lambda_t^{rw} = 0 \quad (76)\]
and the output gap,

$$2(1 + \varphi)y_t^g - \lambda^w_t(1 + \varphi)\lambda^{-w}_t = 0$$ (77)

Combining the last two implies the following target criterion:

$$\frac{1}{\chi}h^g_t + y^g_t = 0$$ (78)

Recall that the variable $h$ is a transformation involving the government spending to GDP ratio:

$$h = -\ln(1 - G/Y)$$ (79)

In steady state we showed that

$$\bar{G}/\bar{Y} = \frac{\chi}{1 - \alpha + \chi}$$ (80)

It then follows that

$$h^g = \frac{\chi}{1 - \alpha}(g^g - y^g)$$ (81)

$$g^g = y^g + \frac{1 - \alpha}{\chi}h^g$$ (82)

Combining this with the target criteria implies

$$g^g = y^g - (1 - \alpha)y^g = \alpha y^g$$ (83)

This allows us to state two key results.

**Proposition 1 Closed Economy Fiscal Inaction**

In a closed economy, where $\alpha = 0$, optimal policy involves keeping the government spending gap equal to zero whatever the shock hitting the economy.

This result, implicit in Gali and Monacelli (2005) for the case of fully flexible wages, but central to the discussion in Eser (2006) for that case as well, is of considerable importance. It tells us that, in a closed economy, there is no role for varying the government spending gap as a stabilisation device, even when it is optimal to vary the output gap. While this might seem straightforward in cases where monetary policy can eliminate all losses due to nominal inertia (see below), it is far less transparent when we have additional distortions. In this situation we might have supposed that a second best result applied: some deviation of public good provision from the optimal allocation adopted by the social planner, might have been justified to offset other distortions that monetary policy was unable to eliminate. For example, following a positive cost-push shock, might it not have been helpful to cut the government spending gap to achieve a more balanced reduction in demand? Or, alternatively, could the impact on output of a restrictive monetary policy have been partially cushioned through an expansionary fiscal policy? The result demonstrated here shows that neither is the case.
The intuition behind this result is not straightforward, but is worth pursuing because it indicates its generality. Take the example of a positive cost-push shock, which requires policy to deflate the economy, which helps reduce both price and wage inflation. Policy can do this through some combination of raising interest rates or cutting the government spending gap. Suppose it only does the former. This causes consumers to reduce their consumption and labour supply compared to the optimal flex price level. Optimisation by consumers will ensure that, given real interest rates, we get the optimal mix of lower consumption and output gaps. We can then ask whether changing the government spending gap could improve social welfare.

Suppose we write a consolidated (in terms of the budget constraint), per period utility function in terms of gap variables

\[ U = U(g^g, y^g) \]  

Consumers choose output (and hence consumption) to maximise utility given prices. Then changes in government spending will alter utility both directly, and indirectly through a change in the output/consumption choice.

\[ \frac{dU}{dg^g} = \frac{\partial U}{\partial g^g} + \frac{\partial U}{\partial y^g} \frac{dy^g}{dg^g} \]  

Utility maximisation ensures \( \frac{\partial U}{\partial y^g} = 0 \), so the only impact of changing the government spending gap is its direct impact, \( \frac{dU}{dg^g} = 0 \) when \( g^g = 0 \). As social welfare is derived from this utility, then social welfare cannot be improved by altering the government spending gap.

It should be noted that the absence of any desirability in varying the government spending gap in this case depends upon the efficiency of the steady-state. If the initial steady-state contained distortions due to monopolistic competition which were not offset by the subsidy described above then it would no-longer be the case that household behaviour ensured \( \frac{\partial U}{\partial y^g} = 0 \) and it is easy to show that the optimal government spending gap would be non-zero. It is also important to note that a zero government spending gap does not necessary imply that actual government spending does not change under optimal policy, because a change in the natural (flex-price) level of government spending may well be warranted for certain shocks. However, it would be misleading to interpret such movements as a countercyclical fiscal policy.

**Proposition 2** *Open Economy Pro-cyclical Fiscal Policy*

In an open economy, where \( \alpha > 0 \), optimal policy involves varying the government spending gap proportionately to the output gap.

In the case of a positive cost-push shock, a negative output gap is accompanied by a reduction in the government spending gap, but only by the degree to which the economy is open. Why does the analysis from a closed economy no longer apply? We now have an additional variable involved in the optimisation problem, which is the terms of trade. Consumers take optimal consumption and
labour supply decisions for a given level of the terms of trade, but they fail to take account of the effect that these decisions have on the terms of trade. International risk sharing implies that lower consumption will be associated with an appreciation in the real exchange rate, which will benefit consumers through an improvement in the terms of trade. Because consumers fail to take this into account, they reduce consumption and labour supply by too much following any increase in interest rates. In this situation, it makes sense for policy makers to also tighten fiscal policy. Although this in itself is distortionary, it helps mitigate the distortion caused by the ‘over-reaction’ of consumers to monetary policy, because monetary policy can be less deflationary as a result. Returning to the consolidated utility function above, we now have

$$\frac{dU}{dg} = \frac{\partial U}{\partial g} + (\frac{\partial U}{\partial y} \cdot dy + \frac{\partial U}{\partial s} \cdot ds) \cdot \frac{dy}{dg} \cdot \frac{ds}{dg}$$  \hspace{1cm} (86)$$

Consumers ensure $\frac{\partial U}{\partial y} = 0$, and not $\frac{\partial U}{\partial y} + \frac{\partial U}{\partial s} \cdot ds \cdot \frac{dy}{dg}$, because they ignore $\frac{ds}{dg}$ in setting output/labour supply and consumption. While it remains the case that the direct impact of altering public good provision away from the steady state is always negative, by changing government spending the authorities can attempt to offset the externality created by $\frac{\partial s}{\partial y}$ being non-zero.

These results are general, in the sense that they apply for all parameter values. We derived them in a model where wages as well as prices are sticky, but they will also clearly apply in the special case where only prices are sticky. It is worth examining that special case, because it enables us to derive one more important result.

**Proposition 3 When complete stabilisation is possible**

When wages are fully flexible, the adverse welfare costs of technology shocks in a sticky-price environment can be completely eliminated by optimal monetary policy.

If wages are fully flexible, then the policy problem is given by,

$$L_t = E_0 \sum_{t=0}^{\infty} \beta^t \left[ \frac{\varepsilon}{\lambda} \pi^2 + \frac{\varepsilon_w}{\lambda_w} (\pi^w)^2 + (\gamma^g)^2 (1 + \varphi) + \frac{1}{\lambda} (h^g)^2 \right]$$

$$+ \lambda_t^g (\pi_t - \beta \pi_{t+1} - \lambda[(1 + \varphi)y^g_t - h^g_t - \ln(1 - \tau_t)^g - \ln(1 - \tau_t)^g + u^w_t + u^p_t])$$

$$+ \lambda_t^g (\gamma^g_t - h^g_t - y^g_{t+1} + h^g_{t+1} - \pi_{t+1} + (r_t - r^p_t))$$

where we replace the dynamic equation for real wages by the equation that results from setting $mc^{\omega,g} = 0$ (see equation (57)) and use this to rewrite the measure of marginal costs which drives domestic price inflation. As a result, the only term in the productivity shock $a_t$ disappears. If cost-push shocks are zero, then the monetary authority can eliminate all gaps. From the first two focs, we see that inflation will always be on target. From the last foc, this implies the output gap will always be zero. The authorities can then set the government spending gap to zero, and the loss function, capturing the costs of nominal inertia, will be zero.
The intuition behind this result is that, for any given level of nominal interest rates, nominal inertia leads to losses only because real interest rates are at a level different from the flexible price equilibrium. As a result, it is possible to achieve the flexible price allocation by setting the appropriate nominal interest rate. If nominal inertia in price setting is the only distortion in the economy (because we have eliminated other distortions by setting an appropriate steady state production subsidy), then monetary policy can completely offset this distortion and achieve a first best allocation. Fiscal policy can therefore remain at its first best level. A similar result would apply if we explicitly included preference shocks in the model.

The result does not apply to cost-push shocks because they introduce an additional distortion into the economy. While the steady state employment subsidy eliminates the steady state monopoly distortion, a cost-push shock means that the monopoly distortion has temporarily changed. However, if we allowed the employment subsidy to also vary period by period, then we could again eliminate this distortion in each period. This is one way in which fiscal policy operating through taxes can assist monetary policy, which we return to below.

While this proposition may be familiar, equally important is the corollary that when wages as well as prices are sticky, then monetary policy can no longer offset the costs of nominal inertia in the face of technology shocks. Once again the intuition is straightforward. We now have two distortions in the economy, both of which involve nominal inertia. A technology shock will change the natural level of real wages. When the only distortion involves nominal prices, we can avoid it by keeping nominal prices fixed and achieving the required real wage change by changing nominal wages. However, if nominal wages are also sticky, we cannot avoid at least one form of nominal inertia.

3.5 Robustness

3.5.1 Inflation inertia

A common theme of a number of empirical studies is that the economy is subject to some degree of inflation inertia, in the sense that lagged inflation appears alongside expected inflation in the Phillips curve. A number of recent papers have examined the implications of inflation inertia for optimal monetary policy (e.g. Steinsson, 2003, Sheedy, 2007, Kirsanova et al, 2007). Following Clarida et al (1999), we can capture this in a very simple way by augmenting the Phillips curves in our model with terms in lagged wage or price inflation. This in turn is likely to add terms in lagged inflation into the social welfare function.

Although this will complicate the model, it has no bearing on the derivation of the results in the previous section. The relationship \( g^p = \alpha g^g \) was obtained by combining the first order conditions for the output gap and the government spending gap, after noting that consumption was in effect a choice variable for monetary policy. If allowing inflation inertia into the NKPC simply adds lagged price inflation, and/or wage inflation, into the Lagrangian, then these particular first order conditions will be unaffected. As a consequence, the result on the
invariance of optimal fiscal policy in a closed economy, and its modification for
an open economy, still apply. Furthermore, in the case where wages are fully
flexible, productivity shocks would still disappear from the modified Lagrangian
(87), and so the third proposition about when monetary policy was able to
to completely offset technology shocks would also still hold. In this case, our
results are completely robust to the addition of inflation inertia into the model.

Inertia in inflation might also imply some inertia in marginal costs compared
to the baseline model. However, as long as the definition of the forcing variables
in the inflation equations were unchanged, our three propositions would still
hold. The first order conditions for the output and government spending gaps
would still permit the lagrange multiplier associated with the wage inflation
equation, $\lambda^\pi w$, to be eliminated giving us an identical target criteria for the
government spending gap.

This result accords with the intuition discussed earlier. Although adding
inflation inertia complicates the trade-off between reducing inflation and stabilis-
ing output, in each period consumers in a closed economy continue to ensure
an optimal combination of consumption and labour supply, so the envelope the-
orem still implies that changes to government spending away from their natural
level will just involve costs associated with a suboptimal provision of public
goods. Equally, in an open economy changes in the government spending gap
will be procyclical, helping to offset the externality associated with the impact
of consumption and labour supply decisions on the terms of trade.

3.5.2 Adding Government Debt

In our baseline model, we ignored government debt. Leith and Wren-Lewis
(2007a) formally augment the baseline model by introducing debt, but for rea-
sons of space we focus on the consequences of this extension here.

All three of our propositions no longer hold exactly when debt is added to
the model. Any shock to the model, as well as any subsequent monetary policy
response, will have consequences for government debt through the government’s
budget constraint. To ignore this change in debt would have one of two conse-
quences. If monetary policy remained active (see Leeper, 1991), a debt interest
spiral would result, and the model would be unstable. This could be avoided by
adopting a passive monetary policy, as in the Fiscal Theory of the Price Level,
but focusing monetary policy on stabilising debt rather than stabilising inflation
is likely to have a serious negative impact on welfare (see Leith and Wren-Lewis

In formal terms, adding debt and the government’s budget constraint to
the model adds an additional constraint to the lagrangian (71), which involves
both output and government spending. The multiplier on this constraint then
enters the first order conditions for both government spending and output, and
in contrast to the multiplier on real wages, it is not eliminated when the two
conditions are combined. This effectively adds a wedge to the optimal combi-
nation of government spending and output gaps derived above, such that even
in the closed economy it will be desirable to permanently implement a non-zero
government spending gap as part of the policy package used to ensure fiscal solvency.

However, results in Leith and Wren-Lewis (2007a), Leith and Wren-Lewis (2007b), and a number of other studies suggest that, if policy remains optimal and a commitment technology exists, then the quantitative impact of allowing for debt will be very small. The reason is that optimal policy involves largely accommodating the change in debt induced by the shock, such that steady state debt follows a random walk. The random walk property of optimal debt under commitment was first shown in the context of models with nominal inertia by Schmitt-Grohe and Uribe (2004) and Benigno and Woodford (2003), although the underlying logic comes from tax smoothing. In response to a shock which raises debt, taxes are raised, and/or government spending is cut, by just enough to pay the interest on the increase in debt, and as this change in fiscal policy is relatively small, the impact on social welfare is also small. For example, in the context of the baseline model discussed here, Leith and Wren-Lewis (2007a) show that the impact of a technology shock on social welfare when wages are sticky rises by only 2.4% when debt is added to the model.

Two recent studies are consistent with the view that the presence of government debt in itself is unlikely to resurrect any role for fiscal demand management. The first, Kirsanova and Wren-Lewis (2007), examines a model which is very similar to a closed economy version of our baseline model, but which also includes debt, and where the consequences of any change in the government’s budget constraint cannot be dealt with by lump sum taxes. Monetary policy is optimal (under commitment), and fiscal policy is either chosen optimally or is restricted to a simple rule whose only argument is the stock of government debt. This simple rule is described as ‘fiscal feedback’, and it of course precludes any demand management role for fiscal policy. The focus of their paper is on the implications of different speeds of fiscal feedback for both monetary policy and the economy as a whole. One result they obtain is that feedback that just stabilises debt comes very close to duplicating the optimal policy for debt, which is that steady state debt follows a random walk. The difference in social welfare following a standard cost-push shock is of the order of 0.002% of steady state consumption. An optimal simple fiscal rule which prevents any countercyclical fiscal role is a restriction with negligible welfare costs, and therefore by implication any additional fiscal demand management would at best make a negligible contribution to social welfare.

The second paper is Schmitt-Grohe and Uribe (2007), which compares alternative fiscal and monetary policy rules with a Ramsey policy, using a fairly elaborate model with capital, money and debt, but one which can be viewed as an extension of the closed economy version of our baseline model. Although their fiscal rules involve income taxes rather than government spending, they are restricted to feedback on government debt alone, and so they exclude any countercyclical role. They also find that, when their monetary policy rules are suitably aggressive, these two rules combined come close to replicating the Ramsey policy. The cost of following simple rules for both monetary and fiscal policy compared to the Ramsey policy can be as low as 0.003% of steady state...
consumption. By implication, the cost of excluding any countercyclical role for fiscal policy must be at least as small as this number.

These results suggest that adding government debt to our analysis does not alter our conclusions in a material way. However, it is important to note that here, at least, the assumption that policy can be time inconsistent is important. Leith and Wren-Lewis (2007b) show that under discretion, steady state debt no longer follows a random walk. Instead, fiscal or monetary instruments must be used to bring debt back to its original, pre-shock level, on the assumption that that level was efficient. Taking the example of a technology shock in our baseline model, Leith and Wren-Lewis (2007a) show that allowing for debt adds around 13% to welfare costs under discretion, compared to the 2.4% noted above under commitment. An interesting exercise would be to examine whether fiscal demand stabilisation might have any advantages over monetary policy when policy was discretionary and lump sum taxes were not available.

3.6 Varying taxes rather than spending

So far we have focused on government spending as an instrument of fiscal policy. In our view this comes closest to representing fiscal policy as a demand management tool, which is the theme of this paper. We have shown that there is little or no role for government spending as part of a countercyclical policy if monetary policy is optimal and unconstrained. (In an open economy, fiscal policy is pro-cyclical.) However, it would be quite incorrect to infer from this that fiscal policy in general has no short term stabilisation role. In our analysis so far, we assumed both tax rates were fixed. Suppose instead that we allowed them to vary in an optimal manner. Using the Lagrangian (71), we would obtain two additional first order conditions. For the production tax gap, \( \ln(1 - \tau_r^t)^g \), it is

\[ \lambda \pi_t = 0 \]  
(88)

i.e. the NKPC for prices ceases to be a constraint on maximising welfare - production tax changes can offset the impact of any other variables driving price inflation. In particular, as we noted above, production taxes that can vary period by period can eliminate completely any cost-push shock.

Similarly, the condition for income taxes is given by,

\[ \tilde{\lambda}_w \pi_t = 0 \]  
(89)

Leith and Wren-Lewis (2007a) show that a combination of production and income taxes, combined with an optimal monetary policy, can completely eliminate the impact of technology shocks on social welfare when we have sticky wages.

These two results show tax changes working in distinctly complementary ways to monetary policy. In the first case, production taxes represent a distortionary tax that works on the same margin as a distortionary shock, so we can use one distortion to offset another. This point would hold in a flex price world. In the second case, income taxes help offset the impact of nominal wage
rigidity. As we noted in discussing proposition 3, monetary policy alone cannot eliminate the impact of technology shocks when both nominal wage and price inertia are present. So here, changes in taxes can clearly assist monetary policy in its stabilising role. This result may be an example of a more general point. There may be other examples where different degrees of nominal inertia among different agents or sectors can lead to distortionary movements in relative prices, and where there exist a tax instruments that may be able to offset these relative price changes. One example might be sales taxes and differences in inertia between traded and non-traded goods.

Why do tax changes appear to be a useful compliment to monetary policy in these situations when changes in government spending were not? The key point is that taxes are useful because they help change relative prices in a way that monetary policy cannot. In contrast, the stabilisation role for government spending is in changing demand, and here it can do little or nothing to assist an unconstrained optimal monetary policy.

4 Conclusion

As recent events have shown, there remain occasions in which policy makers wish to supplement monetary policy with fiscal action to control the business cycle, but macroeconomists appear divided on whether and when such action is warranted. This paper attempts to clarify that debate by looking at New Keynesian models where social welfare is derived from consumers utility, and asking whether fiscal action in the form of government spending changes can assist a fully optimal and unconstrained monetary policy under commitment.

In our baseline model, which includes both nominal wage and price rigidity, we show analytically that in a closed economy optimal fiscal policy should play no role in helping to stabilise output or inflation, whether shocks come from technology, preferences or price mark-ups. In this context, monetary policy is indeed all we need. This is despite the fact that, in the presence of wage as well as price inertia, or for cost-push shocks under just price inertia, optimal monetary policy is unable to eliminate the welfare costs of such shocks.

In an open economy, optimal fiscal policy moves in a pro-cyclical manner, to a degree that is proportional to the openness of the economy. Here government spending partially compensates for an externality associated with agents labour supply decisions and movements in the real exchange rate. Once again, there is no countercyclical role for fiscal demand management. These analytic results are robust to supplementing the model with simple forms of inflation inertia.

Analytic results are not possible when we allow for the impact of shocks on government debt. However, we do know that under optimal policy with commitment, steady state government debt will follow a random walk, and simple calibrations suggest that this adds little to the fiscal and welfare consequences of both shocks and policies to counteract them. By implication, our results that ignored government debt should approximately hold. This is confirmed by some recent papers that have undertaken numerical analysis of optimal monetary and

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fiscal policy using calibrated models that represent variations or extensions of our baseline model, and which allow for government debt. In these papers fiscal policy continues to be ineffective as a demand management tool as long as monetary policy is optimal and unconstrained.

Finally, we use our baseline model to show that these results apply only to government spending as an instrument, representing a demand management role for fiscal policy. We note situations in which variations in tax rates, by changing relative prices, can play a complementary role to monetary policy. It is therefore incorrect to conclude that fiscal policy in all its forms can play no useful role in short term stabilisation. We should also stress that our analysis of the demand management role of fiscal policy is confined to cases where monetary policy is both optimal and unconstrained: a commitment technology exists, and there are no problems with interest rates hitting a lower bound, for example.

This last point suggests an interesting avenue for further research, which is to see whether fiscal demand management might have some role under optimal discretionary policy. Alternatively, reputational considerations might mean that monetary policy follows some simple rule, and while this will mean that fiscal demand management has a potential role (Eser, 2006), the quantitative importance of this remains unclear (see Schmitt-Grohe and Uribe, 2007). Another question to investigate is whether our analytic conclusions about policy under commitment are robust to additional extensions of the model, such as the introduction of capital or credit constrained consumers.

References


