

# EXPANSIONARY VERSUS CONTRACTIONARY GOVERNMENT SPENDING

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## ***Abstract***

*This paper theoretically examines the impact of different forms of government spending on national income in a financially open economy with a significant net international investment position whose central bank sets domestic interest rates to target inflation. It shows that whether government spending is expansionary or contractionary ultimately depends on the productivity of that expenditure, a result that has major implications for the efficacy of fiscal policy deployed for either stimulus or austerity reasons. The key prediction of the model is that public consumption and unproductive public investment are pro-cyclical, whereas only productive public investment is counter-cyclical.*

**JEL Classification:** F41

**Keywords:** national income, international investment position, public consumption, public investment, productivity, inflation targeting

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## **EXPANSIONARY VERSUS CONTRACTIONARY GOVERNMENT SPENDING**

### **1. Introduction**

In response to the global financial crisis, G20 governments implemented unprecedented fiscal stimulus measures aimed at sustaining aggregate demand to bolster national income and employment. Entailing a mix of new public expenditure, tax cuts and income transfers, fiscal stimulus of any kind was presumed countercyclical and was credited with saving the world from another Great Depression. Many governments, especially in the OECD region, subsequently reversed fiscal stances via controversial austerity measures involving government spending cuts and tax rises due to rising concerns about consequent high budget deficits and the sustainability of public debt levels. In what way, and by how much, fiscal activism affects national income remains a contentious topic of central importance to macroeconomic policy.

The expansive recent literature on deploying fiscal policy as a countercyclical instrument centers on measuring the size of fiscal multipliers for different budgetary instruments and time frames. If multipliers are greater than unity, fiscal stimulus is deemed an effective counter-cyclical policy instrument since public spending expands economic activity and output by more than the initial public spending increase. Yet if multipliers are negative due to private consumption or investment crowding out effects, or to significant expenditure leakage via imports, 'fiscal stimulus' becomes a misnomer since fiscal policy is then pro-cyclical.

A range of theoretical approaches and econometric techniques, mostly VAR, have yielded mixed results for fiscal multipliers, with estimates varying widely across economies and through time. Some find fiscal multipliers greater than unity, while others do not. See, for instance, Tagkalakis (2008), Mountford and Uhlig (2009), Auerbach, Gale and Harris (2010), Cogan et al (2010), Monacelli et al. (2010), Romer and Romer (2010), Barro and Redlick (2011), Ramey (2011), Woodford (2011), Corsetti, Meier and Muller (2012), Ravn et al (2012) and Makin (2013). A growing literature also links the effectiveness of government spending as a countercyclical tool to the state of the business cycle (Auerbach and Gorodnichenko 2012, Blanchard and Leigh 2013) and to loan market conditions, including credit frictions, (Fernandez-Villaverde 2010, Carillo and Poilly 2013 and Melina and Villa 2013).

To date relatively little has been made of the difference between public consumption and public investment expenditure, and even less of the subsequently defined distinction between productive and unproductive public investment spending. The effects of government investment on the macro-economy have however been investigated in the real business cycle literature, for instance in an early paper by Baxter and King (1993), while more recently Leeper et al. (2010) have examined the macroeconomic effects of time-to-build lags and investment productivity.

Despite increased globalisation of most economies over recent decades, this literature has mainly focused on closed economy effects, ignoring the important distinction between

gross domestic product and national income for highly open economies with significant international investment positions.

Economies' international investment positions (IIPs) vary widely around the world. Those with notable net asset positions include Singapore (+224%),<sup>1</sup> Switzerland (+136%), Norway (+96%), Japan (+56%), Germany (+41%), China (+37%), while those with notable net liability positions include the United Kingdom (-35%), United States (-17%), Mexico (-37%), Brazil (-38%), Australia (-65%), New Zealand (-90%), Portugal (-117%), Ireland (-96%), Greece (-114%) and Spain (-93%). These sizeable IIPs imply significant divergences can arise between measures of a country's GDP and GNI to the extent that relative country rankings in comparative league tables can change (OECD 2005).<sup>2</sup>

The closed economy emphasis of recent studies and lack of consensus on the magnitude of fiscal multipliers suggest it is timely to rethink the fiscal policy transmission mechanism in open economies with significant net external assets or liabilities, especially with regard to different forms of discretionary public expenditure. That is the main aim of this paper. To achieve this, it advances a simple international macroeconomic model to compare the impact of the different forms of government spending on a net international debtor or creditor economy's national income where the central bank sets domestic interest rates to target inflation.

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<sup>1</sup> Bracketed values are net IIPs as a per cent of latest GDP ('+' indicates net asset position, '-' net liability position. Source: IMF, International Investment Position data.

<sup>2</sup> For instance, within the OECD, Ireland has ranked fifth on the GDP measure but only seventeenth on the GNI measure.

Methodologically, the model is in the aggregative tradition, focusing on macro variables of primary interest to policymakers, without recourse to micro-foundations. Optimising representative agents with rational expectations are not invoked on the grounds that this introduces unnecessary complexity and would link the qualitative results to whatever underlying utility function was arbitrarily selected (Sarno and Taylor 2003). Hence, paradigmatically, the modelling to follow has more in common with the classic Mundell-Fleming approach with its clear lessons about the effectiveness of monetary and fiscal policies than more ambiguous micro-founded approaches, although the foundations and results of this alternative approach differ markedly from previous aggregative models.

The paper first develops a model which combines equilibrium conditions in the real sector of an internationally indebted open macro-economy with those in its monetary sector, under circumstances where the interest rate is the intermediate target of monetary policy to keep inflation low. It then extends the framework to analyse the impact of different kinds of government spending on national income, and hence employment levels. The paper concludes by summarizing key results and lessons about the effectiveness of alternative forms of government spending as macro-stabilization instruments in financially open economies.

## **2. The Model**

The saving-investment approach to international borrowing and lending suggests that either increased government consumption or government investment gives rise to a

current account deficit matched by increased foreign borrowing (see, for instance, Obstfeld and Rogoff 1996). This perspective assumes national output is determined exogenously and fails to adjust national income for net income paid or received on external assets and liabilities, which for many economies can be significant. Meanwhile, conventional macroeconomic theory presumes that national income is determined on the aggregate demand side of the economy in the short run, yet on the aggregate supply side in the long run.

Specifically, in the Keynesian tradition private consumption, investment and government spending, as well as net exports in open economy extensions, determine national output in the short run, whereas in the neoclassical growth tradition, capital accumulation, workforce expansion, and multifactor productivity explain long run growth. Investment plays a dual role since it influences short run expenditure, yet also determines the size of the capital stock in the long run.

This paper departs from this arbitrary distinction between the short and long run by combining aggregate demand and supply side factors in a short run framework. It first establishes conditions for equilibrium in the real sector of an open macro-economy with reference to the behaviour of GDP, national income and the external accounts, before introducing monetary relations covering money demand and supply and interest rate setting under an inflation targeting regime.

## 2.1 The Real Sector

Gross Domestic Product is normally assumed to be the aggregate output of goods and services generated through time by a macroeconomic production function. By totally differentiating the most general form of the production function,

$$y = f(A(t), K(t), L(t)) \quad (1)$$

the sources of output growth can be shown as

$$\frac{dy}{dt} = f_A \frac{dA}{dt} + f_K \frac{dK}{dt} + f_L \frac{dL}{dt} \quad (2)$$

where  $y$  is real GDP,  $A$  is multifactor productivity,  $K$  is the capital stock,  $L$  is the labor force, and  $f_{A,K,L}$  represent respective marginal factor productivities.

Separately identifying the private and public sector components of the capital stock as  $K_p$  and  $K_g$  allows re-specification of the macroeconomic production as

$$y = f(A(t), K_p(t), K_g(t), L(t)) \quad (3)$$

To understand medium run GDP determination it is more appropriate to use discrete rather than continuous time analysis. Analogous to relation (2) above, and presuming no significant net labor force growth, the change in GDP period to period may therefore be re-expressed in discrete time as

$$\Delta y = y - y_{-1} = \phi + \gamma \Delta K_p + \lambda \Delta K_g \quad (4)$$

or

$$y = y_0 + \phi + \gamma I_p + \lambda I_g \quad (5)$$

where  $y_{-1}$  is redefined as  $y_0$ , the value of recurrent output,  $\phi$  is additional output due to productivity improvement,  $\gamma$  is the additional output (net of capital depreciation) per unit

from private investment,  $I_p$ , and  $\lambda$  is the additional output (net of capital depreciation) per unit from public investment,  $I_g$ , each period. Specifying short run output determination in this way highlights how investment volatility contributes to economic fluctuations, consistent with a stylised fact about business cycle behaviour.

The economy's endowed factor inputs enable recurrent production each period, a notion which features in open economy intertemporal models (see for instance Frenkel and Razin 1987). Recurrent output can be higher or lower than normal due to exogenous factors, such as banking crises which freeze credit, labor strikes, natural disasters, or weather shocks. This specification also allows productivity shocks to affect short run output, consistent with real business cycle analysis. However, in reality investment shocks are deemed more relevant.

GDP differs from national income,  $y_n$ , for highly open economies with significant net foreign assets or liabilities to the extent of net income paid, or earned, from abroad. In the case of an international borrower economy,

$$y_n = y - r^* F \quad (6)$$

where  $r^*$  is the effective foreign interest rate and  $F$  is the stock of net external debt. By accounting definition

$$F = F_0 + cad = F_0 + (I - S) \quad (7)$$

where  $F_0$  is pre-existing foreign debt,  $cad$  is the current account deficit,  $I$  is investment and  $S$  is domestic saving.



On the aggregate demand side of the economy, it is assumed that private household consumption,  $C_p$  is determined by permanent income (Friedman 1957, Taylor 2009). Total government spending is comprised of public consumption,  $C_g$ , and public investment,  $I_g$ , each autonomously determined by the government. It is also possible to assume that private consumption is proportional to current national income ( $C_p = cy_n$ ) in the tradition of the standard neoclassical growth model (Solow 1956, Swan 1956). Whether we assume consumption is related to permanent income, or is proportional to current income, makes no difference to the qualitative results derived from the straightforward model to be advanced in what follows.

National saving is the difference between national income and the sum of private consumption and public consumption.

$$S = y_n - (C_p + C_g). \quad (8)$$

Total investment,  $I$ , has autonomous private and public components, and is a simple linear function of the real domestic interest rate, reflecting both standard Keynesian and neoclassical theories of investment behavior, such that

$$I = \bar{I}_p - br + I_g \quad (9)$$

where  $\bar{I}_p$  is autonomous private investment, parameter  $b$  reflects the sensitivity of private domestic investment to real interest rate movements, and  $I_g$  is autonomous government investment. Empirical evidence suggests that private investment can be quite insensitive to interest rate movements (see Taylor 1999), so the value of  $b$  is likely to be small.

All forms of domestic expenditure are funded in keeping with the standard international loanable funds framework that relates domestic saving, investment and international capital flows, and there are no distortions or frictions in the banking and financial system impeding the intermediation of funds between borrowers and lenders.<sup>3</sup> Accordingly, domestic saving and investment are assumed to be independent of each other, so that for a borrower (lender) country, *ceteris paribus*, a rise in investment, private or public, gives rise to an increase (decrease) in its foreign borrowing (lending). Similarly, a rise in private or public consumption affects cross-border capital flows which increase (decrease) an economy's net liabilities (assets) with implications for national income via income paid abroad.

Substituting above relations (5), (7), (8) and (9) above into (6) yields

$$y_n = y_0 + \phi + \gamma(\bar{I}_p - br) + \lambda I_g - r^*(F_0 + (\bar{I}_p - br + I_g)) - (y_n - C_p - C_g) \quad (10)$$

or

$$y_n = \frac{y_0 + \phi + \gamma(\bar{I}_p - br) + \lambda I_g - r^* F_0 - \bar{I}_p r^* - I_g r^* + brr^* - r^* C_p - r^* C_g}{(1 - r^*)} \quad (11)$$

The same relation can be derived for a lender economy experiencing a current account surplus since domestic saving exceeds domestic investment for lender economies.

Therefore, instead of equation (7),  $y_n = y + r^*(F_0 + S - I)$ , which when substituted into (5), also yields (11).

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<sup>3</sup> Mankiw (2013) provides a textbook exposition.

Expression (11) conveys the essentials of short run national income generation in an open economy that has significant external investment position and either borrows or lends internationally. Partially differentiating this expression with respect to the real domestic interest rate

$$\frac{\partial y_n}{\partial r} = \frac{-b(\gamma - r^*)}{(1 - r^*)} < 0 \quad (12)$$

This is negative, since normally,  $\gamma > r^*$ .

If proportional private saving was assumed ( $C_p = cy_n$ ), the above partial derivative would be

$$\frac{\partial y_n}{\partial r} = \frac{-b(\gamma - r^*)}{(1 - r^* + c)} < 0 \quad (12a)$$

Either way, this implies a downward sloping schedule, labelled the  $YY$  schedule, can be drawn in interest rate-national income (or  $r - y_n$ ) space, as shown in Figure 1. In the limiting case of zero sensitivity of investment to real interest rate movements the  $YY$  schedule is vertical.

Moreover,

$$\frac{\partial y_n}{\partial y_0} > 0, \quad \frac{\partial y_n}{\partial \phi} > 0, \quad \frac{\partial y_n}{\partial I_p} > 0, \quad \frac{\partial y_n}{\partial I_g} > 0, \quad \frac{\partial y_n}{\partial C_p} < 0, \quad \frac{\partial y_n}{\partial C_g} < 0 \quad (13)$$

Therefore in the short run, national income is positively related to shocks to recurrent spending, autonomous private and public investment and productivity, but negatively

related to increases in private and public consumption spending. Shocks to any of these variables shift the  $YY$  schedule in Figure 1.

## 2.2 The Monetary Sector

The monetary side of the economy centres on the interaction between residents' demand for money and its supply. The central bank adopts an inflation targeting regime and influences interest rates by controlling the nominal money supply,  $M$ , by intervening in the domestic bond market to alter liquidity. Real money demand depends positively on national income according to the proportion,  $l$ , ( $0 < l < 1$ ), and negatively on the domestic interest rate according to parameter  $\mu$ . Hence,

$$m_d = ly_n - \mu r \quad (14)$$

In the domestic money market, the interest rate adjusts to ensure equality between the real money demand of residents and the real domestic money supply,  $M/P$  where  $P$  is the price level, assumed relatively stable by virtue of the inflation targeting regime. Therefore,

$$m_d = \frac{M}{P} = ly_n - \mu r \quad (15)$$

which yields the following expression for the domestic interest rate.

$$r = \frac{ly_n - (M/P)}{\mu} \quad (16)$$

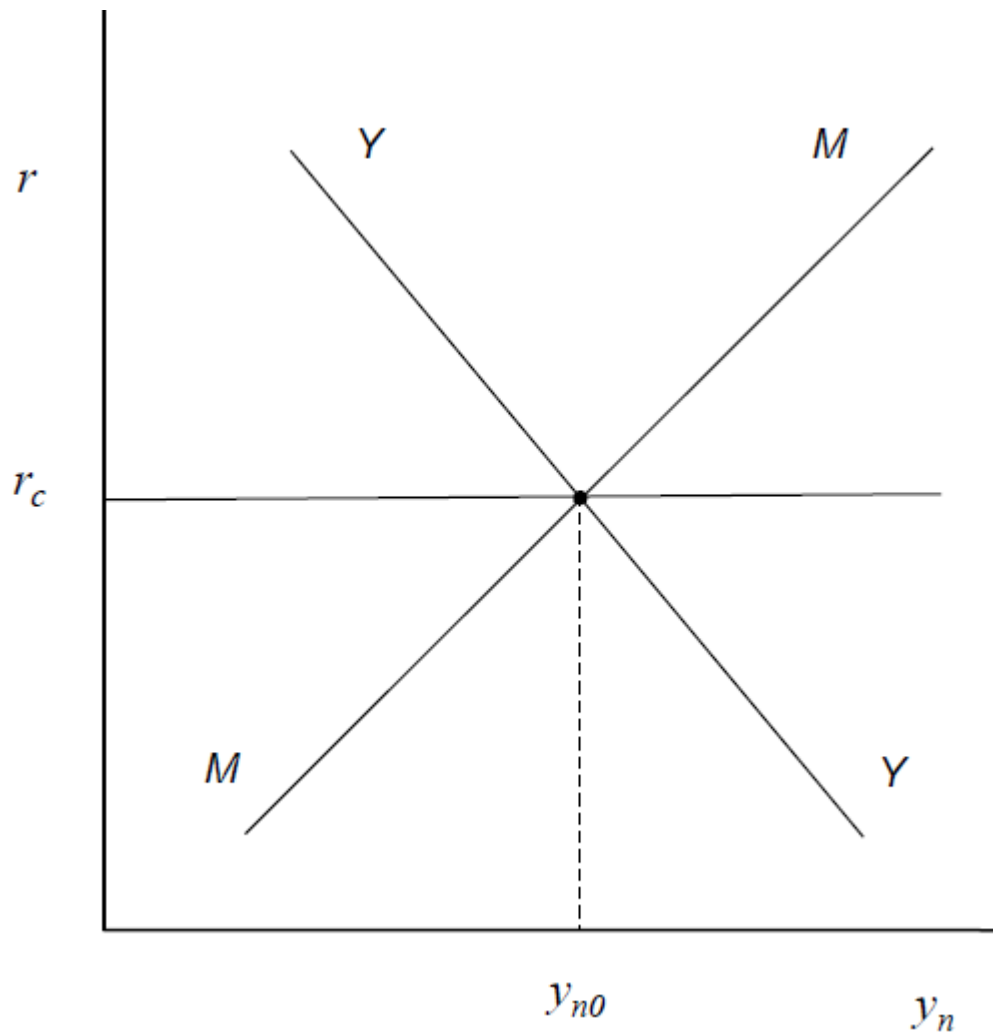
Hence,

$$\frac{\partial r}{\partial y_n} > 0, \quad \frac{\partial r}{\partial M} < 0 \quad (17)$$

Given the first partial derivative in (17) above, it is possible to draw the  $MM$  schedule in Figure 1 as upward sloping in  $r - y_n$  space.

Under an inflation targeting regime, the central bank sets the short term policy interest rate,  $r_o$ , as the immediate target of monetary policy by manipulating the money supply. This official rate is assumed to be significantly above the zero lower bound and sets the ‘average’ interest rate for the central bank desires for the economy,  $r_c$ , via given expectations about future short term rates,  $\theta$ , through the term structure. Hence,

$$r_c = r_o(M) + \theta \quad (18)$$



**Figure 1 – Equilibrium National Income**

Assuming a high degree of international capital mobility and an exogenous world interest rate, interest parity implies the domestic interest rate is also related to the world interest rate,  $r^*$ , plus expected currency depreciation,  $\hat{e}$ .

$$r = r^* + \hat{e} \quad (19)$$

If exchange rate expectations are static, this implies the targeted interest rate would closely align with world interest rates which are presumed invariant throughout. Again, this is consistent with precepts of the standard international loanable funds approach relating saving, investment and capital flows. That approach assumes the domestic interest rate is tied to the exogenous world rate as well, while affording no explicit role to the nominal exchange rate in the external adjustment process. Similarly, the framework of this paper keeps the exchange rate in the background, which can be justified with reference to the output-absorption distinction (following Alexander 1952) that underpins the subsequent analysis.

For instance, consider what happens in the foreign exchange market following a government expenditure shock. An increase in government spending first raises total domestic spending, or absorption, relative to national output. If output and expenditure are initially in balance, the resultant current account deficit arising from the additional spending raises the demand for foreign exchange accordingly, *ceteris paribus*. Under these circumstances, the exchange rate would remain relatively stable because this higher demand is matched by the supply of foreign exchange forthcoming to fund the extra spending over output. Meanwhile, if rising money demand puts upward pressure on the policy interest rate, the central bank automatically provides increased liquidity, obviating exchange rate pressure from further capital inflow.

Figure 1 depicts equilibrium in the real and monetary sectors of the economy at the point where the *YY* and *MM* schedules intersect on the targeted interest rate line. This

framework can now be used to examine the impact of different types of government spending on the economy in response to a temporary shock. For instance, a slump in autonomous private investment would shift the  $YY$  schedule leftward in the first instance, contracting national income. If the central bank maintains an ‘unchanged’ monetary stance by keeping official interest rates at the pre-shock level, the money supply must contract to match lower money demand, shifting the  $MM$  schedule leftward as well. Hence Figure 1 could depict a short run equilibrium characterised by recession with unemployment above its natural rate.

### **3. Increased Public Investment and Public Consumption**

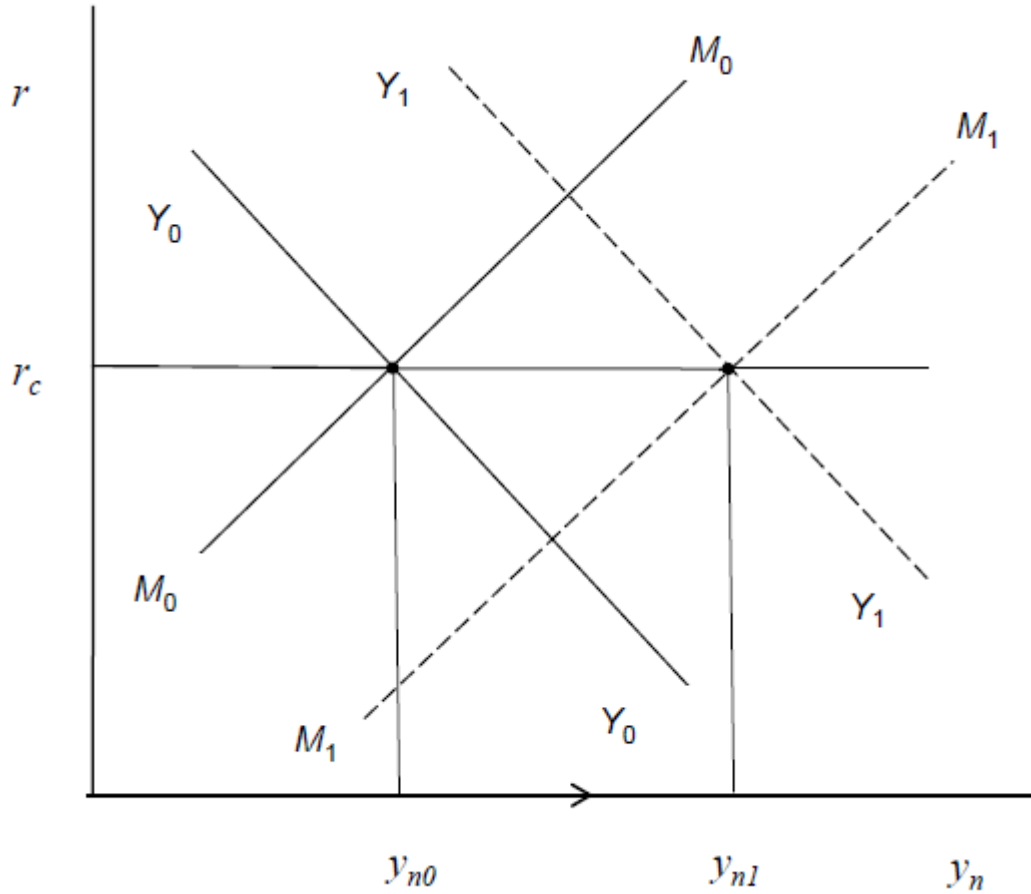
We now turn to examine the effects of different forms of government spending on national income. In common with other aggregative macro-models, it is assumed that increased government spending impacts on the economy within a given time interval. Hence, the following abstracts from the inside and outside lags associated with implementing fiscal policy in practice. Inside lags result from assessing the need for stimulus in light of *ex post* data, and then deciding upon, and legislatively enacting, its form and quantum, whereas outside lags reflect time that elapses between implementation and full macroeconomic impact.<sup>4</sup>

#### *3.1 Productive Government Investment*

Consider first the effects of a discretionary rise in productive government investment in the form of increased infrastructure spending in response to a looming recession. Other



things equal, this lifts total investment spending, shifting the  $YY$  schedule to the right, as shown in Figure 2.



**Figure 2 – Productive Public Investment**

Recalling that

$$\frac{\partial y_n}{\partial I_g} = \frac{(\lambda - r^*)}{(1 - r^*)} > 0 \quad (20)$$

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<sup>4</sup> In previous decades, fiscal stimulus on average arrived around a year after the onset of downturns in advanced economies (Leigh and Steyn 2009), although was deployed more rapidly in response to the global financial crisis (IMF 2013).

productive public spending is here defined as that public investment which generates additional output in excess of the servicing cost on the borrowing required to fund it, which occurs iff  $\lambda > r^*$ . In an open economy, additional public investment raises international borrowing for given domestic saving consistent with the saving-investment approach, so the servicing cost is the interest paid on extra foreign debt. To maintain a given monetary policy stance and official interest rate, the money supply has to accommodate higher money demand, so  $MM$  shifts rightward as well. Note that we can abstract from capital inflow appreciating the exchange rate because no interest differential tends to arise, as occurs in the Mundell-Fleming model.

Under these conditions, a positive multiplier for national income would be expected. In general, the government spending multiplier is estimable at time  $t$  as the discounted sum of national income changes from  $j = 1$  (when stimulus begins) to  $t$ , divided by the discounted sum of new government spending from  $j = 1$  to  $t$ :

$$\varphi_t = \frac{\sum_{j=1}^t \Delta y_{nj} (1+r_j)^{1-j}}{\sum_{j=1}^t \Delta G_j (1+r_j)^{1-j}} \quad (21)$$

where  $G$  is any form of government spending.

Hence, higher public investment proves effective as a countercyclical fiscal measure. A positive multiplier also improves public debt sustainability for it implies the economy's public debt to income ratio falls if the increase in national income exceeds the spending induced increase in public debt.



Again for a given monetary stance, the money supply necessarily contracts to maintain the targeted interest rate, shifting the *MM* schedule leftward as well, thereby yielding a negative fiscal multiplier. Under these conditions expansionary fiscal policy is contractionary and the economy's public debt to income ratio increases.

### *3.3 Increased Public Consumption*

Next consider the effects of fiscal stimulus involving higher government consumption expenditure. A rise in public consumption reduces public and national saving. For given investment opportunities, this increases the external account imbalance via international borrowing in a similar way to unproductive government investment. The mechanism is essentially the same as for unproductive public investment although compared to cases where  $\lambda$  is non-zero yet less than  $r^*$ , the leftward shift would be greater. Again, expansionary government spending would contract national income and yield a negative multiplier.

In sum, the nature of the public expenditure being manipulated by the fiscal authorities becomes central to interpreting the overall impact of fiscal policy and whether fiscal stimulus is counter-cyclical or pro-cyclical in an open economy. Crowding out of private investment is also possible in the case of an international borrower economy if, as public debt rises along with the extra government spending, foreign lenders expect extra compensation for possible default risk via an interest risk premium.

This would effectively increase the world interest rate the economy faces and tend to raise  $r_c$ , thereby limiting national income expansion when government spending is productive and exacerbating national income contraction when spending is unproductive. With well-informed foreign lenders an interest risk premium is more likely when extra government spending is unproductive, than when it is productive. Incorporating a public debt-related risk premium into the analysis may also help explain why in the presence of high public debt to GDP ratios, some estimated government spending multipliers tend to be lower.<sup>5</sup>

Of course, Ricardian effects are possible in the wake of spending increases.<sup>6</sup> In the extreme, though empirically unsupported case, a one for one offset of private consumption by resident households mindful of future tax obligations would neutralise the impact of government spending by preventing the saving-investment gap widening in the first instance.

## 5. Concluding Comments

The macroeconomic framework of this paper differs methodologically from approaches based on optimising representative agents and micro-founded inter-temporal relations.<sup>7</sup> Nonetheless, it is consistent with arguments that aggregative macroeconomic models usefully convey straightforward results and are no more *ad hoc* than optimising micro-based approaches. A huge body of literature examining the effectiveness of fiscal policy

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<sup>5</sup> See for instance Favero and Giavvazi (2007).

<sup>6</sup> See Barro (1989).

<sup>7</sup> See Wickens (2011).

has emerged in recent years, focused mainly on gauging fiscal multipliers. Reflecting the Keynesian tradition however, most are closed economy oriented and abstract from important international macroeconomic linkages.

Existing macroeconomic theory inadequately explains the impact of discretionary fiscal policy on national income because it underemphasizes the implications and significance of saving-investment imbalances and net foreign borrowing. In addressing this shortcoming, the model outlined in this paper provides an alternative perspective which overturns some standard results about the effectiveness of fiscal activism and reveals the circumstances under which fiscal policy, intended to be expansionary, is actually contractionary.

Table 1 summarises the effects of different kinds of government spending on the current account, net international investment position, and national income. Although the effects of unproductive public investment and consumption are qualitatively the same, recall that the national income contraction, and hence size of the negative fiscal multiplier, would always be larger for the consumption case if  $\lambda$  is non-zero yet less than  $r^*$ .

**Table 1 Effects of Different Forms of Government Spending**

Form of Government Expenditure	<i>Current Account Deficit</i>	<i>Net International Investment Position</i>	<i>National Income</i>	<i>Fiscal Multiplier</i>
<i>Productive Investment</i> ↑	↑	↓	↑	+
<i>Unproductive Investment</i> ↑	↑	↓	↓	–
<i>Consumption</i> ↑	↑	↓	↓	–

These findings are seemingly at odds with numerous VAR based econometric studies that have found government spending has a positive effect on output. However as a rule, empirical studies on government spending multipliers have often examined the effects of public consumption and investment combined, and ignored the distinction between productive versus unproductive spending. Moreover, these studies invariably focus on the multiplier effects of public spending on conventional GDP rather than a more relevant measure for economies with significant international investment positions, which is national income net of income paid abroad.

In short, productive infrastructure expands national income, while government spending which lowers public saving, or generates less income than its servicing cost, contracts national income. An easier fiscal stance that reflects more unproductive capital spending or higher public consumption therefore proves pro-cyclical, contrary to the conventional

wisdom that fiscal expansion of any kind is an ineffective means of stabilising national income. An important corollary to this is that fiscal consolidation that targets unproductive public consumption spending will raise, rather than lower, national income, consistent with limited empirical work on this issue (see Alesina et al 2012, Cogley et al 2013).

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