Government Consumption Expenditures and the Current Account

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Abstract

This paper focuses on the effects on the current account of changes to two distinct components of government consumption expenditures, expenditure on goods and expenditure on hours worked. I find that changes to government expenditure on hours do not directly affect the current account and that their effect is considerably smaller – one order of magnitude – than the effect of changes to government expenditure on goods. These findings indicate that considering government consumption as entirely expenditure on goods can lead to overestimating its role in accounting for movements in the current account balance.

1 Introduction

The current account balance measures the difference between a country's national income and its domestic expenditures on consumption and investment. In industrialized countries, a considerable share of domestic expenditures consists of government consumption expenditures. This paper focuses on the effects on the current account of changes to two distinct components of government consumption expenditures, expenditure on goods and expenditure on hours worked. In particular, it uses a two-country model economy to assess whether the effects of a shock to the number of hours worked for the government differ from those of a shock to government expenditure on goods.

An extensive literature has already made substantial efforts to measure the extent to which changes in government consumption expenditures affect movements in the trade balance, which represents by far the largest component of the current account. Within this body of literature, for example, Ahmed (1987) found some evidence of a negative relationship between temporary increases in government expenditures and the trade balance for the United Kingdom during the 18th and the 19th centuries. Similarly, Yi (1993) showed that higher government expenditures played at least a partial role in the deterioration of the U.S. trade balance during the 1970s and 1980s.

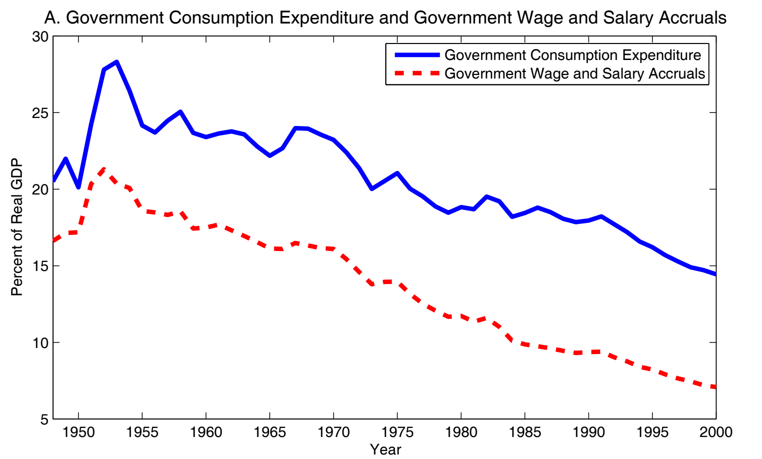
Much of this literature treats government consumption expenditures as consisting entirely of expenditure on goods. However, in reality, they also consist of expenditure on wages and salaries, which, essentially, corresponds to expenditure on hours worked. This component represents expenditure on labor services that include, among others, general public service, national defense, public order and safety, health, and education. In the United States, expenditure on hours worked has accounted for a quantitatively relevant share of both GDP and government consumption expenditures after World War II. In particular, during this period it has represented on average about 75 percent of consumption expenditures by the U.S. government (see Figures 1A and 1B).

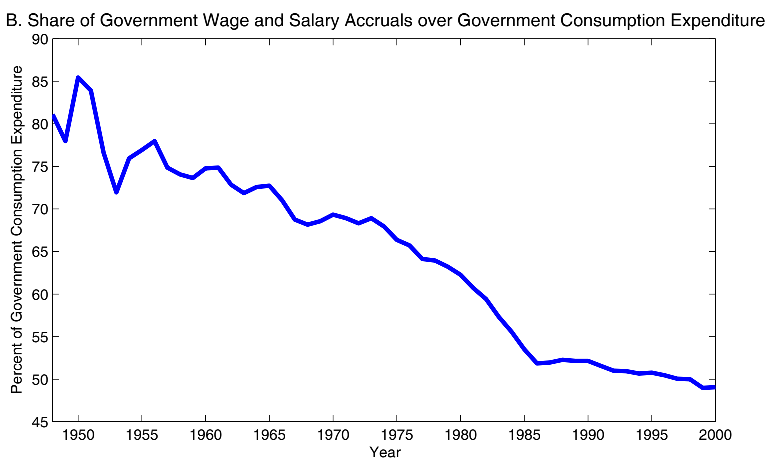
Economic theory says that government consumption expenditures on goods and on hours have effects of opposite sign on variables such as output and investment expenditure in the private sector, which are, typically, two key determinants of movements in the current account balance. A neoclassical model economy, indeed, predicts on one hand that expenditure on goods normally has a positive impact on private output and private investment (see, e.g., Baxter and King, 1993). On the other hand, it predicts that government expenditure on hours has a negative impact on those same variables (see, e.g., Finn, 1998).

This paper finds that the effects on the current account of government expenditure on hours are one order of magnitude smaller than the effects of government expenditure on goods. Notably, a shock to the number of hours worked for the government such that government expenditure on hours increases by 1 percent of GDP produces on impact a deterioration in the current account of barely 0.05 percent of GDP. This effect differs considerably from that of a shock to government expenditure on goods. In fact, as in Baxter (1995), an increase to government expenditure on goods of 1 percent of GDP produces a deterioration in the current account of nearly 0.5 percent of GDP.

The intuition for these findings is as follows. While an increase in government expenditure on goods is accommodated through higher imports, an increase in government hours is accommodated by an expansion in domestic labor supply. In the former case, there is a corresponding deterioration in the trade and current account balances, whereas, in the latter, there are no direct consequences on net exports of goods, services, and income. Similarly, since hours worked are nontraded, an increase in government hours does not directly affect the excess of domestic expenditures over national income, that is, it does not lead directly to a deterioration in the current account. However, it still has an indirect effect, though

FIGURE 1: U.S. GOVERNMENT CONSUMPTION EXPENDITURES (1948 - 2000)





Note: Source: Bureau of Economic Analysis, NIPA Tables.

quantitatively smaller, on the current account through its impact on domestic private output and expenditures on consumption and investment.

One implication of these findings is that it is important to consider the composition of changes to government consumption expenditures when assessing their effects on the current account. Another implication concerns the relationship between fiscal and current account deficits.[1] The findings in this paper hint that a fiscal deficit generated by an increase in expenditure on hours has a substantially smaller effect on the current account than a fiscal deficit generated by an increase in expenditure on goods. Considering that the bulk of government consumption expenditures during the postwar period has gone toward hours, these findings also suggest that fiscal deficits may have had a smaller effect on the current account then that predicted by studies where government consumption expenditures consist entirely of expenditure on goods (see, e.g., Baxter, 1995).[2]

The structure of the paper is as follows: Section 2 presents the model economy. Section 3 describes the solution of the model. Section 4 illustrates and discusses the dynamic responses to unanticipated increases in government consumption expenditures. Section 5 briefly concludes.

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[1] Recent empirical studies have found that this relationship may be fairly tenuous. Bussière, Fratzcher, and Müller (2005), for example, using data from several OECD countries have found that increases in the fiscal deficit of 1 percent of GDP are associated with deteriorations in the current account of about 0.1 percent of GDP. In a surprising result, Kim and Roubini (2004) have found that in the United States increases in the fiscal deficits have actually had a positive effect on the current account in the short run.

[2] In a study on the relationship between the fiscal and the trade deficits, Erceg, Guerrieri and Gust (2005) use a two-country model – calibrated to the U.S. economy and to the rest of the world – and find that fiscal deficits have only a fairly small effect on the U.S. trade balance. For example, a fiscal deficit of 1 percent of GDP generated by an increase in government expenditure on goods induces a trade balance deterioration that is smaller than 0.2 percent of GDP. In another study, Corsetti and Müller (2006) find that, actually, the relationship between the fiscal and the trade deficits depends crucially on two elements: one, the degree of openness of an economy, and, two, the persistence of the shock to government expenditure on goods.

2 The model economy

The model economy consists of two countries, home and foreign, of size π and $(1-\pi)$, respectively. In each country there is a household sector, a private sector, and a government. In the household sector there is a large number of households. In the private sector there is a large number of identical firms. Both domestic and foreign firms produce a single good that can be used for either consumption or investment purposes and that can be freely traded between the two countries. The set of financial claims includes a single noncontingent bond, denominated in units of the good, and equity claims on the dividend stream of private sector firms. The first type of claims can be traded internationally, while the latter cannot.

As in Ghironi (2006), I use an overlapping-generations (OLG) version of the two-country general equilibrium model, rather than the representative agent version.[3] In the representative agent framework, when the set of internationally traded financial claims includes only noncontingent bonds, insurance against country-specific shocks is incomplete. This implies that these shocks, even when temporary, produce permanent changes in the distribution of wealth across countries and in the levels of the other endogenous variables, thereby modifying the long-run equilibrium of the model economy. It is therefore problematic to analyze the dynamic effects of temporary country-specific shocks through solution techniques that are valid only around an equilibrium to which variables eventually return. In contrast, in the OLG framework, temporary country-specific shocks do not alter the long-run equilibrium of the model economy. After these disturbances, as

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[3] For a recent work using an open-economy model with an OLG structure, see also Botman, Laxton, Muir and Romanov (2006).

newly born households with zero financial wealth enter the economy at the beginning of each period, aggregate per capita levels of wealth and of the other endogenous variables eventually return to their preshock equilibrium values.

Finally, time is divided into periods and each period is indexed by the subscript *t*.

Households

Households consume goods and supply labor services in the form of hours worked both to private-sector firms and to the government. These labor services are perfectly mobile across sectors within the same country but immobile across countries. For simplicity, I normalize the households' endowment of hours to one. As in Blanchard (1985), Frenkel, Razin, and Yuen (1996, Ch. 9) and Cardia (1991), in each period households face a constant probability of death, denoted by $(1-\varphi)$. As a consequence, the probability of survival from one period to the next is φ. The representative household in the home country born on date v has preferences over consumption $C_{t,v}$ and hours worked $N_{t,v}$. These preferences are represented by the following utility function:[4]

$$(1) \qquad \sum_{i=0}^{\infty}(\varphi\beta)^{i}U(C_{t+i,v},N_{t+i,v}),$$

where β is the subjective discount factor. The momentary

[4] I focus on the home country for simplicity. A similar economic structure is present in the foreign country. In addition, in what follows, I will denote foreign variables with an asterisk.

utility function is

$$U(C_{t,v}, N_{t,v}) = \theta \log C_{t,v} + (1-\theta)\log(1-N_{t,v}), \quad (2)$$

with $0 < \theta < 1$. Households supply labor hours in a perfectly competitive labor market. The real wage per hour unit is W_t. Households also pay lump-sum taxes, T_t. They hold equity claims on the profit stream of private sector firms. I denote these claims by $S_{t,v}$, their price by V_t and the profits paid out in period t by D_t. They also hold a noncontingent real bond, $B_{t,v}$, that earns a gross real interest rate of R_t.

Households stipulate contracts with insurance companies contingent on survival. These contracts establish that, in the event of death, holdings of financial claims – bonds and equity claims – are transferred to insurance companies. Alternatively, in the event of survival, insurance companies pay households an extra return on their assets. With free entry into the insurance market, a zero profit condition determines the extra return. This condition implies that insurance companies allocate to those who remain alive the assets of those who do not survive. As the number of households that are born each period is large, the fraction of households who survive is equal to the probability of survival, φ. This also means that the fraction of households who do not survive is equal to $(1-\varphi)$. Therefore each household that survives receives a share $(1-\varphi)/\varphi$ of the assets of those who do not survive, so that the return on one unit of assets is equal to $1/\varphi$.

The period t flow budget constraint for the representative household born on date v is then :

$$(3)\quad B_{t+1,v} + V_t S_{t+1,v} = \frac{R_t}{\varphi} B_{t,v} + \frac{V_t + D_t}{\varphi} S_{t,v} + W_t N_{t,v} - C_{t,v} - T_t.$$

The representative household born on date v chooses sequences of end-of period bond and equity claim holdings, $B_{t+1,v}$ and $S_{t+1,v}$, and hours worked, $N_{t,v}$, to maximize its intertemporal utility (1) subject to (3). The first-order conditions with respect to $B_{t+1,v}$, $S_{t+1,v}$ and $N_{t,v}$ give the consumption Euler equation for real bonds, the consumption Euler equation for stocks, and individual supply of hours, respectively:

$$(4)\qquad \frac{C_{t+1,v}}{C_{t,v}} = \beta R_{t+1};$$

$$(5)\qquad \frac{C_{t+1,v}}{C_{t,v}} = \beta \frac{V_{t+1} + D_{t+1}}{V_t};$$

$$(6)\qquad N_{t,v} = 1 - \frac{1-\theta}{\theta} \frac{C_{t,v}}{W_t}.$$

From (4) and (5) one can get a no-arbitrage condition between bonds and stocks:

$$(7)\qquad R_{t+1} = \frac{V_{t+1} + D_{t+1}}{V_t}.$$

Using this no-arbitrage condition, one can rewrite the budget constraint (3) as:

(8) $$A_{t+1,v} = \frac{R_t}{\varphi} A_{t,v} + W_t N_{t,v} - C_{t,v} - T_t,$$

where $A_{t,v}$ denotes individual financial wealth, defined as:

(9) $$A_{t,v} = B_{t,v} + V_{t-1} S_{t,v}.$$

Iterating forward the flow budget constraint (8), imposing a transversality condition, and using both the consumption Euler equation on bonds (4) and the first-order condition on hours worked (6), one can get an individual consumption function:

(10) $$C_{t,v} = (1 - \varphi\beta)\theta \left(\frac{R_t}{\varphi} A_{t,v} + H_{t,v} \right),$$

where $H_{t,v}$ denotes individual human wealth defined as the after-tax present discounted value of hours' endowment of the representative household born on date *v*:[5]

$$H_{t,v} = \sum_{i=0}^{\infty} \varphi^i R_{t,t+i} \left(W_{t+i} - T_{t+i} \right),$$

with $R_{t,t+i} = \prod_{j=0}^{i-1} R_{t+j}^{-1}$, and $R_{t,t} = 1$.

[5] As in Cavallo and Ghironi (2002), this definition of human wealth as the after-tax present discounted value of the household's exogenous endowment of hours in analogous to those of Blanchard (1985) and Weil (1989) for the case of inelastic labor supply and exogenous nonfinancial income. Blanchard (1985) defines human wealth as the present discounted value of exogenous non-intersect income, while Weil (1989) defines human wealth as the present discounted value of after-tax endowment income.

Aggregation

Each period, in the home and foreign countries, a new generation of households is born; its measure in the aggregate two-country model economy is $(1-\varphi)$. This measure is distributed in the two countries according to their respective size.[6] The size of each generation, due to death, declines nonstochastically over time. In any period t the size of a generation born on date v, thus of age $t-v$ is $(1-\varphi)\varphi^{t-v}$. Therefore, the size of the total population in the two-country model economy is:

$$(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}=1.$$

As in Blanchard (1985), the relation between any aggregate per capita variable X_t and its individual counterparts in the home country is:

$$X_t=(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}X_{t,v}.$$

Newly born households own no assets. Therefore, period t aggregate per capita bond and stock holdings are given by:

$$B_t=(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}B_{t,v-1},$$

[6] The home and the foreign countries are of sizes π and $1-\pi$, respectively. The size of their populations corresponds to their respective sizes. Therefore, each period a measure of $\pi(1-\varphi)$ households is born in the home country, while a measure $(1-\pi)(1-\varphi)$ is born in the foreign country.

$$S_t = (1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}S_{t,v-1} = 1.$$

As a consequence:

(11) $$(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}B_{t,v} = \varphi(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}B_{t,v-1} = \varphi B_t,$$

(12) $$(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}S_{t,v} = \varphi(1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}S_{t,v-1} = \varphi.$$

Keeping relations (11) and (12) in mind, aggregation of the household's flow budget constraint (8) gives:

(13) $$A_{t+1} = R_t A_t + W_t N_t - C_t - T_t,$$

where aggregate per capita financial wealth is

(14) $$A_t = B_t + V_{t-1}.$$

Aggregation of the individual consumption function (10) then gives aggregate per capita consumption

(15) $$C_t = (1-\varphi\beta)\theta\left(R_t A_t + H_t\right),$$

where H_t is aggregate per capita human wealth

$$H_t = (1-\varphi)\sum_{v=-\infty}^{t}\varphi^{t-v}H_{t,v},$$

with

(16) $$H_t = W_t - T_t + \frac{\varphi}{R_{t+1}} H_{t+1}.$$

Aggregating the individual consumption Euler equations for bonds (4) gives

$$(1-\varphi)\sum_{v=-\infty}^{t} \varphi^{t-v} C_{t+1,v} = \beta R_{t+1} C_t.$$

Noting that

$$(1-\varphi)\sum_{v=-\infty}^{t} \varphi^{t-v} C_{t+1,v} = \frac{C_{t+1}}{\varphi} - \frac{1-\varphi}{\varphi} C_{t+1,t+1},$$

one can write

(17) $$C_{t+1} = \beta R_{t+1} C_t - \frac{1-\varphi}{\varphi}\left(C_{t+1} - C_{t+1,t+1}\right).$$

Using the aggregate consumption function (15) and the period $t+1$ consumption function of the generation born in the same period one can get an aggregate version of the consumption Euler equation:

(18) $$C_{t+1} = \beta R_{t+1} C_t - \frac{1-\varphi}{\varphi}(1-\varphi\beta)\theta R_{t+1} A_{t+1}.$$

Aggregate per capita consumption growth depends negatively on the level of aggregate per capita financial wealth. Specifically, the second term in the right-hand side of the aggregate Euler equation (18) indicates the reduction in aggregate per capita consumption in period $t+1$ resulting from the entry into the economy of newly born households owning zero financial wealth. This term creates a wedge between the real interest rate on internationally traded bonds and the aggregate marginal rate of intertemporal substitution in consumption. As pointed out in Cardia (1991), this wedge is a function of aggregate per capita financial wealth, where aggregate per capita financial wealth is the sum of aggregate per capita bond and equity holdings (see equation 14). This implies that when a country has accumulated a positive bond position, it experiences slower consumption growth. Conversely, a country that has accumulated a negative bond position will be characterized by faster consumption growth. With $\varphi = 1,$ one obtains the representative agent setup with a standard consumption Euler equation. Finally, aggregation of individual labor supplies yields

(19) $$N_t = 1 - \frac{1-\theta}{\theta}\frac{C_t}{W_t}.$$

Firms

Private-sector firms in the home country produce final goods $Y_{P,t}$, combining capital and hours supplied from the household. The production function is

(20) $$Y_{P,t} = K_t^{1-\alpha_P} N_{P,t}^{\alpha_P},\ 0 < \alpha_P < 1,$$

where K_t is the capital stock in the economy available as of the beginning of period t, $N_{P,t}$ is the number of hours used as a labor input in the private sector, and α_P is the labor income share in the private sector. Firms own capital stock and make investment decisions, incurring convex adjustment costs. The capital stock evolves according to the following law of motion:

(21) $$K_{t+1} = (1-\delta) K_t + \phi\left(\frac{I_t}{K_t}\right) K_t,$$

with $\phi(\cdot) > 0$, $\phi'(\cdot) > 0$, and $\phi''(\cdot) < 0$. For a given level of the capital stock, K_t, an investment expenditure equal to I_t generates $\phi(I_t/K_t) K_t$ units of new capital, where $\phi(\cdot)$ is a concave function. In contrast, in the absence of adjustment costs, $\phi(I_t/K_t) = I_t/K_t$, so that one unit of investment expenditure I_t would generate one unit of new capital K_{t+1}. As in Baxter (1995), I incorporate convex costs of adjusting the capital stock so that, following country-specific shocks, the two-country model economy does not deliver an excessive volatility of investment relative to what observed in the data.

Period t profits for the firm are then

(22) $$D_t = Y_{P,t} - W_t N_{P,t} - I_t.$$

As the marginal rate of intertemporal substitution in consumption for individual households is equal to the gross real interest rate on bonds, R_t (see equation 4), firms discount future profits using the real interest rate R_t. The present discounted value of profits is then:

(23) $$V_t = \sum_{i=1}^{\infty} R_{t,t+i} D_{t+i}.$$

Firms choose sequences of labor demand $N_{P,t}$, end-of-period capital K_{t+1} and investment I_t, to maximize (23) subject to (20) through (22).

I denote with Q_t the Lagrange multiplier on the capital accumulation equation, i.e., Tobin's Q, which indicates the marginal cost of new capital K_{t+1} in terms of foregone output of final goods $Y_{P,t}$. I also denote by $R_{K,t}$ the marginal product of capital:

(24) $$R_{K,t} = (1-\alpha_P)\left(\frac{N_{P,t}}{K_t}\right)^{\alpha_P}.$$

The first-order conditions with respect to $N_{P,t}$, K_{t+1}, and I_t are, respectively:

(25) $$W_t = \alpha_P\left(\frac{K_t}{N_{P,t}}\right)^{1-\alpha_P};$$

(26) $$\begin{aligned} &Q_t R_{t+1} = R_{K,t+1} + \\ &+Q_{t+1}\left[(1-\delta) - \phi'\left(\frac{I_{t+1}}{K_{t+1}}\right)\frac{I_{t+1}}{K_{t+1}} + \phi\left(\frac{I_{t+1}}{K_{t+1}}\right)\right]; \end{aligned}$$

(27) $$1 = Q_t\phi'\left(\frac{I_t}{K_t}\right).$$

As both the production function (20) and the adjustment cost function $\phi(\cdot)$ are linearly homogeneous in K and

N, and in I and K, respectively, it is well known that average Q and marginal Q coincide, so that:

$$V_t = Q_t K_{t+1}. \tag{28}$$

Government

I denote government consumption expenditure with G_t. It is equal to the sum of government expenditure on goods, $C_{G,t}$, and government expenditure on hours, $W_t N_{G,t}$, where $N_{G,t}$ is the number of hours of work supplied by the households to the government.[7] The government collects lump-sum taxes from households, T_t. It also keeps a period-by-period balanced budget. The budget constraint of the government is

$$G_t = C_{G,t} + W_t N_{G,t} = T_t. \tag{29}$$

I assume that government expenditure on final goods does not have any effect on households' marginal utility of consumption. By the same token, I assume also that the production of final goods by private-sector firms is affected neither by government expenditure on goods nor by

[7] In the National Income and Product Accounts (NIPA), government consumption expenditure consists of both consumption and gross investment expenditure. In this paper, I focus on the consumption expenditure, G_t, and government expenditure on hours, $W_t N_{G,t}$, correspond, therefore, to the NIPA definitions of government consumption expenditures and general government wage and salary accruals, respectively. Government expenditure on final goods, $C_{G,t}$, corresponds to the NIPA definition of government consumption expenditures net of government wage and salary accruals.

government hours. Therefore, both types of government expenditures are pure waste.[8]

The real wage per hour paid by the government to households is the same that households receive from private sector. This assertion follows from two assumptions. One, hours can be costlessly moved across sectors. And, two, $N_{P,t}$ and $N_{G,t}$ enter the utility function in a perfectly substitutable manner, so that working for either the private sector or for the government brings households the same marginal disutility.

Government expenditure on goods and on hours are the two exogenous fiscal policy variables. They are taken as given by households and firms. I describe the evolution of these two fiscal policy variables, $C_{G,t}$ and $N_{G,t}$ as follows:

$$C_{G,t} = \left(C_{G,t-1}\right)^{\rho_G} \varepsilon_t^G,\ N_{G,t} = \left(N_{G,t-1}\right)^{\rho_N} \varepsilon_t^N, \tag{30}$$

where ε_t^G and ε_t^N are two zero-mean innovations to government expenditure on goods and government hours, respectively.

[8] In the related literature, however, there are also alternative assumptions on the utility and production effects of government expenditures. In Finn (1998), for example, government expenditure on goods enters nonseparably in the utility function and alters the marginal utility of private consumption, thereby directly affecting private consumption decisions. In contrast, in Baxter and King (1993), and, again, in Finn (1998), one component of government expenditures, i.e., government investment, generates government capital. The stock of government capital, in turn, enters the production function of private-sector firms and shifts the marginal product of private factors of production, thereby directly affecting private production decisions. The analysis here abstracts from the investment component of government expenditures and the related possible effects of government capital on the production of goods in the private sector.

Equilibrium

An equilibrium for this two-country economy, as of period *t*, is a collection of allocations for home and foreign households, $C_{t,v}$, $N_{t,v}$ and $B_{t,v}$, and $C^*_{t,v}$, $N^*_{t,v}$ and $B^*_{t,v}$; for home and foreign private-sector firms, $N_{P,t}$, K_t and I_t, and $N^*_{P,t}$, K^*_t and I^*_t; and sequences of prices, W_t, W^*_t, R_t, R^*_t, V_t, and V^*_t such that (i) taking prices, firms' profits and exogenous processes (30) for $C_{G,t}$ and $N_{G,t}$ as given, households in the home country maximize (1) subject to (3); (ii) foreign households solve their analogous problem; (iii) taking prices as given, private-sector firms in the home country maximize (23) subject to (20) and (21); (iv) foreign private-sector firms solve their analogous problem; and (v) labor, goods and bond markets all clear, as follows:

(31) $$N_t = N_{P,t} + N_{G,t},$$

(32) $$N^*_t = N^*_{P,t} + N^*_{G,t},$$

(33) $$Y_{P,t} = C_t + I_t + C_{G,t} - B_{t+1} - R_t B_t,$$

(34) $$Y^*_{P,t} = C^*_t + I^*_t + C^*_{G,t} - B^*_{t+1} - R_t B^*_t,$$

(35) $$\pi B + (1-\pi) B^* = 0.$$

Equations (33) and (34) are the resource constraints in the home and foreign countries. They can be obtained by integrating the aggregate versions of the household budget constraint (13), the definitions of period *t* profits of private firms (22) and the government budget constraints (29), along with the prices of the competitive equilibrium, in particular the no-arbitrage condition (7), and the market clearing conditions. Equation (35) indicates that real noncontingent bonds are in zero net supply.

3 Model solution

This section illustrates the approximate numerical solution of the model. First, I describe the deterministic steady state of the model economy which is the equilibrium in which all variables are constant. Next, I log-linearize around the steady state the equations that define the equilibrium of the two-country model economy, thus obtaining a system of log-linear difference equations. Finally, in order to obtain numerical simulations of the dynamic effects of shocks to government consumption expenditures, I assign numerical values to the parameters of the log-linear system.

Steady state

This subsection describes the deterministic steady state of the model economy. In what follows, variables without the time subscript denote steady state values. First, I determine the labor income share in private-sector output, α_P. To this purpose, I denote by α the labor income share in total output, where total output, Y_t, is the sum of output in the private sector, $Y_{P,t}$, and of government expenditure on hours, $W_t N_{G,t}$. I also denote by $\theta_G = N_G / N$ the share of hours allocated to the government over total hours worked.

The labor income share in private output is then related to α and to θ_G as follows:

(36) $$\alpha_P = \frac{\alpha(1-\theta_G)}{1-\alpha\theta_G}.$$

With no government hours $(\theta_G = 0)$, private output is equal to total output and $\alpha_P = \alpha$. The steady-state shares of private output and of government expenditure on hours in total output are, respectively:

$$\frac{Y_P}{Y} = 1-\alpha\theta_G, \quad \frac{WN_G}{Y} = \alpha\theta_G.$$

Also, the steady-state shares of government expenditure on goods in total output and in private output are, respectively:

$$\frac{C_G}{Y} = \frac{G}{Y} - \alpha\theta_G, \quad \frac{C_G}{Y_P} = \frac{G/Y - \alpha\theta_G}{1-\alpha\theta_G}.$$

Next, I determine the steady-state distribution of non-contingent bonds between the home and the foreign countries. As this is the only type of financial claim that is traded internationally, I refer to B and B^* as the net foreign asset positions of the home and of the foreign country, respectively. I assume here that both countries are similar in every respect. Households have the same preferences over consumption of goods and labor supply. Firms in the private sector produce goods combining capital and hours according the same production function. Capital depreciates at the same rate, and the government purchases the same amount of goods and hours, thereby taxing households by the same amount in a lump-sum fashion. Furthermore, as in Baxter (1995), firms incur no cost of adjusting the capital stock in the steady state, so that $\phi(I/K) = I/K$ and $\phi'(I/K) = 1$. Then, by the law of motion for capital (21) the ratio of investment to the capital stock is equal to the depreciation rate, $I/K = \delta$, and by (27), $Q = 1$. When investment in new capital goods is just enough to replace depreciated capital and to keep the capital stock constant, then adjustment costs are zero.

With international trade in bonds and a common real interest rate, *R*, by (26), both countries have the same marginal product of capital, $R_K = R - (1 - \delta)$, by (24), the same capital-hours ratio in the private sector, K/N_P, and by (25), the same wage rate, *W*. Given that taxes, *T*, are the same in both countries as well, then by (16) aggregate human wealth, *H*, defined as the after-tax present discounted value of the households' endowment of hours, is also the same in the home and in the foreign countries. This implies that steady-state aggregate consumption, *C*, is also the same in both countries.[9] By (18) and (19), financial wealth, *A*, and hours worked, *N*, are also the same in both countries. With hours allocated to the government, N_G, the same in both countries, hours in the private sector, N_P, are also the same. Given that the capital-hours ratio in the private sector, K/N_P, is the same in the two countries, then the steady-state capital stock, *K*, will also be the same. On one hand, this means that both countries produce the same amount of goods, Y_P, and have the same level of investment expenditure, $I = \delta K$. On the other hand, with the same level of financial wealth, *A*, and Tobin's *Q* equal to 1, it also implies that both countries hold an identical amount of the non-contingent real bond, *B*. As $B = B^*$, the

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[9] For brevity, I do not report here the algebra, which is, however, available upon request.

market clearing condition for bonds (35) implies that in the steady state $B = B^* = 0$. Seen from another viewpoint, when both countries in equilibrium produce and consume the same amount of goods and have the same level of investment and government expenditure on goods, their net exports will be zero. With no international trade in goods occurring in equilibrium, there will also be no trade in bonds between the home and the foreign countries, so that $B = B^* = 0$.

Finally, I determine the steady-state real interest rate, *R*. Given similar economic structures in both countries, I describe its determination with reference to the home country. I use the steady-state counterpart of the consumption Euler equation (18) normalized by output in the private sector Y_P after noting that in the steady state $Q = 1$ and $B = 0$:

(37) $$\frac{C}{Y_P} = \beta R \frac{C}{Y_P} - \frac{1-\varphi}{\varphi}\left(1-\varphi\beta\right)\theta R \frac{K}{Y_P}.$$

To solve (37) for *R*, I use two equations to substitute for K/Y_P and C/Y_P

(38) $$\frac{K}{Y_P} = \frac{1-\alpha_P}{R-\left(1-\delta\right)},$$

(39) $$\frac{C}{Y_P} = 1 - \delta \frac{K}{Y_P} - \frac{C_G}{Y_P}.$$

The first equation is the steady state counterpart of the marginal product of capital (24) after using the steady-state versions of the production function (20) and of private firms' first-order condition for capital (26). The second equation is the steady-state counterpart of the resource constraint (33) normalized by Y_P. The second term in the right-hand side, $\delta \cdot \left(K/Y_P\right)$, is steady-state investment relative to private output. Once the equilibrium real interest rate is computed, then K/Y_P and C/Y_P can be recovered using (38) and (39).

The log-linear system

This subsection presents the log-linear equations that describe the behavior of the model economy around the deterministic steady state. In what follows I use "hat" variables to denote log deviations from steady-state values.[10] I report here only the log-linear equations relative to the home country. Similar equations describe the behavior of the foreign country.

Household behavior is approximated by the log-linear versions of the aggregate consumption Euler equation (18) and the aggregate labor supply equation (19):

$$\hat{C}_{t+1} = \hat{R}_{t+1} + \beta R \hat{C}_t - \frac{1-\varphi}{\varphi}\left(1-\varphi\beta\right)\theta R\left(\frac{C}{Y_P}\right)^{-1}\hat{A}_{t+1}, \tag{40}$$

$$\hat{N}_t = \frac{1-N}{N}\left(\hat{W}_t - \hat{C}_t\right). \tag{41}$$

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[10] For variables such as financial wealth, net foreign assets, current account, and net exports, log deviations are defined respectively as:

$$\hat{A}_t = \frac{A_t - A}{Y_P},\ \hat{B}_t = \frac{B_t - B}{Y_P},\ \hat{CA}_t = \frac{CA_t - CA}{Y_P},\ \hat{NX}_t = \frac{NX_t - NX}{Y_P}.$$

The log-linear version (40) of the aggregate consumption Euler equation is analytically similar to the log-linear consumption Euler equation in Schmitt-Grohé and Uribe (2003), where the interest rate on internationally traded bonds is increasing in the size of a country's net foreign debt.

As for private-sector firms, the log-linear counterparts of the production function (20), the law of motion for capital (21), and for the marginal product of capital (24) are, respectively:

(42) $$\hat{Y}_{P,t} = \left(1-\alpha_P\right)\hat{K}_t + \alpha_P \hat{N}_{P,t},$$

(43) $$\hat{K}_{t+1} = \left(1-\delta\right)\hat{K}_t + \delta \hat{I}_t,$$

(44) $$\hat{R}_{K,t} = \alpha_P\left(\hat{N}_{P,t} - \hat{K}_t\right).$$

The first-order conditions of the problem of the firm (25) through (27), in log-linear terms are:

(45) $$\hat{W}_t = \left(1-\alpha_P\right)\left(\hat{K}_t - \hat{N}_{P,t}\right),$$

(46) $$\hat{R}_{t+1} = \frac{R_K}{R}\hat{R}_{K,t+1} + \frac{\delta}{R\eta}\left(\hat{I}_{t+1} - \hat{K}_{t+1}\right) + \frac{1-\delta}{R}\hat{Q}_{t+1} - \hat{Q}_t,$$

(47) $$\hat{I}_t - \hat{K}_t = \eta \hat{Q}_t, \quad \eta = -\left[\frac{\left(I/K\right)\phi''}{\phi'}\right]^{-1}.$$

Combining the definition of aggregate financial wealth (14) with equation (28) and taking a log-linear approximation yields:

$$\hat{A}_{t+1} = \hat{B}_{t+1} + \frac{K}{Y_P}\left(\hat{Q}_t + \hat{K}_{t+1}\right). \tag{48}$$

The log-linearized process for government expenditure on final goods and government hours in (30) are, respectively:

$$\hat{C}_{G,t} = \rho_G \hat{C}_{G,t-1} + \hat{\varepsilon}_t^G, \tag{49}$$

$$\hat{N}_{G,t} = \rho_N \hat{N}_{G,t-1} + \hat{\varepsilon}_t^N. \tag{50}$$

The labor market clearing condition (31), the resource constraint (33), and the bond market clearing condition are:

$$\hat{N}_t = \left(1-\theta_G\right)\hat{N}_{P,t} + \theta_G \hat{N}_{G,t}, \tag{51}$$

$$\hat{B}_{t+1} = R\hat{B}_t + \hat{Y}_{P,t} - \frac{C}{Y_P}\hat{C}_t - \delta\frac{K}{Y_P}\hat{I}_t - \frac{C_G}{Y_P}\hat{G}_t, \tag{52}$$

$$\pi\hat{B}_t + \left(1-\pi\right)\hat{B}_t^* = 0. \tag{53}$$

Finally, I also include in the system the log-linear versions of the definitions of total output, net exports, and of the current account balance:

$$\hat{Y}_t = \left(1-\alpha\theta_G\right)\hat{Y}_{P,t} + \alpha\theta_G\left(\hat{W}_t + \hat{N}_{G,t}\right), \tag{54}$$

$$N\hat{X}_t = \hat{Y}_{P,t} - \frac{C}{Y_P}\hat{C}_t - \delta\frac{K}{Y_P}\hat{I}_t - \frac{C_G}{Y_P}\hat{G}_t, \tag{55}$$

(56) $$\widehat{CA}_t = \widehat{NX}_t + \left(R-1\right)\hat{B}_t = \hat{B}_{t+1} - \hat{B}_t.$$

In (55), net exports are the difference between domestic production in the private-sector firms and domestic expenditure on goods consumption – by both private and government – and on investment. In (56), the current account balance is the sum of net exports of goods and services and net income receipts from foreigners, $\left(R-1\right)\hat{B}_t$. Combining (56) with (52), the current account balance is also the difference between national income, $\hat{Y}_{P,t} + \left(R-1\right)\hat{B}_t$, and domestic expenditure on consumption and investment, both net of government expenditure on hours. Additionally, it is also equal to the balance on the financial account, $\hat{B}_{t+1} - \hat{B}_t$, which measures the change in the stock of net financial claims on foreigners.

Parameter Values

This subsection presents the numerical values assigned to the parameters of the log-linearized model economy. These parameters are such that the steady state of the model is consistent with the post World War II experience of the U.S. economy. The model period is one quarter.

I set the subjective discount factor β equal to $1.04^{-1/4}$ to get a 4 percent annual real interest rate in the steady state. Next, I choose φ, the probability of survival, so that the average number of periods that household members spend in the labor force, $1/\left(1-\varphi\right)$, is equal to

200 (50 years). Therefore φ corresponds to 0.995. I set the labor income share in total output, α, equal to 0.58, and the quarterly depreciation rate to 2.5 percent. As in Baxter (1995) and Finn (1998), the steady state share of time devoted to labor, *N*, is 0.2. As in Finn (1998) and Schmitt-Grohé and Uribe (2003), the preference parameter θ is set equal to 0.23, a value consistent with the steady state value for *N*. As for the value of η, the elasticity of (I/K) with respect to *Q*, there is no direct empirical measure available. Baxter and Crucini (1995) selected a value for this parameter so that a two-country model economy subject to country-specific productivity shocks would produce a relative volatility of investment equivalent to its empirical counterpart; therefore, I use their same parameter value and set $\eta = 15$. The shares of government consumption expenditure in total output, G/Y, and of government hours in total hours, θ_G, are equal, respectively to 0.2, and to 0.16, the average values for the U.S. economy from 1948 to 2000. I set country size π equal to 0.5, so that both countries have equal size. This allows one to abstract from effects arising from relative country size, per se. Finally, I set the parameters of the persistence of the government expenditures shocks, ρ_G and ρ_N equal to 0.9.

4 Dynamic responses to government consumption expenditures shocks

This section considers the dynamic effects on home-country and foreign-country variables of shocks to two distinct components of government consumption expenditures in the home country only. In particular, it examines whether in the model economy these shocks generate different effects on current account balances. The first shock is persistent and unanticipated balance-budget increase to government expenditure on goods, $C_{G,t}$. Its magnitude is equivalent to 1 percent of the home-country GDP in steady-state, Y. The second shock is persistent and unanticipated balance-budget increase to the number of hours worked for the government, $N_{G,t}$. Its magnitude is such that government expenditure on hours, $W_t N_{G,t}$, also increase by an amount equivalent to 1 percent of the home-country GDP in the steady-state. This choice of the shocks' magnitudes helps compare their dynamic effects. In fact, following both shocks, government consumption expenditure in the home country, G_t, increases by the same amount in terms of steady-state GDP. This amount corresponds to what Baxter and King (1993) refer to as "one commodity unit."

Figure 2 through Figure 5 plot the impulse responses of the various variables to the two shocks. Figures 2 and 4 show the impulse responses to the government expenditure shocks of private output, private consumption, investment, government expenditure on final goods, net exports, current account, total output and government expenditure on hours; I report the responses of these variables relative to each of the two countries as percentages of respective steady-state GDP. Figures 3 and 5 illustrate the impulse responses of private hours, total hours, real return to capital, real wage, Tobin's Q, capital stock, net foreign assets and government hours; in these figures I present the responses of the capital stock and net foreign assets relative to each of the two countries as percentages of respective steady-state GDP, while I report those of private hours and government hours relative to each of the two countries as percentages of respective steady-state total hours. Finally, solid lines represent the responses of home-country variables, while dashed lines represent the responses of foreign-country variables.

Shock to government expenditure on goods

Consider, first, the effects of a shock to government expenditure on goods in the home country only. Figures 2 and 3 illustrate the dynamic responses of both home-country and foreign-country variables to a persistent and unanticipated balanced-budget increase in the level of government expenditure on goods.

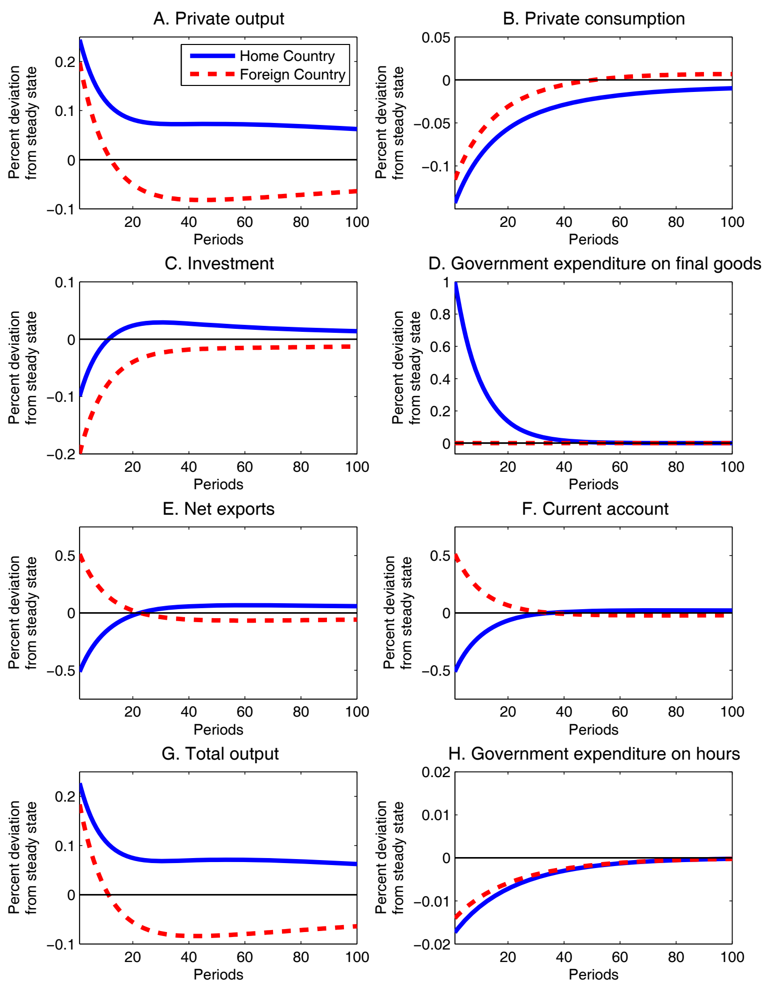
When government expenditure on goods in the home country increases, by the budget constraint (29), lump-sum taxes in the home country increase by the same magnitude too. As a consequence, domestic households observe a decrease in their after-tax labor income. They react by doing two things: they reduce consumption as shown in Figure 2B (by about 0.14 percent of GDP) and they increase their supply of labor hours by 0.37 percent (see Figure 3B). In regard to foreign households, they also reduce their consumption (by about 0.11 percent of GDP, see Figure 2B) and increase their labor supply by 0.3 percent (see Figure 3B). This happens because the increase in government expenditure on goods in the home country drives up the common real interest rate, R_t (not shown in the figures). As a consequence, foreign households react by substituting intertemporally consumption and labor supply. More specifically, they reduce current consumption and increase the number of hours they work to take advantage of the better opportunities to reallocate resources to future periods. In relative terms, home private consumption declines by about 0.03 percent of GDP with respect to foreign private consumption, while home labor supply increases by 0.07 percent with respect to its foreign counterpart. The increase in labor supply in both countries, in turn, produces a number of effects. First, given a decreasing marginal product of labor in the private sector (see equation 25), the real wage decreases in both countries. However, the increase to the total number of hours worked in the home country relative to foreign leads to a decrease in the real wage in relative terms (see Figure 3D) and, with government hours unchanged, also to a decrease in the government expenditure on hours in both countries and in relative terms (see Figure 2H). Second, the increase in home and foreign total hours produces an increase of exactly the same magnitude in hours allocated to private-sector firms in both countries (0.37 percent in the home country and 0.3 percent in the foreign country, see Figure 3A), and also in private output (by approximately 0.25 percent of GDP in the home country, 0.20 percent of GDP in the foreign country, and 0.05 percent of GDP in relative terms) and total output (by approximately 0.23 percent in the home country, 0.18 percent in the foreign country, and 0.05 percent in relative terms), as illustrated in Figures 2A and 2G. Finally, as an increased number of hours is combined with each unit of capital into the production of final goods, the domestic marginal product of capital in the home country increases relative to the foreign country in response to the shock (see Figure 3C). Correspondingly, as the marginal product of capital increases in relative terms, the replacement cost of capital decreases relative to the value of existing capital, so that Tobin's Q increases domestically relative to the foreign country (see Figure 3E). The increase in Tobin's Q in relative terms prompts an increase in domestic investment relative to foreign by about 0.1 percent of GDP on impact (see Figure 2C). In fact, investment in the home country decreases by

0.1 percent, while it drops by 0.2 percent in the foreign country. This dynamics of investment leads to a protracted increase in the domestic capital stock relative to the foreign capital stock (see Figure 3F).

Overall, the relative responses of private output, private consumption, and investment, on impact, approximately offset each other (0.05 percent for private output, -0.03 percent for private consumption, and 0.1 percent for investment). However, government expenditure on goods increases in relative terms by 1 percent of GDP. As one can derive from equations (52), (56), and (55), this leads to a relative deterioration of net exports and current account balances of similar magnitude (see Figures 2E and 2F). Given equal country sizes, this amounts to a current account deterioration in the home country of about 0.5 percent of GDP, like in Baxter (1985), and a corresponding improvement in the current account balance in the foreign country. The impulse responses described in this subsection are also similar to those already obtained within two-country frameworks by Kollmann (1998) and by Betts and Devereux (2001). Over time, as domestic government expenditure on final goods returns to its preshock level, the deficits in the home country become smaller in size and eventually turn into surpluses. Conditional on the positive shock to domestic government expenditure on goods, the sequence of current account deficits in the home country leads to a protracted accumulation of external debt. External indebtedness, after approximately 40 periods, reaches about 5 percent of GDP in the home country and then very slowly reverts back to its preshock level (see Figure 3G).

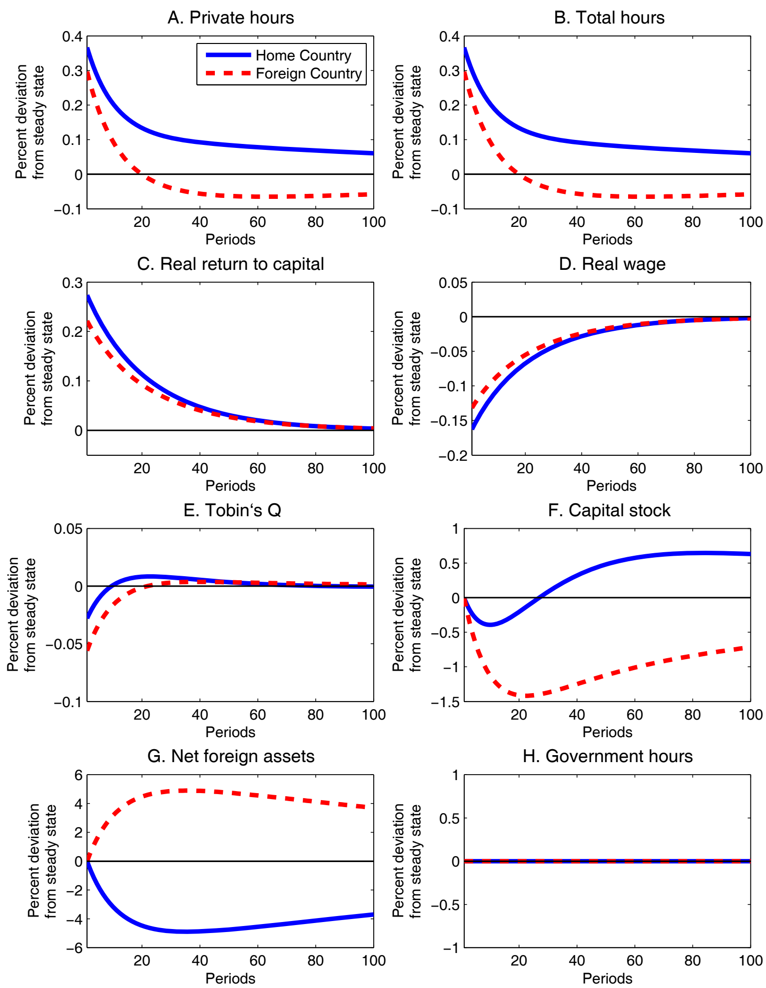
Summing up, within this framework, an increase in government expenditure on goods in the home country leads to offsetting movements in relative domestic private output, consumption, and investment.

FIGURE 2: SHOCK TO GOVERNMENT EXPENDITURE ON GOODS IN THE HOME COUNTRY



Note: This figure shows impulse responses of home-country and foreign-country variables to a shock to government expenditure on goods in the home country only. The magnitude of the shock is equivalent to 1% of the home-country GDP in the steady state. Responses relative to each of the two countries are displayed as percentages of respective steady-state GDP.

FIGURE 3: SHOCK TO GOVERNMENT EXPENDITURE ON GOODS IN THE HOME COUNTRY



Note: This figure shows impulse responses of home-country and foreign-country variables to a shock to government expenditure on goods in the home country only. The magnitude of the shock is equivalent to 1% of the home-country GDP in the steady state. Responses for the capital stock and net foreign assets relative to each of the two countries are displayed as percentages of respective steady-state GDP. Responses for private and government hours relative to each of the two countries are displayed as percentages of respective steady-state total hours.

In addition, the expansion in the goods component of government consumption expenditure produces a sizeable worsening in the current account balance of the home country and corresponding increases in net foreign indebtedness. Therefore, conditional on a positive shock to domestic government expenditure on goods, the current account deterioration in the home country appears substantially linked to the increase in government consumption expenditure.

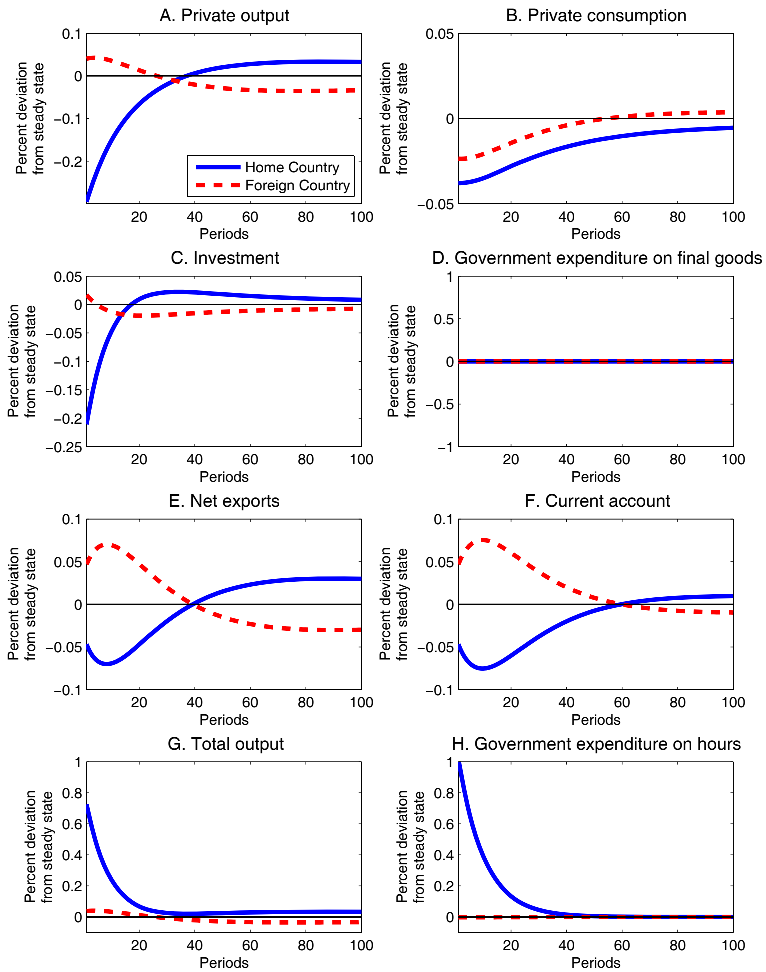
Shock to hours worked for the government

Consider, next, the effects of a shock to government hours in the home country only. Figures 4 and 5 illustrate the dynamic responses of both home-country and foreign-country variables to a persistent and unanticipated balanced-budget increase in the number of hours worked for the government.

When the number of hours worked for the government increases in the home country (by 1.5 percent of total hours, see Figure 5H), less of this resource is available for production in the private sector. Private hours and private output decrease in the home country by 0.44 percent of total hours, and 0.29 percent of total GDP, respectively (see Figure 5A and Figure 4A). In the foreign country, because of the initial increase in the common real interest rate on impact, R_t (not shown in the figures), both total and private hours increase by 0.06 percent of total hours. As a result both total and private output increase by about 0.04 percent of total GDP. Therefore, domestic private hours and private output, relative to their foreign counterparts, decrease by 0.5 percent of total hours and by 0.33 percent of GDP, respectively. In the home country, as fewer final goods are available for consumption and investment, the expanded government use of resources produces a negative wealth effect. Domestic households react by decreasing consumption by approximately 0.03 percent of steady-state GDP (see Figure 4B), and by increasing labor supply. In the foreign country, because of the increase in the real interest rate, private consumption drops by 0.02 percent of GDP. In relative terms, domestic private consumption decreases relative to foreign by about 0.01 percent of GDP. With fewer hours allocated to the domestic private sector, the marginal product of labor, hence the real wage, in the home country increases relative to the foreign (see Figure 5D). In addition, with a higher real wage, the total supply of domestic labor hours relative to foreign further increases, as a consequence of the substitution effect. All together, as a result of both the wealth and the substitution effects, total hours in the home country increase in relative terms by 1 percent (see Figure 5B). Moreover, as the private sector employs fewer hours, the domestic marginal product of capital and Tobin's Q decrease on impact after the shock relative to their foreign counterparts (see Figures 5C and 5E). As replacing existing capital goods becomes more costly relative to their market value, investment in the home country declines by approximately 0.23 percent of GDP relative to the foreign country (see Figure 4C). This leads to a decline in the domestic capital stock relative to foreign (see Figure 5F).

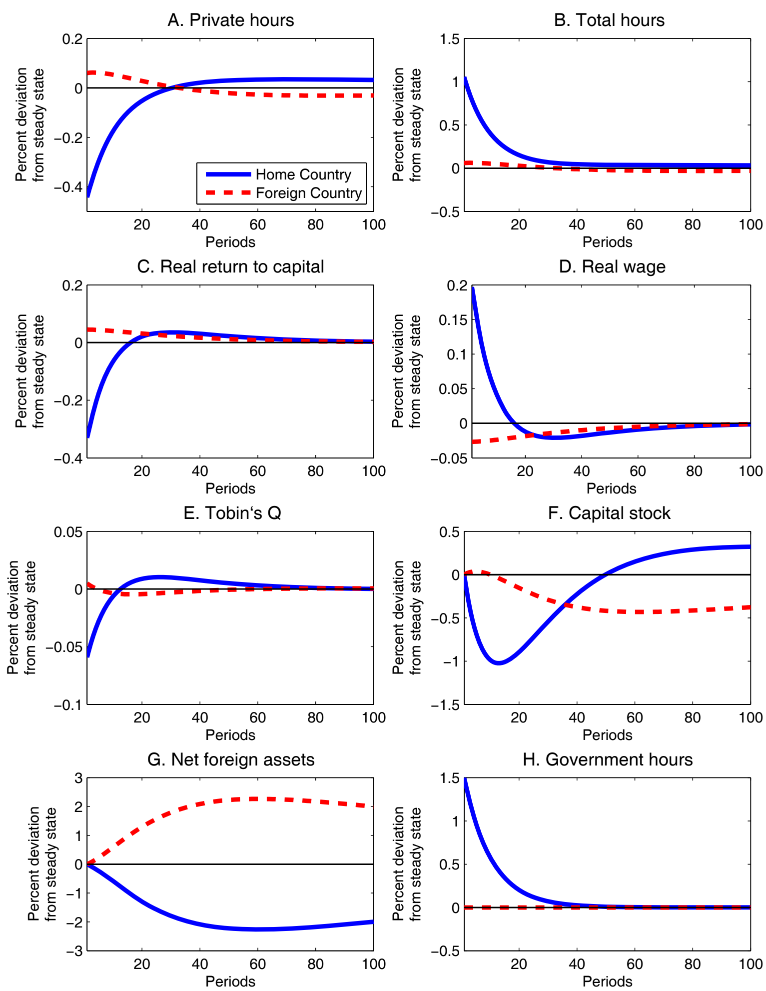
Overall, in relative terms, private output decreases by 0.33 percent of GDP, while government expenditure on hours increases by 1 percent of GDP. Therefore, total output $(Y_{P,t} + W_t N_{G,t})$ increases by 0.67 percent in relative terms as a result of the shock considered in this subsection.

FIGURE 4: SHOCK TO GOVERNMENT HOURS IN THE HOME COUNTRY



Note: This figure shows impulse responses of home-country and foreign-country variables to a shock to the number of hours worked for the government in the home country only. The magnitude of the shock is such that government expenditure on hours in the home country increases by an amount equivalent to 1% of the home-country GDP in the steady state. Responses relative to each of the two countries are displayed as percentages of respective steady-state GDP.

FIGURE 5: SHOCK TO GOVERNMENT HOURS IN THE HOME COUNTRY



Note: This figure shows impulse responses of home-country and foreign-country variables to a shock to the number of hours worked for the government in the home country only. The magnitude of the shock is such that government expenditure on hours in the home country increases by an amount equivalent to 1% of the home-country GDP in the steady state. Responses for the capital stock and net foreign assets relative to each of the two countries are displayed as percentages of respective steady-state GDP. Responses for private and government hours relative to each of the two countries are displayed as percentages of respective steady-state total hours.

The consequences on the current account following this shock are different from those obtained following the shock to government expenditure on goods. While the relative output of final goods from the private sector declines by 0.33 percent of GDP, relative private consumption and investment decline by 0.01 percent and 0.23 percent of GDP, respectively. Therefore, net exports and the current account deteriorate in relative terms by approximately 0.09 percent of GDP (see Figures 4E and 4F). Again, given equal country sizes, this means that the current account balance deteriorates by nearly 0.05 percent of GDP in the home country, while improving by a corresponding amount in the foreign country.[11] The deterioration in the home country produces a worsening in the net foreign debt position ratio to GDP in the home country, which reaches a magnitude of about 2.26 percent of GDP after approximately 60 periods (see Figure 5G). As one can see from the log-linear versions of the resource constraint (52) and the current account definition (56), an increase in the government expenditure on hours $(W_t N_{G,t})$ does not lead directly to a deterioration in the current account. When the government spends more on hours, it increases both national income and domestic expenditure, thereby not directly affecting the excess of domestic expenditure over national income. Furthermore, while

[11] In a related paper, Ganelli (2005), using a two-country model with nominal rigidities, finds qualitatively similar results on the effects of changes to government employment. Specifically, following a permanent reduction in government employment in the home country, domestic private consumption and domestic private output increase relative to foreign and the the current account balance improves.

goods are traded internationally, hours are not. Therefore, an increase in government expenditure on goods leads to a decrease in net exports of goods, services, and income. In contrast, government expenditure on hours does not produce any direct effect on net domestic absorption of traded resources, and, hence, on the current account. The effects on the current account take place, rather, through the changes in output in the private sector and in consumption and investment produced by the shock to government hours. These effects are one order of magnitude smaller than the direct current account effects of an increase in government expenditure on goods. On the whole, the simulations of the model economy indicate that, when considering increases in government expenditure on hours, the link between increases in government consumption expenditures and current account deficits is weakened quite substantially.

5 Conclusions

This paper has distinguished between two components of government consumption, expenditure on goods and expenditure on hours, and has explored the dynamic effects of unanticipated increases in these two, using a two-country model economy. In particular, it has compared the effects on current account balances of a shock to government hours with those produced by a shock to government expenditure on goods. While a shock to government expenditure on goods produces a sizeable deterioration in the current account balance of the country where the shock originates, a shock to government hours has a considerably smaller impact. Specifically, an increase in government expenditure on hours equivalent to 1 percent of GDP produces a deterioration in the current account balance corresponding to barely 0.05 percent of GDP. Increases to government hours are accommodated domestically through an expansion in labor supply and, therefore, do not directly affect the current account balance, which measures the difference between national income and domestic expenditure. Overall, the results in this paper indicate that considering government consumption as entirely expenditure on goods can lead to overestimating its role in accounting for movements in the current account balance.

Acknowledgements

I thank Darrel Cohen, Fabio Ghironi, Reuven Glick, Nouriel Roubini, Mark Spiegel, Diego Valderrama, and an anonymous referee for helpful feedback; Judith Goff and Anita Todd for editorial assistance; Thien Nguyen and Greg Snyders for excellent research assistance. All remaining errors are my own. The views in this paper are solely my responsibility and should not be interpreted as reflecting the views of the Federal Reserve Bank of San Francisco or the Federal Reserve System.

References

Ahmed, S., 1987. Government spending, the balance of trade and the terms of trade in British history. Journal of Monetary Economics 20, 195-220.

Baxter, M., 1995. International trade and business cycles. In: Grossman, G.M., Rogoff, K. (Eds.), Handbook of International Economics, Vol. 3. North-Holland, Amsterdam, pp. 1801-1864.

Baxter, M., Crucini, M.J., 1995. Business cycles and the asset structure of foreign trade. International Economic Review 36, 821-854.

Baxter, M., King, R.G., 1993. Fiscal policy in general equilibrium. American Economic Review 83, 315-334.

Betts, C., Devereux, M.B., 2001. The international effects of monetary and fiscal policy in a two-country model. In: Calvo, G.A., Dornbusch, R., Obstfeld, M. (Eds.), Money, Capital Mobility and Trade: Essays in Honor of Robert A. Mundell. MIT Press, Cambridge, pp. 9-52.

Blanchard, O.J., 1985. Debt, deficits and finite horizons. Journal of Political Economy 93, 223-247.

Botman, D., Laxton, D., Muir, D., Romanov, A., 2006. A New-Open-Economy-Macro model for fiscal policy evaluation. IMF Working Paper No. 06/45.

Bussière, M., Fratzcher, M., Müller, G.J., 2005. Productivity shocks, budget defícts and the current account. ECB Working Paper No. 509.

Cardia, E., 1991. The dynamics of a small open economy in response to monetary, fiscal and productivity shocks. Journal of Monetary Economics 28, 411-434.

Cavallo, M., Ghironi, F., 2002. Net foreign assets and the exchange rate: Redux revived. Journal of Monetary Economics 49, 1057-1097.

Corsetti, G., Müller, G.J., 2006. Twin deficits: Squaring theory, evidence and common sense. Economic Policy, forthcoming.

Erceg, C.J., Guerrieri, L., Gust, C., 2005. Expansionary fiscal policy and the trade deficit. International Finance 8, 361-397.

Finn. M.G., 1998. Cyclical effects of government's employment and goods purchases. International Economic Review 39, 635-657.
Frenkel, J.A., Razin, A., Yuen, C.W., 1996. Fiscal Policies and Growth in the World Economy, 3rd Ed. MIT Press, Cambridge.

Ganelli, G., 2005. The international effects of government spending composition. IMF Working Paper No. 05/4.

Ghironi, F., 2006. Macroeconomic interdependence under incomplete markets. Journal of International Economics, forthcoming.

Kim, S., Roubini, N., 2004. Twin deficits or twin divergence? Fiscal policy, current account and the real exchange rate in the US. Mimeo, New York University.

Kollmann, R., 1998. U.S. trade balance dynamics: the role of fiscal policy and productivity shocks and of financial market linkages. Journal of International Money and Finance 17, 637-669.

Schmitt-Grohé, S., Uribe, M., 2003. Closing small open economy models. Journal of International Economics 61, 163-185.

Weil, P., 1989. Overlapping families of infinitely-lived agents. Journal of Public Economics 38, 183-198.

Yi, K.-M., 1993. Can government purchases explain the recent U.S. net export deficits? Journal of International Economics 35, 201-225.