Macroeconomic Dynamics, **9**, 2005, 288–294. Printed in the United States of America.
DOI: 10.1017.S1365100504040167

HOME BIAS IN GOVERNMENT SPENDING AND QUASI NEUTRALITY OF FISCAL SHOCKS

GIOVANNI GANELLI
International Monetary Fund

We show how introducing home bias in government spending in the redux model generates quasi neutrality of fiscal policy shocks. We offer an intuitive explanation for this result and we stress its policy implications.

Keywords: New Open Economy Macroeconomics, Fiscal Policy, Quasi Neutrality

1. INTRODUCTION

The macroeconomics of international fiscal spillovers, traditionally based on the Mundell–Fleming model, are being reinvestigated within the emerging "new open economy macroeconomics" framework [see Lane and Ganelli (2003, Sect. 4). The starting point of this literature is the redux model presented by Obstfeld and Rogoff (1995, 1996). In the redux model, an increase in government spending in one country decreases domestic consumption and increases consumption abroad.[1] This result follows from the wealth effect due to the fact that residents of the country that expands have to face all the costs of this policy (the increase in taxes) whereas, with no home bias in government spending, the benefits (the increase in demand) are shared with the other country.

We show how introducing home bias in public consumption in the redux model generates a quasi-neutrality result: Temporary fiscal expansions increase domestic output on a one-to-one basis, without any effect on the other (domestic and foreign) macroeconomic variables.[2] Our exercise has two main implications. First, it provides a warning on the realism of some predictions of the redux model. Caselli (2001), for instance, empirically estimates the response of relative consumption for a panel of EU countries to a fiscal shock in Germany (considered as the "foreign" country), finding that the coefficient is closer to zero than to one.[3] Although further empirical research on the international spillover effects of fiscal policy is warranted, Caselli's results suggest that the original redux model

The views expressed in this paper are those of the author and should not be interpreted as reflecting those of the International Monetary Fund. I am grateful to Neil Rankin for his comments and advice. This paper was substantially improved by the comments of William Barnett (Editor), of an anonymous Associate Editor, and of two anonymous referees. Address correspondence to: Giovanni Ganelli, European Department, International Monetary Fund, Room 9-302 V, 700 19th Street, NW, Washington, DC 20431, USA; e-mail: gganelli@imf.org.

 1365-1005/05 $12.00

might overemphasize the importance of consumption spillovers following a fiscal shock.[4]

Second, our exercise has some important policy implications. In particular, it points out that policymakers, when assessing the international effects of fiscal policies, should take into account not only the level of public expenditure but also its composition. The latter aspect tends to be neglected in the policy arena, where the emphasis falls more on numerical targets for the government budget or for the level of spending, regardless of the composition of the latter. In this note, we assume complete home bias for analytical convenience. The actual degree of home bias from an empirical point of view is likely to be considerable but less than what our assumption implies.[5] We believe, however, that comparing the two extreme assumptions used respectively in the redux and in this note can give some insights on the direction in which the effects of fiscal policy change as the weight of domestic spending in public consumption changes.[6]

The zero effect on consumption that we derive shows how, in a one-period fixed-price model, government spending cannot crowd out consumption through higher prices. Since in the presence of price rigidities the labor market efficiency condition does not hold and output is demand determined, domestic output increases one-to-one with aggregate demand.

The basic intuition for our results is that, when government spending is used to purchase only domestically produced goods, the wealth costs of this policy for home agents are perfectly offset by the gains deriving from the stimulation of domestic demand. This implies that there is no effect on domestic consumption. Since in the redux model real balances are a function of consumption, the unchanged pressure on money demand implies no effect on the exchange rate and therefore no expenditure switching effect. This in turn implies a zero output spillover.

2. MODEL

The model presented here is an extension of the redux model that allows for home bias in public spending.[7] The world is populated by a continuum of infinitely lived agents who are both consumers and monopolistic producers of a continuum of differentiated goods. Home agents are on the interval $[0, n]$, while foreign agents are on the interval $(n, 1]$.[8] A representative agent j maximizes the following intertemporal utility function:

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} \left[\log C_s + \chi \log \frac{M_s}{P_s} - \frac{k}{2} Y(j)_s^2 \right] \qquad (1)$$

subject to the budget constraint

$$P_t B_{t+1}^j + M_t^j = P_t(1 + r_t) B_t + M_{t-1}^j + p_t(j) Y_t(j) - P_t C_t^j - P_t \tau_t \qquad (2)$$

https://doi.org/10.1017/S1365100505040162 Published online by Cambridge University Press

where $0 < \beta < 1$ is the discount factor, and all the parameters are positive. The arguments of the utility function are a real private consumption index, real money balances, and an output term, which captures the disutility of having to give up leisure in order to produce more. The private consumption index C, defined as

$$C = \left[\int_0^1 c(z)^{\frac{\theta-1}{\theta}} dz \right]^{\frac{\theta}{\theta-1}}, \tag{3}$$

aggregates over the consumption of the continuum of goods, and $\theta > 1$ is the price elasticity of demand faced by each monopolist. B is a riskless real bond denominated in the composite consumption good, which gives account of international shifts in wealth; r_t is the real interest rate on bonds between $t-1$ and t; $Y_t(j)$ is output of good j; and $p_t(j)$ is its domestic currency price. M_{t-1} denotes nominal money balances held at the beginning period t, and τ_t lump-sum taxes, which are assumed to be payable in the consumption good C_t.

Whereas in the redux model, government spending is defined exactly as private consumption, that is, as an aggregate over the continuum of goods regardless of their place of production, we assume in this model complete home bias in public consumption. With home bias, the domestic government consumption index takes the form

$$G = \left[\int_0^n g(z)^{\frac{\theta-1}{\theta}} dz \right]^{\frac{\theta}{\theta-1}}. \tag{4}$$

The index for the foreign country is, similarly, an integral between n and 1. In this framework, public demand for the domestic representative agent's good comes only from domestic government and it is given by

$$g(z) = \frac{1}{n} \left[\frac{p(z)}{P_G} \right]^{-\theta} G,$$

where government expenditure is now deflated by a price index that is different from the private consumption one.

Aggregating demand from home government with demand from domestic and foreign private agents gives the new world demand for the domestic agent's output as

$$y^d = \left[\frac{p(z)}{P} \right]^{-\theta} C^w + \left[\frac{p(z)}{P_G} \right]^{-\theta} G, \tag{5}$$

where the superscript w denotes world variables. Equation (5) states that demand for domestic output comes from *world* private consumption and from *domestic* public consumption.[9]

The model assumes no impediments to trade, so that the law of one price and the purchasing power parity hold. In each period, the government is subject to the budget constraint[10]

$$G_t = \tau_t. \tag{6}$$

https://doi.org/10.1017/S1365100505040162 Published online by Cambridge University Press

Finally, the model displays nominal rigidities in the form of one-period preset prices.[11]

2.1. Quasi Neutrality of Fiscal Shocks

As standard in this literature, we loglinearize the model around a symmetric steady state in which all producers set the same price and in which both government spending and foreign assets are equal to zero. In what follows, lowercase letters with a tilde denote log deviations in the short run (the period in which the shock hits and prices cannot adjust); lowercase letters with a hat denote log deviations in the long run, when prices are free to adjust to their long-run values.

Loglinearization of (5), taking into account that, in the initial symmetric steady state, $P_0 = P_{G0} = p_0(z)$, yields

$$\tilde{y} = \theta[\tilde{p} - \tilde{p}(h)] + \tilde{c}^w + \tilde{g}.$$

Proceeding in a symmetric way for the foreign country, we find a corresponding expression, which enables us to express relative output as

$$\tilde{y} - \tilde{y}^* = \theta\tilde{e} + (\tilde{g} - \tilde{g}^*). \tag{7}$$

Because the only changes in the algebra, compared to the redux model, concern the demand equations (equation 5 and its foreign equivalent), the equations of the redux that can be derived without using the demand equations are still valid. This is the case for the following expression for net foreign assets[12]:

$$\hat{b} = (1 - n)[(\tilde{y} - \tilde{y}^*) - (\tilde{c} - \tilde{c}^*) - (\tilde{g} - \tilde{g}^*) - \tilde{e}], \tag{8}$$

where $\tilde{e}$ denotes the log deviation of the exchange rate. Substituting (7) into (8) yields an expression for net foreign assets as a function of the exchange rate and of the consumption differential, in which the effects of the temporary components of fiscal policy cancel out:

$$\hat{b} = (1 - n)[(\theta - 1)\tilde{e} - (\tilde{c} - \tilde{c}^*)]. \tag{9}$$

In the redux model, it would be possible to derive an equation corresponding to (9). The corresponding redux equation, however, would be a function of $(\tilde{g} - \tilde{g}^*)$ as well. The fact that, in our model, differential fiscal expansions affect differential demand (because there is home bias) implies the disappearance of differential effects of fiscal expansions on net foreign assets, which were present in the redux model. Intuitively, the gains that home agents derive, in terms of increased demand for their goods, from domestic expansions, perfectly offset the costs deriving from the taxes that they have to pay to finance this policy. Equation (9) is a first step in proving that quasi neutrality holds under the new assumptions: It shows that the net foreign assets position is not directly affected by temporary fiscal policy expansions. As pointed out by an anonymous referee, this result could also have

https://doi.org/10.1017/S1365100505040162 Published online by Cambridge University Press

been shown by decomposing total nominal demand in nominal consumer demand and nominal government demand and imposing the government balanced budget condition in the household budget constraint [equation (2)]. The key implication is that, under our assumptions, a balanced budget increase in government spending does not affect households' savings.

Obstfeld and Rogoff (1995, 1996) and Ganelli (2003) show how the redux model can be reduced to two relationships between relative consumption and the exchange rate.[13] In the redux model, one of the two schedules that can summarize the model in the $(\tilde{e}, \tilde{c} - \tilde{c}^*)$ space is a function of $(\tilde{g} - \tilde{g}^*)$. In the model presented here, however, the fact that $(\tilde{g} - \tilde{g}^*)$ does not enter equation (9) implies that the two schedules are not a function of short-run fiscal expansions. This also means that it is not necessary to carry out explicitly the rest of the calculations in order to prove our claim.

The changes to the algebra, compared to the redux case, are concerned only with the long-run effects of fiscal policy. Since we are only interested in the temporary ones, we can write the variables as implicit functions of the long-run "anticipated" components $(\hat{g} - \hat{g}^*)$. This leads to the following reduced forms for the nominal exchange rate and for the consumption differential[14].

$$\tilde{e} = f_1[(\tilde{c} - \tilde{c}^*), (\hat{g} - \hat{g}^*)], \tag{10}$$

$$\tilde{c} - \tilde{c}^* = f_2(\hat{g} - \hat{g}^*). \tag{11}$$

Equation (10) shows that the nominal exchange rate is a function only of the anticipated components, and is therefore not affected by temporary policies. Following Aoki (1981), we can solve (11) for levels as follows:

$$\tilde{c} = \tilde{c}^w + (1 - n) f_2(\hat{g} - \hat{g}^*). \tag{12}$$

Obstfeld and Rogoff [1996, Eq. (124)] show that world consumption $\tilde{c}^w$ is not affected by temporary fiscal expansions. Therefore (12) proves that temporary expansions do not affect consumption. What about output? Again, using Aoki's method to solve equation (7) for levels, and substituting (10) for the nominal exchange rate, gives

$$\tilde{y} = \tilde{y}^w + (1 - n)(\tilde{g} - \tilde{g}^*) + (1 - n)\theta f_1(\hat{g} - \hat{g}^*). \tag{13}$$

Neglecting the effects of the anticipated component and using the fact that, since $\tilde{c}^w = 0$, equilibrium in the world goods market implies $\tilde{y}^w = \tilde{g}^w = n\tilde{g} + (1-n)\tilde{g}^*$, equation (13) gives

$$\tilde{y} = n\tilde{g} + (1 - n)\tilde{g}^* + (1 - n)(\tilde{g} - \tilde{g}^*). \tag{14}$$

From (14), we can derive the following effects on domestic output, following, respectively, a domestic and a foreign temporary fiscal expansion: $\tilde{y} = \tilde{g}$ and $\tilde{y} = 0(\tilde{g}^*) = 0$. This completes our proof. After the introduction of home bias in

https://doi.org/10.1017/S1365100505040162 Published online by Cambridge University Press

government spending, the model displays the quasi-neutrality property: A temporary fiscal expansion in one country implies a unit multiplier on that country's output, while none of the other macroeconomic variables (output in the other country, consumption in both countries, the current account, and the nominal exchange rate) are affected.

3. CONCLUSIONS

In this note, we have shown how introducing home bias in government spending in the redux model generates a quasi-neutrality result. In this case the costs of a fiscal expansion for domestic residents are completely offset by the gains, with no effect on consumption. This breaks down what we have previously called the indirect effect of fiscal expansions on money demand [see Ganelli (2003)]. The exchange rate neither depreciates nor appreciates, and the output spillover is therefore zero. The quasi-neutrality result resembles the "textbook" balanced-budget multiplier that holds in a closed economy in the traditional IS/LM literature.[15] Introducing home bias in government spending isolates the economy with respect to fiscal shocks. It is important to acknowledge, at this point, that our results might depend on the simple structure of our model. We assume one-period price rigidity and lump-sum taxes, and we use a money-in-the-utility-function approach. Those assumptions could be changed in various directions: multiperiod price adjustment and distortionary taxes could be introduced, and cash constraints on government consumption could be postulated. The sensitivity of our results to those extensions of the model are interesting questions for future research.

NOTES

1. This in turn causes a fall in relative money demand, which depreciates the domestic currency and, through the expenditure switching effect, raises relative output.

2. This property was first discussed by Rankin (1990). Other examples of models in which the property holds are Svensson (1987) and Corsetti and Pesenti (2001). Although in these models government spending falls only on domestically produced goods, the link between this assumption and the quasi-neutrality property has not yet been fully investigated.

3. The magnitude of the coefficient is about 0.2.

4. Although Obstfeld and Rogoff (1995, 1996) do not provide a quantitative calibration of the redux model, they highlight the decrease in relative consumption following a domestic fiscal expansion as a crucial result, from both the positive and the welfare points of view.

5. Although empirical estimates of the degree of home bias in government spending are not readily available, some indirect evidence shows that this might be very high. In the United States, for example, current expenditure (which largely falls on government employment and therefore exhibits full home bias almost by definition) as a share of total government expenditure amounted to 96% in 2003 (Bureau of Economic Analysis), http://www.bea.org.

6. Of course, a more thorough analysis would imply introducing intermediate degrees of home bias in the model; this is left for future research.

7. Warnock (2003) investigates the implications of home bias in private consumption in this framework.

8. Since the model is symmetric, we will introduce the equations only for the domestic agents.

9. In the basic redux model with no home bias, world public consumption would enter equation (5).

10. Since we are focusing on fiscal policy, we ignore seignorage and we set monetary shocks to zero. We also focus on balanced-budget fiscal expansions. Since Ricardian equivalence holds in the model, government deficits would not have real effects. The existence of two different price indexes for private and public consumption implies that a more precise expression for the government budget constraint would be $P_{G_t} G_t / P_t = \tau_t$.

However, since in what follows we loglinearize the model around a symmetric steady state where $P_0 = P_{G0} = p_0(z)$, we can ignore this minor complication.

11. We follow the original redux framework, assuming that the rigidity is in prices denominated in the producers' currencies.

12. Equation (8) corresponds to equation (62) in Obstfeld and Rogoff (1996), for the version of the model that encompasses public spending.

13. See Obstfeld and Rogoff [1996, Eqs. (60) and (127)].

14. Notice that we have replaced $(\hat{c} - \hat{c}^*)$ with $(\tilde{c} - \tilde{c}^*)$ exploiting a well-known property of the redux model. The result that the exchange rate and relative consumption are not functions of temporary shocks stems from the fact that $(\tilde{g} - \tilde{g}^*)$ does not affect $\hat{b}$.

15. See Bailey (1971, p. 153).

REFERENCES

Aoki, M. (1981) *Dynamic Analysis of Open Economies*. New York: Academic Press.

Bailey, M.J. (1971) *National Income and the Price Level: A Study in Macrotheory* (2nd ed.). New York: McGraw-Hill.

Caselli, P. (2001) Fiscal consolidation under fixed exchange rates. *European Economic Review* 45, 425–450.

Corsetti, G. & P. Pesenti (2001) Welfare and macroeconomic interdependence. *Quarterly Journal of Economics* 116, 421–445.

Ganelli, G. (2003) Useful government spending, direct crowding-out and fiscal policy interdependence. *Journal of International Money and Finance* 22, 87–103.

Lane, P.R. & G. Ganelli (2003) Dynamic general equilibrium analysis: The open economy dimension. In S. Altug, J. Chadha, & C. Nolan (eds.), *Dynamic Macroeconomic Analysis*, pp. 308–334. Cambridge, UK: Cambridge University Press.

Obstfeld, M. & K. Rogoff (1995) Exchange rate dynamics redux. *Journal of Political Economy* 103, 624–660.

Obstfeld, M. & K. Rogoff (1996) *Foundations of international macroeconomics*. Cambridge, MA: MIT Press.

Rankin, N. (1990) Macroeconomic interdependence, floating exchange rates, and product substitutability. In A.S. Courakis & M.P. Taylor (eds.), *Private Behavior and Government Policy in Interdependent Economies*, pp. 235–257. Oxford: Oxford University Press.

Svensson, L.E.O. (1987) International fiscal policy transmission. *Scandinavian Journal of Economics* 89 (3), 305–334.

Warnock., F.E. (2003) Exchange rate dynamics and the welfare effects of monetary policy in a two-country model with home-product bias. *Journal of International Money and Finance* 22 (3), 343–363.