



## Public infrastructures, public consumption, and welfare in a new-open-economy-macro model

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### ABSTRACT

This paper focuses on the trade-off faced by governments in deciding the allocation of public expenditures between productivity-enhancing public infrastructures and utility-enhancing public consumption in a two-country model. The results show that a permanent increase in the domestic stock of public capital financed by a reduction in public consumption raises domestic welfare if the productivity of public capital is high and the weight of public consumption in private utility is low compared to private consumption. The effect on foreign welfare is negative in the short run, but positive in the long run. This implies that, if foreign authorities care not only about the present discounted value of welfare but also about welfare dynamics, a permanent domestic reallocation of public spending might result in a virtuous global technological cycle.

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### 1. Introduction

Governments face several trade-offs in the process of planning and executing fiscal policy. For example, decisions on the methods of financing the deficit (or on the use of the surplus) and on the composition of public expenditures need to be made.

With regard to the latter issue, governments are involved in the provision of public infrastructures which can increase the productivity of private firms.<sup>2</sup> Examples include roads, bridges, airports, and all “... those public works, which, though they may be in the highest degree advantageous to a great society, are, however, of such a nature that the profit could never repay the expense to any individual or small number of individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect or maintain” (Smith, 1776). At the same time, governments spend large part of their budgets on goods and services that can also be privately provided and, while they do not directly impact the productivity of the private sector, are likely to affect consumers’ utility in a way similar to private consumption. Examples of such utility-enhancing spending for public consumption include (but are obviously not limited to) insurance programs, defense, clean streets, and public parks.

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<sup>2</sup> Throughout the paper, we will use interchangeably the expressions infrastructure expenditure and capital expenditure. Public infrastructures and public capital will also be used as synonymous.

This trade-off between productivity-enhancing public investment and utility-enhancing public consumption is often at the forefront of the public debate and policy discussions. Despite being a major policy issue, this trade-off has however received less attention than it deserves in the academic literature.

Several authors, particularly since the work of *Aschauer (1989)* have investigated, both theoretically and empirically, the consequences of productive public spending.<sup>3</sup> Very few papers, however, explicitly focus on the trade-off we are interested in. In addition, we are not aware of any paper that analyses the implications of productive public capital in a two-country model featuring at the same time imperfect competition and nominal rigidities. In this paper we fill in this gap, by analyzing the trade-off related to government spending composition in the context of a New Keynesian two-country model belonging to the so-called New Open Economy Macroeconomics (NOEM) framework.<sup>4</sup>

The only two previous papers which we are aware of explicitly focusing on the trade-off between productive government spending and utility from public consumption are *Barro (1990)* and *Turnovsky and Fisher (1995)*. In comparing our results to theirs, we find that in our model, contrary to *Turnovsky and Fisher (1995)*, the presence of monopolistic competition and the open economy dimension imply that a shift toward productive government spending is welfare improving even in the short run for plausible parameter values. In our open economy framework, unlike in *Turnovsky and Fisher (1995)*, domestic residents can also increase short-run consumption, and therefore welfare, by running a current account deficit. Our welfare results are therefore more in line with the endogenous growth model presented by *Barro (1990)*—in which an increase in the share of productive capital in total government spending is welfare-enhancing at all horizons—than with the neoclassical framework used by *Turnovsky and Fisher (1995)*.

The open-economy dimension also allows us—unlike *Barro (1990)* and *Turnovsky and Fisher (1995)*—to study the impact of a shift in domestic government spending composition on the current account, the exchange rate, and foreign variables. This analysis of how public infrastructures in one country affect another country is important from both the theoretical and empirical point of view.<sup>5</sup> More in general, we see our paper as furthering the theoretical analysis of fiscal policy. We see this as important, in view of the renewed interest of policy makers in several countries in the fiscal instrument. In addition, as stressed by *Alesina and Perotti (1995)*, the academic debate on fiscal policy tends to neglect composition issues, which are at the core of our paper.

Our analysis shows that a permanent increase in domestic public capital financed by a reduction in public consumption is welfare enhancing for domestic residents, provided that the productivity of public capital is not too low and the weight of public consumption (compared to private consumption) in private utility not too high. However, since a negative net welfare impact cannot be ruled out, one policy implication is that governments should take into account household preferences with respect to public provision of goods and services in deciding the composition of public spending. The implementation of such a policy has a negative short-run impact on foreign utility, because foreign residents have to meet an increased global demand within a relatively underdeveloped (compared to domestic) public infrastructure system. One implication is that, if foreign authorities care about welfare dynamics, they will have an incentive to also increase their level of productive public capital spending in order to avoid short-run welfare losses. A domestic policy shift can therefore result in a virtuous global technological cycle.

If the domestic shift in public spending composition is temporary, overall domestic welfare is reduced for low levels of the productivity of public capital, but is increased for high levels. This implies that governments which value the welfare of their citizens should carefully evaluate the impact of planned infrastructure projects on the productivity of the private sector before changing the public spending mix, especially in cases in which the projected increase in productive capital stock is likely to be temporary (due, for example, to uncertainty about securing the necessary fiscal resources to maintain it in the medium and long run).

The rest of the paper is organized as follows. Section 2 introduces the model. Section 3 discusses the parameterization. Sections 4 and 5 present and discuss the results for the case of a permanent and of a temporary shift in public spending composition, respectively. Section 6 concludes.

## 2. The model

The model is similar to those developed by *Obstfeld and Rogoff (1995)* and *Betts and Devereux (2000)*. Our main modeling innovations are the introduction of productive public capital and of utility-enhancing public consumption. We also assume multi-period price rigidities as *Calvo (1983)*, rather than one-period fixed prices.<sup>6</sup>

Firms and households are indexed by  $z \in [0, 1]$ . A fraction  $n$  of households and firms are located in the domestic country, while  $1 - n$  are located in the foreign country. In the description of the model that follows, unless equations for the foreign country are explicitly discussed they can be assumed to be symmetric to the equations for the domestic country.

<sup>3</sup> This literature includes *Baxter and King (1993)*, *Glomm and Ravikumar (1997)*, *Rioja (2003)*, *Kalaitzidakis and Kalyvitis (2004)*, *Coto-Martinez (2006)* and *Linnemann and Schabert (2006)*.

<sup>4</sup> The NOEM literature originated with the seminal paper of *Obstfeld and Rogoff (1995, 1996)*. Surveys are provided by *Lane (2001)*, *Sarno (2001)*, and *Corsetti (2007)*.

<sup>5</sup> See *Clarida and Findlay (1994)*, for a theoretical model of international strategic behavior in budgetary decisions on public investment. Empirically, important international spillover effects are found to be generated by public infrastructure spending by *Owyong and Thangavelu (2001)*.

<sup>6</sup> We restrict our attention to the case of Producer Currency Pricing (PCP), in order to focus on the international impact of government spending composition, rather than on deviations from the Purchasing Power Parity.

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