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And yet they Co-move! Public capital and productivity in OECD

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Abstract

In this paper, we add to the debate on the public capital–productivity link by applying very recent developments in the panel time series literature that take into account cross sectional correlation in non-stationary panels. In particular, we evaluate the productive effect of public capital by estimating various production functions on a panel of 21 OECD countries over the period 1975–2002. Our results suggest that public capital has a positive long run impact on output, with elasticities that range between 0.05 and 0.15, depending on model specification. These findings are robust to the existence of spillover effects from public capital investments in other countries and to the inclusion of other productivity determinants, like human capital, the stock of patents and R&D capital. Finally, we do not find any important effect of public capital on GDP in the short run: this suggests that public infrastructure investments might not be a powerful countercyclical policy instrument.

JEL classification: C33; C15; H54; O47

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1. Introduction

The role of public expenditure as a countercyclical economic policy instrument has been the object of a lively debate among both academics and policymakers, at least since the burst of the

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2008–9 recession and the announcement of the fiscal package stimulus by the Obama's administration. In particular, the U.S. Congress approved in 2009 the $787 billion American Recovery and Reinvestment Act, whereof approximately two-thirds amounted to direct government expenditure and transfers. Most of the recent theoretical and applied macroeconomic literature focuses on quantifying the economic impact of the fiscal stimulus and, more generally, on estimating the magnitude of the fiscal multiplier (see Hall (2009) among the others).

However, a large fraction of the Obama's fiscal package (approximately $130 billion) has been devoted to infrastructure expenditure, which not only may be used as a countercyclical tool, but it also might have a more lasting long run effect on the productive potential of an economy: this is the issue we focus on in this study.

Since the Aschauer (1989)'s seminal paper, several contributions have highlighted that public infrastructures are important inputs that contribute to economic growth. Improvements in public infrastructures (e.g. better and more extensive transport networks) might impact TFP in a number of ways, e.g. by increasing the productivity of private inputs like physical capital and R&D or by reducing production and transport costs, thereby fostering greater specialization, more intensive competition and in general by providing those public goods that are crucial for economic growth.[1]

The relevant empirical literature has developed along a number of strands according to differences in the type of sample, theoretical approach and econometric methodology. Most studies estimated production functions, while others relied on the estimation of cost functions where public capital is assumed to be a quasi-fixed input (Cohen and Morrison (2004)); in turn, some authors included public investment as an additional explanatory variable in growth convergence equations (Esfahani and Ramirez (2003)). As far as the sample choice is concerned, most contributions are based on aggregate data at either country (Pereira and Roca-Sagales (2001) and Pina and Aubyn (2005)) or regional level (Bronzini and Piselli (2009)), with a minority focusing on industry level data (Bottasso and Conti (2010)) or cross country data (Canning and Pedroni (2008)). Turning to the econometric methodology, recent studies on aggregate (single) country data adopted VAR techniques, which investigate the relationship between public capital, GDP and private inputs without imposing a theoretical structure, and generally found positive effects of public capital on GDP; however, purely time series studies are often plagued by small sample problems linked to the short time span of the data. For this reason, many authors have turned to conducting studies based on cross country or regional level data: while "first generation" panel studies simply estimated either fixed or random effects models, "second generation" studies tackled the endogeneity problems that plague the estimation of production functions more seriously by using instrumental variable techniques, such as the Arellano-Bond GMM estimator. Only recently issues stemming from the non-stationarity nature of panel data have been addressed by some authors in order to avoid possible biases associated to the presence of unit roots. However, these studies do not account for unobservable time varying heterogeneity associated to unobserved common shocks which might affect each country or region to a different extent, thus generating cross sectional correlation: this is likely to be the case when analyzing macro panel data, where cross section dependence can be due to a variety of factors, such as omitted unobserved common factors, spatial spillover effects, trade linkages, global economic cycles, etc. Indeed some authors (e.g. Calderon, Moral-Benito, and Serven (2011)) have addressed cross sectional correlation by removing unobserved common factors through a demeaning of the variables: this procedure works insofar as

[1] Other papers have investigated the impact of public capital on employment and labor market outcomes (see, among the others, Everaert & Heylen, 2004)).