Size and composition of public investment, sectoral composition and growth ☆

Giulia Felice

Politecnico di Milano, Italy
Centro Studi Luca d'Agliano, Italy

A R T I C L E   I N F O

A B S T R A C T

After providing some descriptive evidence on the relationship between the size and composition of public expenditure and the sectoral employment composition of the economy, this paper develops an endogenous growth model with two private sectors, where the government provides, as pure public goods, both infrastructure investment, directly affecting the productivity of private capital in the 'modern' sector, and a flow of goods and services, enhancing the productivity of the otherwise labour-intensive 'traditional' sector. Government productive expenditure affects the long-run growth rate through its size and composition, both directly, by enhancing the productivity of private factors, and indirectly, by changing the employment sectoral composition of the economy.

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1. Introduction

The role of public investment in fostering economic growth has been constantly present both in academic research, starting from the seminal contributions of Aschauer (1989) and Barro (1990), and in the policy debate (Besley and Van Reenen, 2013; European-Commission, 2001).[1] The initial strong positive effect of public investment on growth, found, among others, by Aschauer (1989) and Easterly and Rebelo (1993), was later questioned by other empirical studies, which addressed spurious correlation and reverse causality issues. The empirical evidence on the effect of total government expenditure on aggregate output growth is generally 'mixed', and the related debate still quite heated (Bergh and Henrekson, 2011; Gramlich, 1994; Nijkamp and Poot, 2004). Beyond the methodological aspects, what emerges clearly is that results strongly depend on the types of expenditure considered and the definition used. Distinguishing between productive and unproductive public expenditure, as a first step, seems to lead to the clearest results. Productive public expenditure, variously defined, is shown to positively affect growth

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[1] In this paper, we use public investment and productive public expenditure as synonyms referring to the total government expenditure devoted to the provision of public goods enhancing the productivity of the private sectors of the economy. Similarly, we use public infrastructure and public capital interchangeably, referring to the stock of public capital, resulting from the accumulation of the share of productive public expenditure devoted to infrastructure.

by several contributions (Angelopoulos et al., 2007; Kneller et al., 1999; Romero-Avila and Strauch, 2008), but even in this case there is no general consensus owing to the differences in the magnitude and statistical significance of the effect, and sometimes even in the sign (Afonso and Furceri, 2010).

However, even when focus is limited to productive public expenditure only, this lack of robust evidence on the impact of public investment on growth may be due to a composition effect. Indeed several recent studies have shown, on the one hand, that there is a wide heterogeneity in the effects of public investment across regions and industries and, on the other hand, that the effects differ depending on the type of investment (Devarajan et al., 1996; Florio, 2011; Ghosh and Gregoriou, 2008; Holtz-Eakin and Lovely, 1996; Romp and de Haan, 2007).

This paper seeks to contribute to this literature by providing a theoretical framework disentangling the effect of different types of productive public expenditure and, unlike the past endogenous growth literature with public intervention (see Section 2), by simultaneously considering the interplay with the sectoral composition of the economy. This is relevant as productive public expenditure may affect the sectoral composition of employment and output. From the demand side, depending on the type of public investment, it drives an increase in the demand for industries using different technologies; from the supply side, public investment may unevenly affect the productivity of different industries, depending on each investment's scope (i.e., the composition of public expenditure) influencing, this way, relative prices and returns to private factors, with potential effects on the composition of private expenditure. In a nutshell, this paper aims at investigating the growth effects of public investments when they are mediated by the sectoral composition of the economy.

From a positive point of view, a higher public expenditure negatively affects the growth rate, being a large share of productive government expenditure devoted to the traditional sector of the economy, whose employment share accordingly increases (see Section 3). This may explain the very high positive effect of public expenditure on growth obtained from theoretical models not taking into account that productive public expenditure mostly generates demand for the traditional sector of the economy. This amounts to saying that a large positive effect of public expenditure on the productivity of private factors of production can be consistent with a low effect on aggregate growth, once the effect on the sectoral composition of the economy is taken into account. From a normative point of view, this approach provides the government with a new policy tool, i.e., the composition of public expenditure in terms of *types of goods* ('modern' vs. 'traditional'), to affect the growth rate of the economy.

Moreover, we add to the structural change literature (see Section 2) by introducing another potential determinant of an economy's sectoral structure, i.e., public expenditure composition, complementing those supply-side and demand-side factors highlighted by previous contributions where only private agents' decisions are considered and where structural composition is driven by fundamentals (technology and preferences). Our approach implies that the sectoral composition of an economy does not necessarily reflect the fundamentals, but also public expenditure level and composition, which may be driven by several other determinants.

In more detail, as a first step we provide some descriptive evidence on the relationship between the size and composition for 'traditional' and 'modern' goods of government productive spending and the sectoral composition of employment. Productive public expenditure's size and share spent for traditional goods both are significantly negatively associated with the employment share in the 'modern' sector. In order to explain this evidence, we develop an endogenous growth model with two private sectors: a 'modern' sector (e.g., manufacturing, business services) and a 'traditional' sector (e.g., personal services, construction), both producing goods which can be used for consumption and investment.[2] In this economy there are two publicly provided goods, which are purchased by the government and provided to enhance the productivity of the private sectors of the economy.

The public goods are produced by different sectors, the 'traditional' sector and the 'modern' sector, and they unevenly affect the productivity in the two sectors. In this set up, the government has two policy instruments (in a balanced budget framework), namely the size and the composition of public expenditure, i.e. in terms of 'traditional' and 'modern goods', both affecting the growth rate of the economy. We focus on productive public expenditure (i.e., the public expenditure affecting the productivity of private sectors) and its composition, since both types of public goods affect the supply side of the economy.

The main implications of our model can be summarized as follows. In the long-run the growth rate of the economy depends on government intervention, both directly, through the size of public expenditure and its composition and indirectly, through the long-run effects of government decisions on the employment sectoral composition.[3] We conduct two policy experiments. First, we investigate how the growth rate of the economy and the sectoral employment shares vary as the size of the public sector increases, holding constant the public expenditure composition. Second, we study the effect of changing the composition of public expenditures at an invariant size of the public sector.

We single out a growth-maximizing size of public expenditure for any given composition of public expenditure. More interestingly, we single out a growth-maximizing public expenditure composition for any given size of total public expenditure, which is particularly relevant to the current political agenda, where a lot of emphasis has been put on public expenditure's containment rather than on its composition. Finally, we provide a comparison between our results and those of a one-sector economy with similar features.

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[2] We define our 'modern' and 'traditional' aggregates following a technology criterion in the spirit of the recent contributions following Baumol (1967), mentioned in Section 2. The sectors constituting the two aggregates are assumed to use similar technologies even if producing goods or services with different uses. See Section 3 for the correspondent sectoral taxonomy used in the empirical analysis.

[3] In Section D we also study the transition path where the employment shares change overtime.