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# Public capital and imperfect competition

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## Abstract

In this paper we consider a macroeconomic model in which public capital is a productive input and there is monopolistic competition in the product market. We analyze the effects of a permanent variation in public capital investment both in the short and in the long run. Finally, we show that the optimal provision of public capital under imperfect competition is higher than that associated with the first-best policy.

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## 1. Introduction

In this paper, we consider a macroeconomic model in which public capital is a productive input and firms have monopoly power in the product market. We analyze the effects of a permanent variation in public capital investment in both the short and the long run. Furthermore, we analyze the effect of investment in public capital on consumer welfare, and the optimal provision of public capital. Our main contribution is to address these issues in a dynamic general equilibrium context with imperfect competition.

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Several papers have analyzed the effects of investment in public infrastructure on the macroeconomic performance of the economy. In his seminal empirical paper, [Aschauer \(1989\)](#) estimated the productivity of investment in public infrastructure in the U.S. The primary motivation of Aschauer's research was to document a shortage in public capital leading to the observed slowdown in productivity. In fact, Aschauer found a surprisingly high productivity of public capital and, although this result was criticized in subsequent research, there is still general empirical support for the importance of public capital in productivity.<sup>1</sup>

On the other hand, there is a line of theoretical research geared towards analyzing the effects of investment in infrastructure. [Aschauer \(1988\)](#), [Turnovsky and Fisher \(1995\)](#), and [Baxter and King \(1993\)](#) introduce public capital as an input in the production function in a neoclassical dynamic model with perfect competition. They analyze the effects that a change in the supply of public capital has on the stationary equilibrium of the economy. [Barro \(1990\)](#) considers instead an endogenous growth model in which public capital has the effect of enhancing growth. These papers show that a fiscal policy consisting of an increase in public capital investment has a large multiplier effect since it directly affects production and it indirectly affects the productivity of both private capital and labor.

Regarding the normative aspects, if all markets are perfectly competitive, the design of the optimal fiscal policy must take into account only the productivity and the cost of an additional investment in public capital. This issue is illustrated by [Barro \(1990\)](#), [Pestieau \(1974\)](#), and [Turnovsky and Fisher \(1995\)](#), who introduce welfare considerations into their analyses. When markets are perfectly competitive and the government can use lump-sum taxes, the optimal provision of public capital is determined by the productive efficiency condition, that is, the marginal productivity of public capital must be equal to the marginal cost of producing such capital. Since the first welfare theorem holds in this context, the market allocation is efficient and, therefore, the government should supply public capital at the minimum cost. On the other hand, [Barro \(1990\)](#) analyzed the case in which public capital is financed by a proportional tax on income. Even if the optimal provision of public capital is also determined by the productive efficiency condition, the rate of growth is lower since the government taxes the return on private capital instead of using lump-sum taxes and, thus, public capital is not supplied at the minimum cost. Therefore, perfectly competitive markets achieve the optimal allocation of capital and labor when the government supplies the public capital. However, when markets are imperfectly competitive the allocation of capital and labor is not efficient and the government has to enhance employment and private investment. Thus, in an imperfectly competitive economy, in order to determine the optimal provision of public capital, we have to take into account not only the marginal productivity of public capital but also the multiplier effect on private capital and employment.

The effects of fiscal policy when markets are imperfectly competitive have been analyzed by several authors,<sup>2</sup> the main aim being to illustrate the expansionary effects of

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<sup>1</sup> See [Gramlich \(1994\)](#) for a survey of this literature.

<sup>2</sup> See the surveys of [Silvestre \(1993, 1995\)](#) and [Dixon and Rankin \(1994\)](#). Recently, [Heijdra \(1998\)](#) compares the fiscal multipliers under perfect and imperfect competition. Also, he analyzes the sensitivity of the fiscal multipliers to the size of the mark-up and the magnitude of the economies of scale.

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