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Asymmetric competition among nation states: A differential game approach☆

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ABSTRACT

This paper analyzes the impact of foreign investments on a small country's economy in the context of international competition. To that end, we model tax and public input competition within a differential game framework between two unequally sized countries. The model accounts for the widely recognized characteristic that small states are more flexible in their political decision-making than larger countries. However, we also acknowledge that small size is associated with limited institutional capacity in the provision of public services. The model shows that the long-term outcome of international competition crucially depends on the degree of capital mobility. In particular, we show that flexibility mitigates against – but does not eliminate – the likelihood of collapse in a small economy. Finally, we note that the beneficial effect of flexibility in a small state increases with its inefficiency in providing public services and with the degree of international openness.

1. Introduction

Small states generally suffer from limited access to capital and labor resources, both in amount and in variety. Then, foreign direct investments (in short, FDI, hereafter) can contribute significantly to their development (Read, 2008). In fact, small economies tend to have high level of access to private foreign capital as a ratio of total capital formation (Streeten, 1993). Using data from the World Bank, Fig. 1 suggests that the ratio of FDI flows to the gross fixed capital formation is higher in small countries (i.e., population less than two million)[1] than in large countries (i.e., population in excess of 30 million).[2] Moreover, the economic well-being of small countries is positively correlated with the ratio of FDIs. The data in Fig. 1 indicate that small countries above the average line, such as Luxembourg, Malta, Cyprus or Estonia, exhibit a high level of per capita GDP, whereas small countries below this threshold have a lower level of per capita GDP. This is confirmed in Fig. 2, which suggests that a direct relationship exists between the level of GDP per capita and foreign investments in small economies. In the cluster of larger countries, however, this relationship is hardly apparent.[3] Countries, such as Poland, Italy, Turkey, India and Spain appear above the threshold in Fig. 1, whereas the USA, Ukraine, Nepal, and Greece among others, are situated below it.[4]

Given these facts, this paper analyzes the impact of foreign investment flows on the economic performance of a small country competing internationally for mobile production factors. In this context, we investigate the conditions by which the economies of such countries can be viable, or even expand, in the long term. To that end, we develop a

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[1] Our data set contains 51 countries with population less than 2 million. This represents 72% of all the existing "small" countries. An exhaustive description cannot be provided due to a lack of relevant information.

[2] Our data set of countries with population in excess of 30 million is exhaustive. It contains 41 countries.

[3] Note that, we have not controlled for other determinants of per capita GDP; for example, the availability of natural resources. Taking into account oil reserves and the recent increase in oil prices would explain the position of Qatar or Brunei in our figures.

[4] The ambiguous role of FDIs on the economic performance of countries is documented in the literature (see, for example Alfaro et al., 2004).

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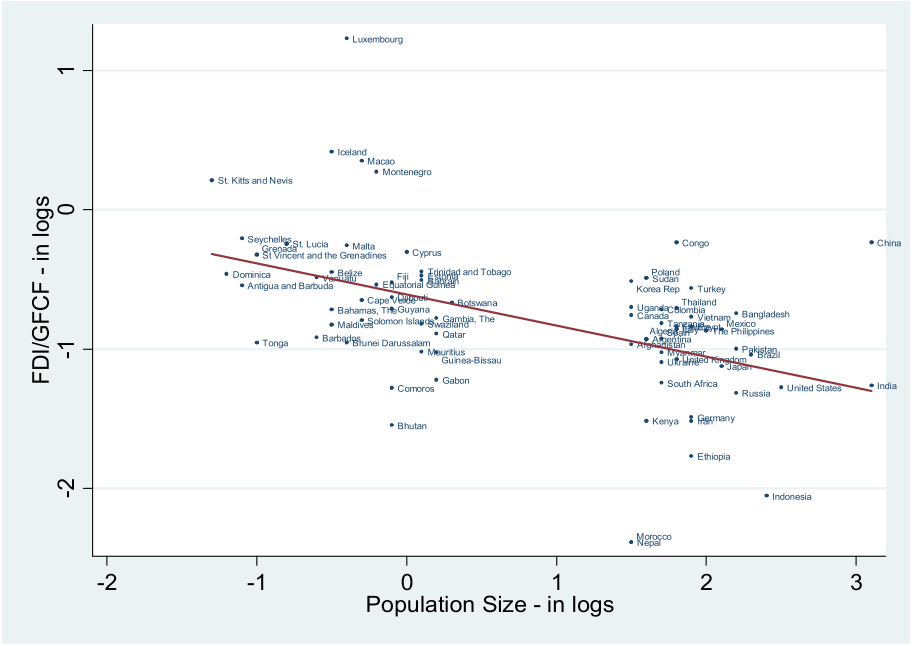

Fig. 1. Relationship between the ratio of FDIs to Gross Fixed Capital Formation and population from 2000 to 2010. Source: World Bank.

dynamic framework to study how a small country attracts foreign capital through two policy instruments, namely taxes and public services.[5]

For the sake of simplicity, we focus on two competing countries of uneven size. In this study, size is defined as number of capital-owners in a respective country and these capital owners are simultaneously entrepreneurs and workers. By adopting this approach, our model focuses on the economic size of a country.

The dynamic aspect of international competition is addressed by a differential game framework in which the strategic behavior of the small country differs from that of its larger rival. We account for the widely recognized characteristic that small states are more flexible in their political decision making than much larger countries (see, in particular, Streeten, 1993).

We thus assume that the small country adopts a Markovian feedback behavior (i.e., the policy variables are continuously reset in response to the dynamics of the states of the world), whereas the larger country chooses an open-loop rule (i.e., the policy variables are set only once at the initial time). We also acknowledge that small size is associated with handicaps, as small economies are generally characterized by limited institutional capacity in the provision of public goods (Commonwealth Secretariat, 2000) relative to large countries. Finally, we assume that the capital owners living in both countries have heterogenous attitudes toward their attachment to home. Thus, they incur costs related to moving abroad. The extent of these costs depends on their attitudes toward their countries. Additionally, their decision to relocate their capital is affected by capital taxation and by productivity-enhancing public services.

The main results of the paper can be summarized as follows. First, the model shows that GDP, in particular the GDP per capita, of the small country increases with the flow of FDIs, which is consistent with the facts presented above. Moreover, the long-run solutions show that the economy of the small country can expand, shrink or even collapse. In this context, two cases can be distinguished: one exhibits high international openness and another exhibits low international openness. The fundamental difference between these cases is that the small country will only experience economic collapse if capital mobility is high (i.e., high international openness). However, higher efficiency in the provision of public services can partially countervail this effect by decreasing the likelihood of collapse. In the second case, when capital mobility is low, international competition for capital can eventually reduce the size of the small economy without provoking its collapse. If capital mobility is very low, the model shows that international competition tends to expand the economy of the small country. We also assess the extent to which flexibility is beneficial to the small country, given that it suffers from limited institutional capacity. By comparing the Markovian and open-loop outcomes, we find that flexibility mitigates against – but does not eliminate – the likelihood of a small economy collapse. Finally, we show that the benefit of flexibility increases in tandem with the inefficiency of public service provision and with the degree of international openness in the small country.

Our paper contributes to the existing literature in the following ways. First, we provide a dynamic counterpart to previous static papers in which countries compete with two instruments.[6] Following the Zodrow and Mieszkowsky (1986) model, there has been a growing body of literature on the joint role of taxes and public inputs in attracting mobile production factors. For example, Zissimos and Wooders (2008) analyze how the provision of public goods designed to reduce the production cost of private firms is able to relax international tax competition between governments of equal size. Benassy-Quere et al. (2007) provide an empirical analysis of the impact of taxes and public goods on the allocation of private capital. They find that both corporate taxes and public capital contribute significantly to inward FDIs. Pieretti and Zanaj (2011) propose a two-stage game in which both small and large jurisdictions compete for capital

[5] These public services contribute to the domestic attractiveness of private capital, as they are supposed to enhance private productivity. Examples of this are spending for the operation and maintenance of power and transportation infrastructures, operating costs of universities, and also the enforcement of property rights and the provision of capital market, labor and environmental regulations. It follows that countries' attractiveness may also be due to the quality of their institutions. In the Oxford Handbook of Entrepreneurship (Casson et al. 2006), it is argued that the abundance of entrepreneurs in a country depends on the existence of regulations, property rights, accounting standards and disclosure requirements, among other factors. Furthermore, in recent years, there has been a surge of national and cross-country studies relating economic development to institutions, especially institutions affecting capital market development and functionality (see, for example, La Porta et al., 1997).

[6] A exception is Wildasin (2003, 2011) who studies tax competition within an explicitly dynamic framework. In addition to other differences to our paper, he does not consider competition in a non-tax instrument.