Research paper

Corruption and economic growth with non constant labor force growth

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ABSTRACT

Based on Brianzoni et al. [1] in the present work we propose an economic model regarding the relationship between corruption in public procurement and economic growth. We extend the benchmark model by introducing endogenous labor force growth, described by the logistic equation. The results of previous studies, as Del Monte and Papagni [2] and Mauro [3], show that countries are stuck in one of the two equilibria (high corruption and low economic growth or low corruption and high economic growth). Brianzoni et al. [1] prove the existence of a further steady state characterized by intermediate levels of capital per capita and corruption. Our aim is to investigate the effects of the endogenous growth around such equilibrium. Moreover, due to the high number of parameters of the model, specific attention is given to the numerical simulations which highlight new policy measures that can be adopted by the government to fight corruption.

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1. Introduction

In recent years, many contributions to the study of discrete and continuous dynamical systems and their applications to many fields of Economics have been produced. One of these applications concerns the study of economic growth models. Dynamic economic growth models often consider the standard one-sector Solow–Swan model that predicts convergence to a steady state with zero per capita growth. The reason is the diminishing returns to capital. However, these models do not show interesting dynamics because neither cycles nor complex dynamics can be observed (it seems to be an important limitation of the neoclassical framework). For example [4–6] have tried to introduce endogenous growth cycles in several ways. Benhabib and Spiegel [7] and Boldrin and Montrucchio [8] consider two sectors instead of one. Another line followed by other researchers is the introduction of nonlinearity in their models in order to show complicated dynamics (see [9–11]). In fact, the authors consider that the labor force growth is described by different laws instead of the constant growth rate. For example, Brianzoni et al. [11] investigated the neoclassical growth model with labor force dynamics described by the Beverton–Holt equation while assuming the VES (variable elasticity of substitution) production function. Cheban et al. [12] follow the same approach. Their works focus on the study of the long run dynamics showing that a compact global attractor for suitable values of the parameters is feasible. Another example of these methodologies is proposed by Day [9] who introduces nonlinearity in his Solow model through the logistic labor force growth rate showing the presence of growth cycles that do not converge to a cycle of any regular periodicity and that are not quasiperiodic. In our specific case,

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we face with the appearance of a compact global attractor in the phase space. From an economic point of view, the existence of an attractor means that the long run behavior of the economic system can be bounded, hence it is possible to plan some measures of intervention. Moreover, the dynamics can be chaotic and, as [13] stresses, there are situations where the whole economy can be better off along chaotic fluctuations than at a stationary state in the long run.

In this work we follow this line of research and reconsider the model proposed by Brianzoni et al. [1] which studies a discrete time growth model with corruption in public procurement. There are several empirical works dealing with the relationship between corruption and economic growth. Mauro [3] found evidence of the fact that higher levels of corruption significantly decrease both investment and economic growth. The same author also underlined the persistence of corruption argumenting that some countries are stuck in a bad equilibrium characterized by pervasive corruption with no signs of improvement.

Firstly, let us define the concept of public procurement. According to the definition of Kühn and Sherman [14] "public procurement refers to all the stages of the contracting process concerning acquisition by a government department or any government-owned institution of goods or services such as textbooks for schools, commissioning of large-scale construction works (i.e. roads, bridges and airports), etc." The same authors identify the impact of corruption in different sectors of public procurement such as finance, environment, health and human safety, and innovation. In addition, corruption diminishes trust in government.

A broader definition of corruption involves inappropriate use of political power and reflects a failure of the political institutions within a society. A definition of corruption that meets the needs of this contribution is the abuse of public office for private economic gain [15]. This definition excludes corrupt practices that occur exclusively among private sector agents, and purely political corruption which focuses on the allocation of political power rather than economic resources.

In this work, we start from the model of [1], which investigate the relationship between corruption in public procurement and economic growth in the Solow framework. Hence, it is useful to list some relevant aspects on corruption re-marked by the authors:

- bribery and corruption in public procurement increase government costs by 20–25% [14];
- great part of the expenditure area in the public sector involves a higher number of low-value transactions which are less convenient for potentially corrupt public officials than public procurement. The latter involves a small number of high value auctions;
- high degree of discretion of public officials and politicians in delaying public procurement programs respect to other areas of public expenditure;
- the awareness of managers about the illicit payments to secure government contracts.

Moreover, previous studies show that countries are stuck in a good equilibrium (low corruption and high capital per capita) or in a bad one (high corruption and low capital per capita). Differently, Brianzoni et al. [1] find the conditions under which there is an equilibrium that could be defined intermediate (i.e. between the bad equilibrium and the good equilibrium).

Another important feature concerning the work of Brianzoni et al. [1] is the connection between the effect of corruption on public procurement (as in [16]) and the effect of the presence of public goods on economic growth as an input to private production (see [17]), considering that these two problems have been studied separately before.

Notice that [1] assume constant population growth. Differently, in this paper we would like to understand how endogenous population growth influences capital per capita and corruption. Hence, we use their model as a benchmark but we consider the Solow growth model with logistic population dynamics, comparing our results to theirs.

The introduction of the logistic population growth in the model can help us find new insights between economic growth and corruption in public procurement. There are works dealing with the study of economic growth model with logistic population dynamics, like [10,18,19]. In fact, in the Solow model the assumption of a constant labor growth rate is not a good approximation of the reality, since the main problem is that population grows exponentially and so tends to infinity as time goes to infinity. This hypothesis is realistic only for an initial period, whereas it is often observed that as population grows, some members interfere with each other in competition for some critical resource; this competition diminishes the growth rate until the population ceases to grow. More precisely, as described by Smith and Haigh [20], in many countries a more realistic population growth model would have the following properties: (1) when population is small in proportion to the environmental carrying capacity, then it grows at a positive constant rate, and (2) when population is larger in proportion to the environmental carrying capacity, the resources become relatively scarce resulting in a negative population growth rate.

The logistic population growth is able to reproduce this behavior. Additionally, it can exhibit a wide variety of long-run dynamics (as cycles of every order or chaos). This allows us to consider many scenarios for the population growth and hence their effects on corruption and capital per capita.

Summarizing, the introduction of the logistic population growth rate permits us to make several considerations:

1. It allows a better description of the population dynamics in relation to the environmental carrying capacity, as supported by the literature previously cited;
2. It aims to evaluate the influence of the population dynamics on the variables k_t and m_t; in fact, the logistic map can show a large variety of dynamics. Moreover, our results on the existence of invariant sets will determine conditions on parameters for which n_t can be assumed endogenous only in certain cases.