



## Economy size and performance: An efficiency analysis in the telecommunications sector

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### ABSTRACT

The existing empirical evidence on the relationship between economy size and performance has been inconclusive. This paper employs stochastic frontier analysis to estimate economic measures of efficiency for the telecommunications sectors of 139 economies and examine their relationship with economy size. Simultaneously, it controls for the effects of competition in telecommunications, privatization of state-owned providers, independent regulators, and the quality of political institutions on sector performance. The findings suggest that economy size has a positive but decreasing impact on sector performance. Small economies have an incentive to grow to improve sector performance, though larger size is not a sufficient condition for efficiency. Sector policy and the quality of polity may contribute significantly to sector performance.

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### 1. Introduction

The relationship between economy size and economic performance has attracted a large array of studies (e.g. Alesina & Spolaore, 2003; Armstrong, De Kervenoael, Li, & Read, 1998; Armstrong & Read, 1995; Briguglio, 1998; Easterly & Kraay, 2000; Gal, 2003; Winters & Martins, 2004a) many of which have produced ambiguous results. In light of this ambiguity, this study recommends a closer scrutiny of the relationship in the context of individual industries, which may allow for better understanding the mechanisms related to economy size that influence the production of economic value, as well as provide a better comparison setting than the one of the aggregate economy pervading existing studies. This study takes the first step and uncovers empirical evidence from the telecommunications industry.

To some extent, the ambiguity in existing studies might be due to methodological issues. To a larger extent it may reside on the strong assumption in the literature that larger economy size is a sufficient condition for higher performance, *ceteris paribus*. Namely, theoretical arguments favor larger economy sizes on the grounds of increasing the focal economy's capability to exploit economies of scale, gain negotiation power, and enhance its accessibility to advanced technologies. Yet, a number of studies fail to empirically corroborate these assumptions. Instead they find no evidence of a performance differential between different sized economies or even an inverse size–performance relationship—at least at the firm level (Ahmad & Bravo-Ureta, 1995; Barrett, Bellemare, & Hou, 2010; Løyland & Ringstad, 2000; Townsend, Kirsten, & Vink, 1998).

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A common explanation for this is that economies of size exist up to a certain range and disappear when diseconomies of scale emerge. Moreover, managerial problems of running larger firms may develop, which could counteract production and financial economies. Based on existing evidence this paper suggests that a continuously linear relationship between economy size and performance is unlikely. Instead, it proposes and examines a curvilinear relationship, which might be manifested in the initial capacity of larger economies to exploit increasing returns to scale up to a certain size that subsequently is counterbalanced by the emergence of governance problems.

This study departs from existing empirical studies of the relationship between economy size and performance in various ways. First, unlike the neoclassical paradigm which assumes that economic units (e.g. the telecommunications industry in an economy) are always efficient, namely, they produce at the production possibility frontier (Bos, Economidou, Koetter, & Kolari, 2010), this study considers that, in reality, they may use the optimum technology with varying degrees of efficiency. It employs stochastic frontier analysis to derive measures of performance (efficiency) for the telecommunications industries of 139 economies over the period 1990–2004 and examine how economy size relates to these measures.

Second, the analysis is contextualized in a service sector, telecommunications, which requires substantial sunk investments in specific assets and manifests strong economies of scale and scope. Due to the non-exportable nature of the sector's outputs, the market size required for reaching the minimum efficient scale of operation and minimizing its long term average costs is directly determined by the economy's size.

Third, economy size is measured by constructing a size index accounting for human capital, economic resources, and natural resources. The use of a composite index allows for the avoidance of ex ante arbitrary size classifications whilst it considers most major factors involved in the creation of economic value (Alesina & Spolaore, 2003). The focal economy's size is estimated in relation to each other economy's size for every year of available observations, thus allowing for temporal variation in its size as well as in its relative relationship with other economies.

Last, this paper controls for important factors identified in the literature on telecommunications policy, which might affect sector performance beyond economy size. The importance of telecommunications to an economy's growth and welfare (Röller & Waverman, 2001; Thompson Jr. and Garbacz, 2007) is evidenced by intense regulatory guardianship. Correspondingly, sector performance is largely dependent on the breadth of policy and the quality of political institutions. The latter signifies the independence of the sector's regulatory authority to pursue appropriate policy without the risk of capture by politicians and the government's commitment to protect investors' interests. Therefore, along with economy size, the paper controls for the effects of competition in the markets of fixed and mobile telephony, the privatization of state-owned operators, the establishment of an independent regulatory authority in the sector, and the quality of political institutions.

The findings shed light on the relationship between economy size and telecommunications performance as well as on important sector-specific policy issues. Empirical evidence suggests that economy size has a positive but declining relationship with the efficiency of the telecommunications sector. This implies that whilst smaller economies can have incentives to grow larger, larger size is not a sufficient condition for efficient operation in the sector. In parallel, the role of the examined telecommunications policies and the quality of local polity in the sector's performance and by extension in optimum policy formation is fundamental.

The remainder of the paper is organized as follows. Section 2 reviews the literature on small economies and identifies existing evidence of the relationship between economy size and performance. Section 3 discusses the research methodology, model development, and data collection and Section 4 elaborates on the empirical results. The paper concludes with a section on concluding remarks.

## 2. Economy size and performance

The literature on small economies does not provide theoretically or empirically grounded economy size classifications, even though a handful of criteria of economic activity, natural resources, and labor, are consistently used to proxy size (Armstrong & Read, 1995; Briguglio & Buttigieg, 2004; Downes, 1988; Jalan, 1982; Thorhallsson, 2006). Population has been widely used as a size measure because it is easily available and provides a crude proxy for the size of domestic market and local labor force (Armstrong & Read, 1998a, 1998b). Early studies defined a small economy one with less than 15 million population (Chenery & Taylor, 1968) whilst more recent ones tend to place the threshold in the 1–10 million population band (Easterly & Kraay, 2000; Wint, 2003; Winters & Martins, 2004b). In search of a multi-faceted expression of economy size a number of studies combine various criteria (mostly population, GDP, and geographical area) to construct a composite index of size (Demas, 1965; Gayle, 1986; Jalan, 1982).

Whereas the optimum threshold for smallness remains in debate, the literature is clearer with regard to the characteristics that portray a small economy. Contingent on these characteristics two loosely distinct views of the effects of economy size on performance dictate the existing literature. The first considers smallness as a crucial limiting factor for the efficient operation of local firms and, by extension, aggregate industries and the overall economy. The second identifies specific characteristics of small economies, which might offset the limitations of smallness.

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