Economic Performance and Institutions: Measuring Technical Efficiency Using SPF Approach

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***Abstract**: This paper propose to employ the SPF approach (stochastic production frontier) to measure the technical efficiency of the country level for best economic performance, as the measure of growth is the essential practice to comprehend the roots of economic growth. It is evident from the results, that there is an essential difference in the perception of the technical efficiency cross-country and the total factor productivity traditional growth measurement. The SPF Model as well allows us to search for technical efficiency sources. The sources of Technical inefficiency cross-country are demonstrated by institutional arrangements. We find amongst all the different measures of institutions the role of openness to international trade, the State and political institutions are important factors of the global economic performance divergence.*

Key Words: Productivity; Technical Efficiency; Institutions; Stochastic Production Frontier; Economic Performance

1 Introduction

The institution is an essential factor in disclosing the differences in growth cross-countries. This paper focused on implementing a theoretical and empirical immensely study on how institutional and governance frameworks bind to the performance of the economy and how much. Over the last decade, research focused on institutions' impact on economic growth. The rigidities of the Institutional clarify why the countries of poor economies can't catch up with rich countries.

Olson's (1996) empirical study demonstrated of not all poor economies necessarily grow faster than rich ones according to the prediction of convergence theory. Worse than that the per capita income gap between relatively rich and poor countries over time increased. this gap grows five times more between 1870 to 1990, Prichett (1997). Traditional growth theories confirm the human capital role (Lucas 1988); diffusion of technology (Barro and Sala – i - Martin 1997); the infrastructure (Barro 1990); or reward

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for innovation (Romer 1990) based on various empirical and theoretical grounds. However, All these determinants spill no true light on the growth source – they are growth (North 1997). The better source is efficiency to understand the growth of countries. Inefficient countries mean a major discrepancy between social and private benefits when there is any economic transaction[1]. According to the institutional arrangement, this activity may be socially profitable, but the individual will stop doing it if the cost of the private sector exceeds the social sector.

This paper claim, that the crucial measure of growth performance is productivity measurement. We propose measuring the technical efficiency cross-sectional instead of the stander measure of the growth (like GDP per capita growth) which better supports the theoretical framework mentioned above. We adopt the SPF approach for technical efficiency (TE) measuring. Our results appear that TE (expressed as economic performance) is different completely from that expressed in the total factor productivity growth (TFP). Also the role of the institutions as the descriptive factor of EP (economic performance). Our focus here is on three particular aspects of institutions which is extremely relevant to productivity:

1. The international trade role - capital flow and international openness;
2. Economic institution presented by the state - which is measured by the legal system, size of government and regulatory environment;
3. Political institution – is measured in terms of political rights, regime type and durability.

We discover That the three aspects above, are very important to explain TE across countries, also, the political institutions and domestic economic account for TE (economic performance) more than if the country is open to trade and the flow of capital, in other words, the local government is more important and matters whether or not to adopt the strategy of an open economy.

The paper consists of 6 sections. Section 2 will briefly explain the literature review of growth empirics, TE (economic performance) and institutions. Section 3 discusses the

[1] This discrepancy is caused and shaped by the institutional structure, especially when property rights are poorly defined (North and Thomas (1973)).

specification and the details of our novel model. Section 4 uses data with details. Section 5 presents the same data while section 6 is the conclusion.

2 The Literature Review of the Institutions, Growth Empirics and Economic Performance

2.1 Productivity Measurement and the Growth Models

Neo-classical growth models failed to explain productivity growth and technological change and therefore have always been criticized. For example, Solow's (1956) model presumes that technology is Harrod neutral which affects labour productivity only. It predicts negative growth of a country's real GDP per capita correlates with its initial income level – the convergence hypothesis. Solow (1956), on the contrary, finds that capital accumulation explains only 1/8 and 1/4 of income growth. The rest is explained by productivity growth. Easterly and Levine (2001), based on AK growth model, suggest that 60% of growth is due to change in productivity rather than factor accumulation. Endogenous growth theory, like Romer (1986; Lucas (1988) considers the effects of the variables such as human capital, trade and endogenous technology on output growth, and the different mechanisms of technology diffusion. Limam and Miller (2004) argue that the sources of TFP growth may be different between developing and developed countries. In advanced countries, technological innovations provide the main source of TFP growth. Acquiring and absorbing foreign technology are the main sources in developing countries. In other words, a methodology that allows us to decompose productivity and efficiency may prove helpful.

Our measurement is mostly derived from Fare, Grosskopf et al. (1994). Their work decomposes productivity into changes in efficiency (catching up) and changes in technology (innovation). Each country is compared to a frontier. How much a country getting closer to the "world frontier" is measuring the "catching up" effect; how much the world frontier shifts meaning "technical change" or "innovation".

Standard growth empirics say, using the growth rate of GDP per capita, is not sufficient to capture the productivity measurement. Temple (1999) realized that estimating stochastic production frontiers (SPF) may be a promising elaboration. This method allows

us to decompose growth into input changes, efficiency change and technical progress. This research is innovative in deriving rates of productivity on a comparable basis for a wide range of countries. We describe the fundamentals of SPF in the next section.

2.2 Fundamentals of SPF (Stochastic Production Frontier)

Stochastic production frontier (SPF) is a measurement of production frontier across cross-sections while incorporating stochastic assumptions. It uses a mixture of one-sided and/or two-sided (e.g. normal) errors. The error term is composed of two parts. A one-sided component captures the effects of inefficiency relative to the stochastic frontier. A two-sided component permits random variation of the frontier across cross-sections and captures the effects of measurement error, other statistical 'noise', and random shocks outside the cross-sections' control.

Thus, given quantities of inputs, there is a maximal output possible, but this maximal level is random (to be precise, which is randomly distributed as a function) rather than exact. This assumes that some inputs or external effects have maximal possible effects, but others have potentially unbounded effects, e.g. weather. Stochastic frontier expresses maximal output, given some set of inputs, as a distribution (typically normal) rather than a point[2]. Based on Fare, Grosskopf et al. (1994)'s the definition of productivity, we will measure the economic performance of each country relative to the world's best possible output, given the available resources and technology at a particular time period. This comparative measurement of economic performance against the world production frontier is technical efficiency.

2.2.1 Basic SPF Model

The production function can be specified in a general form as follows:

[2] Compared to deterministic frontiers, which ignore the stochastic effect on the production frontier, they are more consistent with economic theory. The chief advantage of the deterministic frontier seems clear to be the availability of a measure of exact technical inefficiency for each observation instead of distribution. However, their major disadvantage is that they are bound to be confounded by statistical 'noise', whereas stochastic frontiers are more realistic, and take statistical 'noise' into account.

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