Measuring productivity of research in economics: A cross-country study using DEA

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Abstract

We measure productivity in leading edge economic research by using data envelopment analysis (DEA) for a sample of 21 countries belonging to the Organization for Economic Cooperation and Development (OECD). Publications in ten top journals of economics from 1980 to 1998 are taken as the research output. Inputs are measured by R&D expenditure, the number of universities with economics departments and (as an uncontrollable variable) population. Under constant returns-to-scale, the US emerges as the only efficient country. Under variable returns-to-scale, the efficiency frontier is defined by the US, Ireland and New Zealand. With the exception of the US, all countries in our sample display increasing returns-to-scale, and thus have the potential to raise their efficiency by scaling up their research activities.
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1. Introduction

This paper addresses the issue of measuring productivity in economic research through a cross-country study of 21 member countries of the Organization for Economic Cooperation and Development (OECD). Using data envelopment analysis (DEA), we generate a ranking of these countries, taking publications in leading economics journals as a measure of research output and, as research inputs, a country's R&D expenditure, the number of its universities with economics departments, and its population.

Measuring research productivity is a current focus of political debate on reforming the university system in several countries. In political terms, reforms—such as introducing new career paths that put strong emphasis on publications in internationally renowned journals, or allocating 'global' budgets to universities so as to enhance their autonomy and flexibility—are motivated by a desire to raise the productivity of research within a given country, to promote academic excellence, and to make the country's research globally competitive. For instance, the 1989 Plan for Economics Sciences drawn up by the European Union (EU) was initially intended to promote academic excellence in economic research in the countries of the EU and, thereby, to narrow the gap in leading edge research between EU-countries and the US.

The issue of measuring research productivity in economics is closely related to the ubiquitous rankings of economists or economic departments. A common feature of these rankings (see, for instance, [1–7]) is the fact that research output is evaluated simply by adding up appropriately defined output measures, such as citations or publications. Needless to say, from an economic point of view, it would be desirable to also incorporate some sort of input measure in order to obtain a true comparison, or meaningful ranking. This basic insight has been taken into account in an increasing number of studies, whose rankings of economics departments incorporate such inputs as faculty size, ratio of faculty to students, number of federal grants, and expenditure on library acquisitions [8–10].

In generating country rankings by aggregating the research output of economics departments in each country, Kirman and Dahl [11,12], Eichenberger et al. [4] and Kocher and Sutter [13] all take into account various input measures, e.g., population, manpower in economics and financial resources. Although input-adjusted country rankings are clearly preferable to those that consider only output data, they still exhibit a major shortcoming, viz., the fact that input measures are incorporated merely by weighting output indicators by single input proxies, such as manpower or population. This, we feel, represents a somewhat crude method of efficiency measurement.

The current paper uses a different approach. It applies DEA to obtain a cross-country ranking of leading edge research output in economics. DEA is a linear programming technique, widely used when there are multiple inputs and outputs but no clear functional relationship between the two. Specifically, it is a tool for evaluating relative efficiency, since it first identifies those countries defining the efficiency frontier, and then compares other countries' input–output relationships with theirs. As a result, DEA makes it possible to rank countries according to their research productivity, and to identify the sources of inefficiencies. To our knowledge, this is the first paper to use this technique in assessing economics research productivity on a cross-country basis.

The remainder of the paper is structured as follows. Section 2 provides a brief overview of the selected journals, and the rationale for their being chosen, as well as giving details of the data base. Section 3 presents a brief review of previous research in the field, and gives a "broad-brush"