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Introduction

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This issue emerged out of papers presented at the 2010 New Zealand Workshop on Efficiency and Productivity Analysis, held at the Auckland University of Technology. We have been very fortunate to receive contributions from a group of authors with outstanding contributions to the literature on efficiency and productivity measurement. Given the current state of many global economies and the pressures for continuing improvements in efficiency and productivity for countries, firms and their industries it is imperative that new tools of performance measurement are developed or further refined so that policymakers can deal more effectively with the increasingly complex issues that arise out of some very challenging economic and financial trends.

The first paper by Färe, Grosskopf, Margaritis and Weber draws on recent work on time substitution by Färe et al. (2010) to develop an innovative way to simulate the effects of compliance with the Kyoto Accord. They use the model to investigate the costs of carbon dioxide emissions restrictions for 28 OECD countries during 1991–2006. They find that the costs of compliance in terms of lost real GDP are relatively low if countries are able to reallocate production decisions across time. In contrast to The Stern Review, which advocates immediate reductions in greenhouse gas emissions, their results show that for real GDP to be maximized across the period emissions should have been cut gradually, with smaller cuts as a percent of actual emissions during 1991–1998 and larger cuts during the period 2000–2006.

The second paper by Diewert discusses methods of measuring total factor productivity for non-market production units. Diewert considers specifically the imputation of output prices when price and quantity data on output-specific inputs are available. In the main part an activity analysis approach under some strong assumptions is used in the interest of simplifying the exposition thereby making the paper more accessible to a wider range of readers including Government statisticians and business economists interested in productivity measurement, whereas the more technical appendix uses less restrictive technologies. Diewert offers some valuable insights about the impact of the assumptions that must be made. In a follow up note, Balk shows that the two approaches offered by Diewert, the simple one in the main text and the seemingly more general one in the Appendix, are basically equivalent.

The third paper by Färe and Primont considers the specification and estimation of input-specific inefficiencies for firms that buy inputs in competitive markets and may choose an inefficient input vector. A motivation for obtaining input-specific allocative efficiency estimates may reflect the desire to calculate the inefficiency of the use of each input in response to a regulatory restriction on one of the inputs. The classic example of this is the Averch and Johnson (1962) model of rate-of-return regulation. The main results of the paper are that price efficiency and the quantity efficiency measures can each be derived from the

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other; the relationship between the two measures has a simple representation in terms of both the input demands and the shadow price functions; and these relations can be derived from general results on the duality between cost and distance functions.

The fourth paper by Levkoff, Russell and Schworm shows that the FGL (Färe et al. 1985) version of the Russell graph efficiency measure can fail to correctly indicate whether an observation is efficient if the observation occurs on the boundary of the output space, i.e. it fails to satisfy the indication property. In addition, an increase in an output quantity starting at an inefficient boundary output vector can lower the value of the FGL index. The FGL index, therefore, satisfies neither indication nor weak monotonicity. This situation may be problematic for a number of technologies including those characterized by a rotational nature (for example, agricultural cropping). Levkoff, Russell and Schworm propose an alternative measure that satisfies the desirable theoretical properties of indication and weak monotonicity. A problem with the new measure is that it relies upon an enhanced indicator function which seems to require exact knowledge of the underlying technology.

In the fifth paper Fox introduces a productivity paradox arising when productivity is calculated by aggregating more disaggregated productivity measures. He suggests an aggregation method circumventing this monotonicity problem with some very attractive aggregation and decomposition properties. However, while this is potentially very useful at the level of aggregating industry productivity, it is less useful in examining issues relating to the entry and exit of firms. Hence, an alternative method is suggested which can overcome the aggregation problems inherent in the other methods, and can be used for examining changes in industry structure through the entry and exit of firms and changes in the relative shares of economic activity between firms.

The sixth paper by Harrison, Rouse and Armstrong compares two approaches proposed by Banker and Morey (1986a, b) to incorporate non-discretionary variables in DEA. The authors use simulations to explicitly model the environmental impact in output separate from the effect of managerial efficiency thereby providing a better understanding of the relationship between managerial efficiency and the effect of different environmental conditions.

The seventh paper by Koutsomanoli-Philippaki, Margaritis and Staikouras illustrates the use of the directional distance function approach to assess profit efficiency for a sample of banks in 25 European Union member states over the period 1998–2008. Profit efficiency is inextricably linked with the ability of banks to absorb bad debts and hence with the ability of banking systems to withstand systemic shocks. They report a significant level of profit inefficiency for the EU region, which is predominantly attributed to allocative inefficiency. They also find small banks appear to be the most profit efficient, while large banks are the most inefficient which is an interesting finding in view of the current regulatory policy debate regarding bank size.

The last paper by Frijns, Margaritis and Psillaki is an important contribution to empirical work on asset pricing. In particular, the paper investigates the role of firm efficiency in asset pricing. The authors use directional distance functions to determine the degree of efficiency of a firm using various output measures. They conduct Fama–French-type performance regressions to test whether firm efficiency has a role in explaining stock price performance over time, and panel regressions to assess whether firm efficiency exhibits significant explanatory power for stock returns in cross-sectional analysis. The paper convincingly finds that efficient firms significantly outperform inefficient firms and that less efficient firms have higher expected returns. Results are not driven by other risk factors, hence firm efficiency may be viewed as a potential new asset pricing factor.

We believe the papers included in this special issue will stimulate the reader and provide substantive analytical and empirical insights for further work in the areas of efficiency and productivity measurement. We would like to thank all authors, the Editor-in-Chief Robin Sickles, Scott Atkinson, Bob Chambers, Robert Hill, Kathy Hayes, Aline Muller, Lehnert Thorsten, David Tripe and Osman Zaim for their valuable contributions to this special JPA issue on Efficiency and Productivity: Empirical and Theoretical Treatments.

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