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# Measuring productivity change in higher education: an application of Hicks-Moorsteen total factor productivity index to Malaysian public universities

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## Abstract

This paper offers an in-depth analysis of efficiency and productivity changes using the Hicks-Moorsteen total factor productivity index, in the context of higher education institutions. Unlike the Malmquist method, this approach makes no assumptions about firms' returns to scale conditions. We assume that the production technology exhibits variable returns to scale, which is more plausible than the constant returns to scale assumption, because universities usually operate at suboptimal scales. Three major groupings of Malaysian public universities are used in our case study: research, comprehensive, and focused universities. The results show that technical efficiency has improved after the 2007 National Higher Education Strategic Plan within all the three university groupings.

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## Disclosure statement

No potential conflict of interest was reported by the authors.

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## Notes

1. Gilbert and Wilson ([1998](#)), Glass and McKillop ([2000](#)), and Arjomandi, Valadkhani, and Harvie ([2011](#)) experienced this difficulty in their studies of the Korean banks, UK building societies, and Iranian banks, respectively.
2. Briec and Kerstens ([2004](#)) also proposed an interesting difference-based variation of the Malmquist index known as the Luenberger–Hicks–Moorsteen indicator in the literature. For more recent theoretical contributions on the Hicks–Moorsteen index, also see Briec and Kerstens ([2011](#)), Briec, Kerstens, and Peypoch ([2012](#)), and Kerstens and Van de Woestyne ([2014](#)).
3. Research universities are well-established, research-intensive institutions. According to Malaysian Ministry of Higher Education ([2007](#)), this category is awarded to universities that place emphasis on aspects of research and development. These universities share the following features: (1) research-oriented subject areas; (2) competitive entry requirement; and (3) highly qualified academics. Comprehensive

universities (also called multi-disciplinary universities) focus on a wide range of courses and fields of specialization. The three characteristics among these universities are: (1) wide range of subject areas; (2) competitive entry requirement; and (3) highly qualified academics. Focused universities focus on certain fields of knowledge related to the original objective of their establishment. They have the same characteristics as research universities.

4. All research is on the focused and established institutions: Universiti Malaya, Universiti Sains Malaysia, Universiti Kebangsaan Malaysia, Universiti Putra Malaysia, and Universiti Teknologi Malaysia.

5. Also called multi-disciplinary universities, which focus on a wide cross-section of courses and fields of study: Universiti Islam Antarabangsa Malaysia, Universiti Malaysia Sarawak, Universiti Malaysia Sabah, and Universiti Teknologi MARA.

6. They concentrate on specified disciplines linked to the original objective of their establishment: Universiti Utara Malaysia, Universiti Pendidikan Sultan Idris, Universiti Malaysia Terengganu, Universiti Sains Islam Malaysia, Universiti Tun Hussein Onn, Universiti Teknikal Melaka Malaysia, Universiti Malaysia Pahang, and Universiti Malaysia Perlis.

7. Peer-review approach is an evaluation process of research output carried out by qualified individuals within the relevant areas. This approach was adopted by Johnes ([1995](#)) and Meng et al. ([2008](#)).

8. This is entirely consistent with the theory behind technical changes explained by O'Donnell ([2012a](#)).

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## Additional information

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Dr Amir Arjomandi is a lecturer at the School of Accounting, Economics and Finance, University of Wollongong. Amir's research interests are in efficiency and productivity, environmental economics, applied microeconomics. His works are published in several journals including Economic Modelling, Journal of the Asia Pacific Economy, Applied Economics Letters, Studies in Economics and Finance, and Research in International Business and Finance.

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Dr Mad Ithnin Salleh obtained his doctoral degree from the University of Wollongong, Australia, specialising in efficiency and productivity. His area of interest includes performance measurement, efficiency and productivity, and developing a quantitative method for management and quality management system. He is currently a senior lecturer at the Faculty of Business and Economics, Sultan Idris Education University, Malaysia.

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