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The competitive advantage of nations: An application to academia

Anne-Wil Harzing^{a,*}, Axèle Giroud^{b,1}^a University of Melbourne, Department of Management and Marketing, Parkville Campus, Victoria 3010, Australia^b Manchester Business School, Booth Street West, Manchester M15 6PB, UK

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ABSTRACT

Within the field of bibliometrics, there is sustained interest in how nations “compete” in terms of academic disciplines, and what determinants explain why countries may have a specific advantage in one discipline over another. However, this literature has not, to date, presented a comprehensive structured model that could be used in the interpretation of a country’s research profile and academic output. In this paper, we use frameworks from international business and economics to present such a model.

Our study makes four major contributions. First, we include a very wide range of countries and disciplines, explicitly including the Social Sciences, which unfortunately are excluded in most bibliometrics studies. Second, we apply theories of revealed comparative advantage and the competitive advantage of nations to academic disciplines. Third, we cluster our 34 countries into five different groups that have distinct combinations of revealed comparative advantage in five major disciplines. Finally, based on our empirical work and prior literature, we present an academic diamond that details factors likely to explain a country’s research profile and competitiveness in certain disciplines.

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1. Introduction

Within the international business discipline, scholars have long reflected upon what industries and nations specialize in, and what the explanation behind their international competitive advantages might be (see e.g., Grant, 1991; Porter, 1990; Rugman and D’Cruz, 1993). Within the field of bibliometrics, there is sustained interest in how nations “compete” in terms of academic disciplines, and what determinants explain why countries may have a specific advantage in one discipline over another (see, e.g., BIE, 1996; Braun, Glänzel, & Grupp, 1995a, 1995b; Frame, 1977; Garg, 2003; Horta and Veloso, 2007; Kozłowski, Radosevic, & Ircha, 1999). Clearly academic publishing is not a traditional competitive zero-sum game, i.e. if academics from one country publish in a particular journal, it does not mean academics from other countries cannot publish there. However, there is certainly an element of competition involved as most journals have page limits and not all papers can be published.² Therefore, one can assume that when a country publishes more in certain disciplines in comparison to others, it has a competitive advantage in these disciplines.

* Corresponding author. Tel.: +61 03 8344 3724.

E-mail addresses: harzing@unimelb.edu.au, anne@harzing.com (A.-W. Harzing), Axele.Giroud@mbs.ac.uk (A. Giroud).

¹ Tel.: +44 0161 306 1320.

² One could argue that with the increase of open access publishing, journal space is no longer a limitation. However, legitimate open access journals are still selective in terms of the papers they accept. Further, many of them are not included in the Web of Knowledge, the database used in this study. Moreover, we are considering 2002–2012, a period in which OA journals were still fairly rare in most fields. Hence, we do not think the trend to OA publishing has a large impact for the current study.

Understanding academic competitiveness matters, since academic output has risen worldwide over the past two decades, and higher-education institutions put increasing emphasis on the research performance of their academic staff, which in turn is a way to assess institutions' competitiveness in various academic fields. In this paper, we consider country-level competitiveness in various disciplines, with the understanding that it is higher education institutions that compete and engage in specific actions to maintain their competitive position (Bertsch, 2000).

There is a large number of quantitative analyses of research productivity. Yet very few engage in a *comparative* analysis of how academically competitive individual countries are in specific disciplines in relation to others, and, importantly, what might explain this competitive advantage. Studies that have compared countries include reports aimed at aiding policy-makers (e.g. FWF, 2007; King, 2004; May, 1997), or broad-ranging cross-country and cross-discipline studies that provide descriptive comparisons (e.g. Braun et al., 1995a,b; Yang, Yue, Ding, & Han, 2012), rather than a more systematic analysis of elements that might constitute a country's competitiveness in individual fields of study.

Existing studies have identified some determinants explaining variation in research output and quality. The main determinants put forward include country size, level of economic development (GDP or GDP per capita) (Inönü, 2003; King, 2004; May, 1997; Rousseau and Rousseau, 1998), financial investments (public expenditure for R&D) (FWF, 2007; King, 2004; May, 1997; Zhou and Leydesdorff, 2006), competitive promotion of basic research such as knowledge infrastructure (for instance, the example of CERN would explain Switzerland's success for publications in physics), and incentive structures within research institutions (Almeida, Pais, Formosinho, 2009). These determinants centre on selected economic and institutional considerations, and the literature has not, to date, presented a comprehensive structured model that could be used in the interpretation of a country's academic competitiveness.

In this paper, we use frameworks from the international business and economics disciplines to present such a model. Our study makes four major contributions. First, we include a very wide range of countries and disciplines, explicitly including the Social Sciences, which unfortunately are excluded in most bibliometrics studies (see also Harzing, 2013). Second, we apply theories of revealed comparative advantage and the competitive advantage of nations to academic publishing. Third, we cluster our 34 countries into five different groups that have distinct combinations of revealed comparative advantage in five major disciplines. Finally, based on our empirical work and prior literature, we present an academic diamond that details factors likely to explain a country's research profile and competitiveness in certain disciplines.

2. Literature review

In this paper, we apply theoretical concepts from the international business and economics literatures to academic publishing. In doing so, we follow the lead of Lockett and McWilliams (2005) and Cronin and Meho (2008), who both used the balance of trade metaphor to study citation patterns between disciplines. Like these authors, our analysis is reflective and descriptive rather than prescriptive, it does not imply a recommendation of which disciplines or research areas countries *should* focus on. Although this could well be a natural extension of our study, this is the domain of science policy (see e.g. Irvine and Martin, 1984), which is not the focus of our current study.

The international economics literature has long established means to compare how well countries perform internationally for specific industries/products. The concept of Revealed Comparative Advantage (RCA) is used to highlight where countries benefit from an advantage and specialize in terms of trade (Maneschi, 2008). It was first developed by Balassa in 1965 and compares a country's share of world exports in a sector to its share of exports overall. It shows whether a country specializes in a specific product relative to other countries that export the same product. "The comparison to world exports in the formula for RCA serves the useful purpose of normalizing the trade data for the size of sectors and countries, which otherwise might give misleading impressions of the importance of a sector and country in international trade" (OECD, 2011, p. 32). The concept of RCA can also be useful in the analysis of scientific discipline across a large number of countries, as it can be used with other data as a guide to what causes actual scientific output patterns, and whether these truly constitute a comparative advantage or not.

Another useful theory can be found in the international business literature. Porter's diamond (Porter, 1990), which builds on Porter's earlier frameworks on competitive strategy (Porter, 1980) and competitive advantage (Porter, 1985) has become a well-established framework to analyze the competitive advantage of nations (Ketels, 2006). In his seminal 1990 book, Porter develops the concept, bridging the gap between strategic management and international economics (Grant, 1991; Pitelis, 2009, p. 101). The diamond suggests that national competitive advantage depends on four determinants, represented as a diamond; namely, factor costs, domestic demand, related and supported industries in the home country, and amount of rivalry in the home country between leading firms/institutions by sector. The complete model includes two additional constructs. Chance events (such as technological discontinuities, global shifts or political decisions by foreign governments) matter because they create discontinuities that allow shifts in competitive position (Porter, 1990). Government is crucial because it can shape all four determinants. The four determinants and two additional constructs interact as a system, with identified hierarchies amongst factors. For instance, Porter distinguishes between basic factors (natural resources, climate, location and demographics), and advanced factors (communications infrastructure, sophisticated skills, research facilities). Advanced factors are the most important to competitive advantage, as they are not factors for which supply depends upon exogenous endowment, and thereby result from investments by individuals, companies and governments.

There were two main areas of critique relating to the model. Firstly, authors have suggested that for countries with supra-national institutions, the diamond may need to be complemented with that of neighbouring countries because of a common

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