

The role of “non-economic” endowments: introduction to the special section on what we know and what we should know about international knowledge sourcing

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Abstract

Recent developments in the pattern of international knowledge sourcing have highlighted a new international division of labor in knowledge production which now is affecting emerging as well as advanced countries. The source of this division of labor has been identified as residing in the changing economic endowments of these countries. We extend this by suggesting that the new international allocation of knowledge-related activities is related strongly to a country's “non-economic” endowments. Our arguments provide context to the papers in this special section.

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1. Introduction

Sourcing knowledge across borders has been envisaged traditionally as a “North–North” phenomenon with foreign direct investment (FDI) in research and development (R&D) flowing from advanced to advanced countries. Over the past decade, FDI statistics and an increasing number of studies show a more complex picture of “North–South” and “South–North” FDI flows which is challenging otherwise accepted stylized facts (UNCTAD, 2005; OECD, 2009). FDI in R&D continues primarily to be from advanced countries but nowadays is targeting mostly emerging economies which rank high in the hierarchy of foreign R&D locations (Contractor *et al.*, 2010; D'Agostino *et al.*, 2013). Research based on *Financial Times* data reveals that China is ranked first in the world for greenfield FDI in R&D projects since 2010, and second for number of projects (Fingar, 2015). In addition to emerging economies becoming major host locations for R&D offshoring, there is a parallel pattern related to the offshoring of R&D by emerging country firms which are targeting advanced countries (Von Zedtwitz *et al.*, 2006; Athreye and Kapur, 2009; Moncada-Paternò-Castello *et al.*, 2011). The number of companies headquartered in emerging countries which appear on the Global Innovation 1000 list published by PwC's Strategy&, multiplied between 2005 and 2014. Similarly, the growth of these companies' R&D activities has been explosive compared to the growth rates of

companies headquartered in North America and Europe (Jaruzelski *et al.*, 2015). The emergence of new locations and new players has transformed knowledge sourcing from a cross-border to a truly global phenomenon.

These recent developments have been conceptualized as the result of a new international division of labor in knowledge production (D'Agostino *et al.*, 2013) based on the idea that valuable, economic, and knowledge-related resources have become available in “non-traditional” locations. In a process that can be described as “capabilities accumulation” (Cimoli *et al.*, 2009a), emerging economies have experienced an upgrading of their technological capabilities and enjoy large availability of talent (Athreye and Cantwell, 2007; Lewin *et al.*, 2009), both critical inputs for knowledge production. The new international division of labor in knowledge production is influenced also by political factors, “non-economic actors” such as universities and research institutions, and the related national innovation capacity of these countries which ultimately influence the effective possibility of “traditional actors” to source knowledge from non-traditional locations, and the effective capability of “non-traditional actors” to source knowledge from traditional locations. Indeed, it has been argued convincingly that emerging economies have been able to channel resources from initial “static” comparative advantages toward the construction of new non-economic endowments supporting activities characterized by higher learning opportunities and demand elasticities (Amsden, 1989; Cimoli *et al.*, 2009b). However, these non-economic endowments as a determinant of the new international division of labor in knowledge production have been mostly overlooked.

This special section tries to fill this gap by examining the role played by the non-economic endowments of emerging countries. The papers in this special section focus on emerging economies as host as well as home locations for R&D offshoring to understand the drivers of both North–South and South–North patterns in this phenomenon, drawing on diverse theoretical perspectives and methodologies.

2. What do we know about international knowledge sourcing?

International knowledge sourcing for a long time has been a hot topic in the innovation studies literature. Scholars in this tradition initially engaged in debate on the magnitude of this phenomenon (Patel and Pavitt, 1991; Cantwell, 1995) before co

nverging on the idea that international knowledge sourcing was a North–North phenomenon involving R&D FDI by one advanced country toward another (Cantwell and Piscitello, 2000; Arvanitis and Hollenstein, 2011). Within this perspective, R&D internationalization increasingly was aimed at sourcing knowledge from abroad to complement and enhance knowledge production at home (Almeida, 1996; Cantwell and Santangelo, 2000) which resulted in the hierarchy of foreign R&D locations involving mostly advanced countries (Cantwell and Janne, 1999; Patel and Vega, 1999). These host countries were ranked according to their technology- and R&D activity-specific advantages (Dunning and Narula, 1995; Florida, 1997; Pearce and Papanastassiou, 1999).

Since the mid-2000s, renewed interest in international knowledge sourcing has resulted in a number of investigations of the offshoring of administrative and technical work (Kenney *et al.*, 2009), high-value company functions (Contractor *et al.*, 2010), intangibles (Grimaldi *et al.*, 2010), and capabilities (Jensen *et al.*, 2013). The small number of papers focusing on R&D offshoring and its link to innovation (Fifarek and Veloso, 2010; Piscitello and Santangelo, 2010; D'Agostino and Santangelo, 2012; Castellani *et al.*, 2015) include a study by D'Agostino *et al.* (2013) which explicitly relates a North–South pattern to a new international division of labor in international knowledge sourcing. The source of this new division of labor has been identified as emerging from the changing economic endowments of emerging countries reflected by their technological upgrading and large availability of talent at advantageous cost. The countries involved include, among others, India and China, and countries in Eastern Europe and Latin America (Athreye and Cantwell, 2007; Lewin *et al.*, 2009).

Taiwan's technological strengths in computer hardware, India's software development expertise combined with its large supply of engineers, and the appearance of R&D clusters within different emerging countries are all illustrative of these changes (Chen, 2004; Arora and Gambardella, 2005). At the same time, the changing endowments of emerging countries have been paralleled by a shortage of talent and higher comparative costs in the advanced countries (Lewin *et al.*, 2009). All of these developments have become major drivers also of a South–North pattern of strategic asset-seeking FDI by emerging country firms searching for new intangible resources (Luo and Tung, 2007; Athreye and Kapur, 2009).

Theoretically, the distinction between North–South vs. South–North international knowledge sourcing raises important issues which are not touched upon within the traditional North–North perspective, since, arguably, they are

less important in that context than in North–South or South–North contexts. In the North–South context, the distinctive institutional environment of emerging countries and the uneven development within these countries of different aspects of their national innovation systems are critical factors which advanced country investors need to consider (Meyer, 2004). Concurrently, international knowledge sourcing in a South–North direction raises many questions related to the absorptive capacity of investors from emerging countries (Deng, 2010).

3. What should we know about international knowledge sourcing?

Economic factors alone seem insufficient to explain the new directions of international knowledge sourcing mainly because, to a large extent, cross-country differentials in economic endowments can be explained by differentials in non-economic endowments. In particular, a country’s innovation infrastructure which relates to the political environment and the stock of scientific and technological knowledge that ultimately influence a country’s innovative capacity (Pavitt, 1980; Furman *et al.*, 2002; Fagerberg and Srholec, 2008; Cimoli *et al.*, 2009a) is especially critical for emerging countries. In these contexts, the networks and ties among organizations and political actors are generally much stronger than in advanced economies. For instance, many important Chinese firms are state-owned enterprises with explicit political objectives alongside business aims (Meyer *et al.*, 2014). In addition, the stock of scientific and technological knowledge in emerging countries is increasingly the result of a new “brain circulation” process whereby foreign-educated scientists and engineers return to their home countries carrying with them wide-ranging, personal relationships with mentors and peers from their former host countries (Saxenian, 2005). The resulting international networks of non-economic actors such as universities and research centers, and their connections with similar networks involving economic actors then become critical for channeling foreign knowledge to these locations. Thus, it would seem that political factors and non-economic actors are at the heart of national innovation capacity and are major determinants of the participation of emerging countries and emerging country firms in the new international division of labor in knowledge production.

The relevance of a country’s non-economic endowments raises several questions related to what we know about international knowledge sourcing. In particular, the ability of non-traditional locations to develop state-of-the-art knowledge remains a debated question (von Zedtwitz and Gassmann, 2002). Other critical issues are the type of knowledge and R&D activities which are more likely to be sourced from and located in emerging economies (D’Agostino and Santangelo, 2012; D’Agostino *et al.*, 2013). The growing involvement of emerging economies as R&D FDI host locations shown in recent statistics is attracting research interest (Moncada-Paternò-Castello *et al.*, 2011), although at this point in time, the phenomenon is not well understood. There is also evidence that firms located in fast-growing emerging economies invest in developed economies for technology-seeking reasons (Athreye and Kapur, 2009), although again, we need a more complete understanding of this phenomenon from theoretical and empirical perspectives.

To advance what is known about international knowledge sourcing, the collection of papers in this special section addresses the following questions:

- The most recent statistics document that emerging economies are now ranked top in the hierarchy of foreign R&D locations, but can knowledge be sourced effectively in non-traditional locations and in specific activities?
- Emerging economies have experienced an upgrading of technological capabilities and enjoy a large availability of talents, but to which extent are the actors in these locations able to develop state-of-the-art technology?
- Recent statistics on R&D internationalization document the growing involvement of emerging economies as home locations of R&D FDI aimed at sourcing knowledge from developed countries, but what is the influence of home-country political factors on the potential for advanced market subsidiaries to transfer knowledge to their headquarters?
- Emerging economies are benefitting increasingly from a “brain circulation” process, so how do economic and non-economic actors such as universities and research institutions, compare in terms of their ability to leverage the network of scientists and inventors to facilitate the involvement of emerging economies in international knowledge sourcing?

4. Outline of the special section

All the papers in this special section point to the relevance of the non-economic endowments of non-traditional locations involved increasingly in international knowledge sourcing, and focus on specific aspects of these endowments,

including the country's innovation capacity, the political embeddedness of emerging country firms, and the role of research institutions as distinctive conduits enabling the global connectivity of these countries. The studies in this section use different theoretical lenses and empirical perspectives. By employing a variety of units of analysis (i.e., host country, multinational enterprise subsidiaries, and co-invented patents), the collection of papers in this special section offers a variety of complementary insights on the international division of labor underlying knowledge sourcing across borders. In addition, the adoption of qualitative and quantitative methods enables the effective capture of distinct aspects of this phenomenon. These aspects are investigated in connection with science-based sectors (such as pharma) and other sectors (such as machinery construction) as well as in connection with specific R&D activities within these sectors, including clinical trials in the pharma case.

In relation to questions about whether knowledge can be sourced effectively in non-traditional locations in specific activities, and whether actors in these locations are able to develop state-of-the-art technology, Haeussler and Rake (2017) build on the concept of national innovation capacity (Patel and Pavitt, 1994; Furman *et al.*, 2002). They exploit rich and valuable data on clinical trials to show what makes countries attractive for locating clinical research. Their results challenge existing views on the extent of the FDI in R&D and the involvement of particular countries, and suggest that the location of clinical research activities across non-traditional locations is driven by knowledge rather than cost arguments. Their quantitative analysis shows also that the strength of the knowledge base in these non-traditional countries enables direct research to respond to local needs.

The study by Ciabuschi *et al.*, (2017) investigates the influence of home-country political factors on reverse knowledge transfer from foreign subsidiaries to headquarters in the context of South–North FDI. Drawing on Zukin and DiMaggio's (1990) concept of political embeddedness, their study explores the relevance of political embeddedness on reverse knowledge transfer in the context of a Chinese state-owned multinational company operating in the construction machinery industry and its four knowledge-seeking subsidiaries in advanced countries. Their theory-building case suggests that the home country level of political embeddedness drives the quest for strategic assets such as technology and competence in advanced markets, but simultaneously increases some of the organizational barriers to reverse transfer knowledge, thereby undermining the strategic knowledge-seeking internationalization intent.

The third paper by Perri *et al.*, (2017) examines the effectiveness of economic and non-economic actors in facilitating foreign knowledge inflows to emerging countries. Drawing on the literature on knowledge networks (Hansen, 2002; Owen-Smith and Powell, 2004) and their governance modes (Inkpen and Tsang, 2005), Perri and colleagues explore this question in the context of the co-inventor networks generated by US patents associated with the Chinese pharmaceutical industry. They argue and confirm that in the Chinese setting, universities and research centers are more effective than multinationals for connecting the local innovation system to global knowledge networks because the knowledge networks of research institutions are operationalized through the personal relationships of their affiliated inventors. In contrast, multinationals' networks are orchestrated organizationally to achieve a much stronger focus on appropriating the returns from their inventions.

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