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Intellectual property rights, diasporas, and domestic innovation

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ABSTRACT

This paper studies the interaction between international migration and intellectual property rights (IPR) in determining innovation performance of developing countries. Although emigration may directly cause brain drain, it generates a flow of knowledge acquired by emigrants abroad back to their home countries, which could be exploited under sound IPR institutions. IPRs can thus stimulate domestic innovation by creating the right environment to absorb potential gains from international migration. Using a panel dataset of emerging and developing countries, we show that emigration has a favorable effect on strengthening the link between IPR protection and innovation by making a new source of knowledge available to domestic innovators. We test our results through instrumental variable methods using information on geography, cultural distance and institutions.
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1. Introduction

The recent surge in the outward transfer of human capital has made emigration a key concern for the developing world (Docquier and Rapoport, 2012). This process has given origin to a rich debate on the threats and opportunities that skilled emigration may pose to the sending countries. The traditional literature on migration and brain drain presents mechanisms through which skilled emigration could be detrimental to growth. [1] A growing number of contributions, however, have introduced channels through which emigration may foster development and create brain gain. These include incentives for education attainment through migration prospects (Mountford, 1997; Beine et al., 2001, 2008; Stark et al., 1997), return migration of better trained managers and entrepreneurs (Mayr and Peri, 2009; Dustmann et al., 2011), and access to foreign-produced knowledge by means of cross-border diaspora networks (Kerr, 2008; Agrawal et al., 2011).

There is little doubt today about the contribution of emigration in creating potential gains for the home economy.[2] Nevertheless, there is little formal research on the role of home country institutions in moderating a link between the knowledge absorbed by emigrants abroad and innovation in their home countries. This study seeks to fill this gap by exploring the interaction between intellectual property right (IPR) protection and migration in determining innovation performance in emerging and developing countries (EDCs).[3] The key question we aim to answer is whether an appropriate level of IPR protection in the sending country could stimulate domestic innovation by creating the right environment to exploit superior knowledge acquired by its migrants to more advanced economies. In sum, we argue that although emigration may directly result in a brain drain, it also generates a flow of

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[1] See e.g., Berry and Soligo (1969), Bhagwati and Hamada (1974) and Miyagiwa (1991).

[2] Referring to Agrawal et al. (2011), The Economist (2009) writes: "[…] a scientific diaspora gives countries of origin a leg-up in terms of access to the latest research, mitigating some of the problems of a 'brain drain'. And given that the same scientist is going to be more productive in America than in a developing country because of better facilities and more resources, immigration may help overall innovation (some of the benefits of which may flow back to firms in poorer countries)." See also 'The Magic of Diasporas' in The Economist (2011).

[3] When dealing with technology transfer and innovation in the developing world, intellectual property right protection is certainly a crucial institution to consider (Maskus, 2000).

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ideas and inventions back to the sending country, which could be absorbed in countries with sound IPR institutions.

The roles of IPRs and migration as means of technology diffusion have generally been studied in isolation of each other. [4] Among the vast literature on IPRs, Chen and Puttinan (2005) and Parello (2008) are perhaps most closely related to our work, as they specifically focus on domestic skill accumulation and innovation. While the former positively relates IPR protection to innovation, the latter finds it ineffective for innovation in less-developed countries. On migration, Williams (2007) and Oettl and Agrawal (2008) focus on the externalities of international migration to emphasize their role in knowledge and technology transfer. Our work contributes to this literature by shedding light on how migration may influence the effect of IPR protection on innovation in the sending country.

The conceptual framework we adopt argues that although emigration can initially result in the loss of domestically available skills, it also instigates a channel through which more advanced knowledge acquired by emigrants abroad can flow back to the developing world. This can for instance be made possible through the remote mobilization of intellectuals and professionals abroad and their connection to scientific, technological, and cultural programs at home.[5] We first argue in line with Agrawal et al. (2011) that the capacity of innovators who remain in their origin countries is related to their access to valuable technological knowledge that is partially accumulated abroad (i.e., brain banks). We then claim that the diaspora knowledge partially makes up for the lacking innovation capacity in the home country that can be utilized under a sound IPR regime. In other words, migration increases the magnitude of potential benefits from IPR protection in terms of innovation in developing economies.

Using a sample of emerging and developing countries, we perform an empirical analysis to investigate the joint impact of emigration and IPR protection in the sending country on innovation there. The sample we use is a panel of 34 low-income countries ranging from 1995 to 2006. We measure innovation activities in EDCs through the number of resident patent grants, with data taken from WIPO (World Intellectual Property Organization). We use this information together with extensive original data on migration stocks and the index of IPR protection as measured by Park (2008). Our findings show that emigration has a favorable effect on strengthening the link between IPR protection and innovation by making a new source of knowledge available to domestic innovators. Hence, benefits of IPRs can be better seized in the presence of diaspora knowledge networks, confirming the main conclusions of our conceptual framework.

Our results are tested using a variety of robustness checks that are also able to address a potential omitted variable bias. Indeed, in the presence of omitted variables, the causal mechanism we highlight may not necessarily be the driver of our correlations. In particular, there can be a host of unobserved factors, which may trigger emigration and are at the same time correlated with innovation. For instance, countries with superior innovation capabilities could be better able to send migrants to more advanced countries. Although we provide a variety of controls, among which trade and FDI tend to play an important role, we certainly cannot exclude the possibility that some key factors remain unobserved. We address these concerns via a first difference as well as an instrumental variable approach. Our instrumental variable estimates use information on geography, cultural distance and institutions. These methods allow us to validate the importance of IPRs in transforming skills learned from abroad by emigrants and transferred back to their home country into successful innovations.

In the remainder of the paper, we introduce the conceptual framework and main empirical implications in Sections 2, conduct the empirical exercise in Section 3, and conclude in Section 4.

2. Conceptual framework and main empirical implications

Diasporas help spread ideas by promoting trust through ethnic ties, speeding the flow of information, and through the return of better trained and more experienced migrants to their home countries. The conceptual framework presented in this section shows how this relates to the IPR regime in the sending country. We argue that IPR protection influences a country's potential for innovation by increasing the absorptive capacity in the country of origin, thus enabling them to exploit the benefits that arise from cross-border diaspora networks.

Although the immediate consequence of skilled migration is a brain drain, migrants are provided with the opportunity to learn better skills and up-to-date technologies in more advanced countries. The knowledge acquired abroad can in turn flow back to the country of origin. This can happen through different channels. The most direct channel is the physical return of the brains, as is the case with the domination of China's technology industry by return migrants (sea turtles). A secondary route is the recirculation of knowledge back to the country of origin with a good illustrative example being the frequent interaction between Indian computer scientists in Bangalore and their counterparts in Silicon Valley. Both phenomena also implicitly involve access to foreign-produced knowledge through trade and investment activities of cross-border diaspora networks (Agrawal et al., 2011). In this way, skilled emigrants foster technology diffusion through the return of newly learned information and skills to their home economy (Kerr, 2008).

The protection of IPRs creates incentives to innovate by granting monopoly rights to inventors through a patent. A strong IPR regime hence increases returns from skills, creating stimulus for innovation and rendering skilled occupations more attractive. However, this does not necessarily translate into innovation in developing countries without access to more advanced foreign technologies.[6] Diaspora networks create this possibility by generating knowledge flows from their host to their home countries. Only then can IPRs instigate domestic innovation by creating the basic absorptive capacity needed in the home country. IPR protection therefore creates the conditions for an effective innovation sector, in terms of either industrial development or foreign direct investment prospects, and employs workers into skilled occupations that can benefit from diasporas. The idea somewhat complements Chen and Puttinan (2005), who illustrate how a stronger IPR regime encourages a shift from the imitation of foreign technologies to domestic innovation in developing countries. Our analysis adds to this argument by showing how the mobility of workers makes it possible to learn foreign technologies and how a strong IPR regime in turn allows this knowledge to be put into use among a more qualified skill profile in the home labor market.

The strength of IPR institutions here works as a moderating factor to exploit gains from diaspora networks. The results obtained by stronger IPRs are compatible with various explanations for brain gain, namely human capital incentives (Beine et al., 2001), return migration (Mayr and Peri, 2009), and access to new knowledge through trade and FDI within diaspora networks (Agrawal et al., 2011). IPRs function as an intermediary channel to exploit gains from migration by encouraging investment in education and thereby human capital formation in the sending country. Better IPR protection also encourages return migration of workers who have obtained better skills abroad back to the

[4] Only two theoretical contributions to our knowledge have looked at both in the same context, namely Mondal and Gupta (2008) and McAusland and Kuhn (2011).

[5] Student/scholarly networks, local associations of skilled expatriates, short-term consultancies by high-skilled expatriates in their country of origins, and other unestablished intellectual/scientific diaspora networks are a few examples of such networks (Meyer and Brown, 1999).

[6] Although a flow of workers into the innovation sector may increase the number of inventors, Helpman et al. (2010) argue that research productivity in the innovation sector may decline due to human capital complementarity as less talented workers become researchers and reduce the average productivity of the team or because of managerial time constraint when a fixed amount of time needs to be allocated to each worker.

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