



Patenting abroad: Evidence from OECD countries[☆]



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ABSTRACT

The hypothesis that when the imitation risk is supported from exports then the decision to patent abroad is intensified is coming under scrutiny in the present paper, using data from 28 OECD countries. We investigate this issue, via two routes: the full sample for all source countries and a group-based. Higher exports increase the impact of imitation risk in the destination country on patenting abroad. The impact is positively correlated with the source country's size. Business cycle impact is statistically significant and positive but the counter intuitive sign of the IPR regime in the destination country demands further investigation. Finally, the distance variable is statistically significant and negative, verifying gravity model.

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1. Introduction

The world experienced an unprecedented internationalization of economic activity during the last three decades. International trade and foreign direct investment dominated this internationalization assisting, among others, the developing countries to accelerate their growth rates (e.g. Schneider, 2005). Internationalization, on the other hand, led to the re-allocation of global economic activity, with OECD countries becoming gradually knowledge and technology oriented economies. In this environment, inventors from a country faced the dilemma of expanding the protection of their invention in foreign countries.

As a result of the trend in international patenting during the last two decades, as Paci et al. (1997) note, firms in developed countries aim at the commercial exploitation of their invention in foreign countries either through exports or through licensing. Royalties and licence fees become more and more an important source of international income (Beattie, 2012) and, accordingly, the decisions of these inventors are affected by the intellectual property rights protection framework of the destination country.

Research has moved towards identifying the factors on which this decision might depend on, given the difficulty to identify the determinants of patent value (e.g. (Ernst et al., 2010; Petrick and Echols, 2004). A track of the literature has followed Eaton and Kortum (1996) who argue that imitation risk plays a significant role in the decision to patent in a foreign country. Another track of the literature has followed Smith (1999, 2001) who related the decision to export to a destination country with the intellectual property rights protection framework in this country.

This paper aims to explain the decision to patent abroad based on the assumption that imitation risks do matter in relation with the country's exports to the destination country since a certain share of the patents granted by the source country patent office has international economic value and the patentee seeks protection in foreign markets. It relies on an augmented gravity model to explain international patenting of 28 OECD countries using data for the period 1995–2005 when most of the major institutional changes regarding intellectual property rights after the TRIPs agreement has been implemented. In order to make our results more robust, we decided to follow in our empirical estimations two routes: the full sample for all home countries and a group-based (“big” and “small and medium” home countries), dividing countries according to their level of innovative activities. We quantify the above mentioned hypothesis, using panel data methodology, in the following way: higher exports from source to destination country imply higher impact of imitation risk in the destination country on patenting abroad. In particular, where the imitation risk has a positive impact on the decision to patent in a foreign country, the impact

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will be even more positive the higher the level of exports from the source to the destination country. The result holds for the full sample of countries and for the group of “small and medium” ones. However, for the group of “big” countries the positive impact is not affected by the interaction. Even though the individual variables, imitation risk and exports, seem to impact the decision to patent abroad, the complementarity (interaction) is not statistically significant suggesting that patenting abroad decision for the group of “big” countries is pursued for other reasons than protecting exports.

The rest of the paper is organized as follows. Section 2 presents the theoretical background and the hypotheses setting. Section 3 presents the model and the data. Section 4 presents the empirical results and a discussion. Finally, Section 5 offers some concluding remarks.

2. Theoretical background and hypotheses setting

Because national patents protect inventions only in domestic markets, inventors may decide to patent abroad. It is a fact that patenting abroad has increased dramatically during the last three decades as data from the WIPO database reveal. From the same database, however, we conclude that a fraction of national patents is also patented abroad. Some of the inventions do not have any economic value (Cohen and Levin, 1989) and consequently the patentees would never try to patent abroad given that patenting abroad bear significant administrative and financial costs¹. Then again, some of the patentees who could put into effect the commercial exploitation of their patents do not identify a technological or entrepreneurial opportunity and subsequently leave their patents idle at the national patent office (Goniadis and Varsakelis, 2012). From the patentees that, eventually, exploited commercially their patents in the national market, some do not aim at an international route and some others do not patent abroad because they cannot see technological or entrepreneurial opportunities in other markets. The patentees, who recognise a technological or entrepreneurial opportunity in international markets and aim at the international exploitation of their patent, examine next whether this opportunity is country specific (usually the home country) or generic. If the invention is home specific, the patentees do not have an economic incentive to patent abroad. If the invention is generic, a potential economic value exists, even with some minor modifications of the invention, and the patentees consider the case of patenting abroad. To the extent that patentees perceive the potential economic value of their patents in foreign markets they should examine the countries where patenting their inventions is profitable. They compare the potential economic benefit from the patent with the cost of patenting in the specific country. This cost-benefit analysis influences the selection decision of the countries that are worth to patenting at. Hence, the decision to patent abroad takes a strategic character rather than of a simple short run decision.

Internationalization strategy may follow three tracks: exports, licensing and foreign direct investment (FDI). Foreign direct investment used to follow the stand alone strategy in the previous decades, that is a production unit produced the entire product to serve the destination market. However, this strategy has changed during the last decades and multinational firms try to optimize their production process by increasingly locating the various stages across different countries; they are organized within global value chains (GVCs)², as illustrated by the high correlation between FDI stocks in countries and their GVCs participation index (OECD, 2014). In the case of GVC, the mother company transfers knowledge to its subsidiary in the foreign country related to the specific stage of production (e.g. a certain piece of machinery). Based on this fact, the local rival firms could replicate only this partial

knowledge. Therefore, patenting in the destination country might not be economically beneficial since GVCs spread in a large number of countries and the patent document “total knowledge” is difficult to match with specific stages of production. We argue that the firms organised as GVC are more interested in patenting in the final product markets (domestic or foreign). To our knowledge, literature so far has analysed the flow of intangibles in a supply chain context by case studies only (Hall and Andriani, 1998; Choi et al., 2004) where there was privileged access to firm data. According to recently published data from OECD (October 2015; OECD-WTO TiVA initiative³, but they are presented in five-year intervals for the period 1995–2008 and annual thereafter) the Foreign Value Added Share of Gross Exports averages range from 11.2% in Japan to 54.2% in Luxembourg for the period of 1995–2011. Overall for the large, in terms of patenting abroad, OECD countries this share is lower than 25%.

In summary, for the reasons presented above, although the GVCs are admittedly important in the context of global manufacturing and value chain (e.g. Hall et al., 2011) we opt to focus on gross international trade data.

In the case of international trade and foreign direct investment the patentees extract the monopolistic rent of the patent while in the case of licensing extract a part of the economic value of the inventions through royalties and fees. In all cases, the inducement to patent in the destination country is the risk of imitation from local firms and firms from other countries which have commercial interest in the destination country, extracting that way part or sometimes the full economic value of the invention. The imitation risk is lower the higher the tacit component while in advanced industrial countries, intellectual property rights may impede imitation of certain capabilities (Teece, 2004).

Empirical literature, using data mainly from the US and other big innovative countries, has tried to determine the factors which are considered in the answer to the question: “Where do I patent?” More specifically, it has mainly focused on the imitation risks that inventors face in other countries, even though the inventor protects the invention at home through a domestic patent. In their seminal paper, Eaton and Kortum (1996) considered international patenting in a model to explain the impact of world innovation on economic growth. They found that the physical distance, the human capital, as a proxy for the imitation risks, and the patent protection framework of the destination country affect the patenting abroad decision (the distance's importance is also confirmed in (Drivas and Economidou, 2014)). Eaton and Kortum (1996, 1999) argue that imitation cost plays a significant role in the inventors' decision to patent their idea in a foreign country. This cost increases with the knowledge base of the outsiders and the commercial interest to the destination country. Based on the Eaton and Kortum data set, McCalman (2001) verified these results, in an effort to estimate the impact of the General Agreement on Tariffs and Trade (GATT) – Uruguay round on the transfer of income and McCalman (2005) estimated the impact of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement on the short and long run growth. Those findings were further verified by Yang and Kuo (2008) with data for the OECD countries and Archontakis and Varsakelis (2011) who adopted a gravity model to explain the US residents international patenting in the OECD countries.

Besides the imitation risks, another track examined specific aspects. For example, Harhoff et al. (2007) assessed to what extent validation and renewal fees as well as translation costs affect the validation behaviour of patent applicants. They rely on a gravity model that aims at explaining patent flows between inventor and target countries within the European patent system. To further enforce this evidence, Ulku (2007) found that an increase in the share of researchers in labour has a positive effect on innovation *only* in the big market OECD countries that include the G7. Acemoglu and Linn (2004) using data at firm

¹ As reported in Financial Times: “According to EU estimates, it costs about €30,000 to get a bundle of national patents to cover all 27 member states...” Financial Times, Jun 22, 2012 – accessed on 27 Sep. 2012: www.ft.com/cms/s/0/cbf2298c-bbab-11e1-90e4-00144feabd0.html.

² We would like to thank one of the anonymous referees for pointing out this issue.

³ Source of data from the OECD's link: <http://www.oecd.org/sti/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm>.

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