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# Technology spillovers, intellectual property rights, and export-platform FDI

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## ABSTRACT

How do trade liberalization and changes in market size affect the strength of intellectual property rights (IPR) protection in Southern countries? We explore this question in an international oligopoly model in which a Northern firm has the option of export-platform FDI (EPF): that is, to set up an export platform in the South to serve not only the Southern market but also other export markets. EPF allows the Northern firm to take advantage of low tariffs that often exist between the South and other export markets. However, with imperfect protection of IPR in the South, the Northern firm's technological advantage is reduced under EPF as technology spills over, at least partially, to Southern firms. We show that when trade between the South and the export market becomes more liberalized, South government weakens its optimal IPR policy to improve welfare. The opposite is true when trade is liberalized between the North and the South, or between the North and the export market. The effect of an increase in the size of the Southern market critically depends on whether the Northern firm chooses EPF over home production to increase its profit in the Southern market or in the export market. The robustness of our findings is explored in a variety of extensions including multiple export platforms, multilateral trade liberalization, and EPF by multiple Northern firms. Explicitly incorporating export markets and the possibility of EPF, this paper sheds new light on our understanding of the North–South conflict regarding IPR protection, a highly debated issue among member countries of the WTO.

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## 1. Introduction

Foreign direct investment (FDI) induces technology spillovers, which enhance the productivity of local firms. If a firm in a developed country (the North) builds its manufacturing plant in a less developed country (the South), Southern competitors can enhance their productivity by employing workers who are trained by the Northern firm's manufacturing plant in the South.<sup>1</sup> Furthermore, by virtue of observing the successful management efforts of Southern subsidiaries of Northern

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<sup>1</sup> Even when a Northern firm exports its product from its home country, Southern competitors could learn about the Northern firm's technology by simply looking at the product. Learning by reverse engineering, however, can be amplified under FDI. For example, in India, local software firms have benefited from reverse engineering by employing engineers with experience in U.S. firms' local subsidiaries. In this way, they have quickly gained the necessary knowledge and expertise to produce export-quality software (Bhatnagar, 2006; Patibandla and Petersen, 2002).

firms, their Southern competitors would choose to adopt improved management techniques and to innovate more rapidly (Maskus, 1998). That is, FDI could have a beneficial demonstration effect for Southern firms.

Protection of intellectual property rights (IPR) affects foreign firms' FDI decision in significant ways because it reduces the degree of technology spillovers induced by FDI. One survey (see Mansfield, 1994) asked intellectual-property executives in a random sample of 100 major U.S. firms in six manufacturing industries in 1991 about the importance of IPR protection for their FDI decisions. For investment in facilities to manufacture components or complete products, about 50–60% said it was important, and for investment in R&D facilities, about 80% said it was important. As pointed out by Maskus (1998), firms with easily copyable products and technologies, such as pharmaceuticals, chemicals, food additives, and software, are more concerned with the local IPR system's ability to deter imitation. Firms considering investing in a local R&D facility pay particular attention to local patent protection. Patibandla (2007) points out that, in a knowledge-intensive industry such as the pharmaceutical industry and the software industry, IPR protection plays a critical role for FDI. Regarding the software industry, the Indian government amended the Copyright Act in 1994 to make it up to par with the most modern laws in the field, and the stronger IPR protection induced multinational corporations to invest and expand their operations in India for software development (Patibandla, 2007; Patibandla et al., 2000; Patibandla and Petersen, 2002).

We explore a model that captures the link between IPR protection and technology spillovers induced by a Northern firm's FDI in South, where the strength of IPR protection is endogenously chosen by a welfare-maximizing Southern government, to address the following two questions: "How does trade liberalization affect the strength of IPR protection in South?" and "How does an increase in the size of the Southern market affect the strength of IPR protection?" A key feature of our model is that the Northern firm has the option of export-platform FDI (EPF): that is, to set up an export platform in the South to serve not only the Southern market but also another export market. The answers to these questions turn out to be richer in the presence of export-platform FDI than the corresponding answers that arise from a standard North–South trade model. We elaborate on implications for IPR policy that arise from our findings.

In our model, a Northern firm (firm N) and a Southern firm (firm S) compete in the Southern market and a third country export market. Firm N has an initial cost advantage and it can locate in South, use South as an export platform to serve both the Southern market and the export market. Alternatively, it can choose to locate and serve these markets from North. By locating in South, firm N saves on tariff payments to the Southern government. In addition, by opting for export-platform FDI in South, firm N presumably faces a lower tariff in the export market. Throughout the paper we assume that is indeed the case. Such savings in tariffs, however, come at an expense – the erosion of firm N's cost advantage. If firm N locates in South, its technology spills over to firm S and the cost advantage of firm N is reduced.

Trading off the gains from tariff savings and the losses from the reduced cost advantage, firm N makes its optimal location choice. By explicitly incorporating export-platform FDI, our model captures firm N's tariff saving not only by jumping the tariff to serve the Southern market but also by serving the export market from South at a lower tariff. We show that this new element of the trade-off leads to new implications for the Southern government's IPR policy. Regarding the effect of trade liberalization on the strength of IPR protection, we show that trade liberalization between South and the export market has an effect that is opposite to effects of trade liberalization between North and South or that between North and the export market. Regarding the effect of an increase in the size of the Southern market, we show that it critically depends on the market-seeking motive of firm N – FDI targeting the Southern market or the export market.

The Southern government can induce firm N to locate in South by choosing a sufficiently strong level of IPR protection. If the IPR protection is perfect so that firm N's technology does not spillover to firm S, firm N's incremental profits by locating in South instead of North are positive both in the Southern market and in the export market. Then, if the Southern government maximizes Southern welfare by inducing firm N to locate in South, it chooses the level of IPR strength so that firm N is just indifferent between locating in South and locating in North, because firm N's technology spillovers benefit firm S. This implies that there are two possibilities in the equilibrium: firm N's incremental profit by locating in South instead of North is positive in the Southern market and negative in the export market, or it is negative in the Southern market and positive in the export market. Alternatively, the Southern government can choose a sufficiently weak level of IPR protection so that firm N chooses to locate in North. We find that parameterizations always exist in which inducing export-platform FDI by choosing a sufficiently strong level of IPR protection is optimal for the Southern government.

We study how trade liberalization and a change in the size of the Southern market affect the equilibrium level of IPR protection at which the Southern government induces firm N to undertake export-platform FDI in South. These comparative statics analyses are motivated by recent North–South conflicts on IPR protection. While the protection of intellectual property rights (IPR) is fairly strong in developed countries, it is generally not the case in developing countries (see, for example, Saggi, 2012), which makes technology spillovers in developing countries a widespread phenomenon. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), signed on 15 April 1994, sets the minimum standards of protection for several categories of intellectual property for WTO member countries. However, as pointed out by Grossman and Lai (2004), IPR remains a highly contentious issue in international relations. Developed countries – collectively referred to as North – want their advanced technologies to be fully protected. Developing and less developed countries – collectively referred to as South – are reluctant to strengthen IPR protection, since to do so would hurt their domestic producers and consumers.

Suppose that the tariff charged by the third country to South is reduced. This tariff reduction increases firm N's advantage of serving the third country export market from South instead of North, holding constant its relative advantage of serving the Southern market from South. Hence firm N's overall incremental profit by undertaking export-platform FDI

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