

**Draft**

**Market Structure, FDI, Imitation and Innovation: An  
Empirical Verification based on North-South Intellectual  
Property Rights Conflict**

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**Market Structure, FDI, Imitation and Innovation:  
Development of a Model for the pharmaceutical industry  
based on North-South Intellectual Property Rights Conflict**

**ABSTRACT**

First included in the Uruguay Round of the GATT trade negotiations (1986-94), Intellectual Property Rights have emerged as a source of conflicts between the developed (North) and the developing (South) countries in the world. The conflicts have become more acute and frequent particularly in the pharmaceutical industry. This study is to develop an extended North-South empirical model to analyze the IPR conflict and possible policy implication for the pharmaceutical industry. In this empirical model, innovation from the North, followed by imitation in the South ( India, Bangladesh China and other select East Asian Countries) and Foreign Direct Investment are treated as endogenous. We find that tighter IPRs benefits the North and South due to large market structure. It seems that in an oligopolistic market induced by vertical innovation, tighter IPRs may hurt both economies; while in a monopolistic competitive market induced by horizontal innovation, tighter IPRs may benefit both economies as long as the degree of IPR protection is appropriately chosen. Thus we argue that the existence of an optimal degree of IPR protection in the South, which may differentiate it from in the North.

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**I**

**INTRODUCTION**

The divide and the debate between the North (the developed economies) and the South (the developing economies) regarding

the enforcement and tightening of IPRs<sup>1</sup> in the pharmaceutical industry is well-known. The US companies, for example, have been arguing on strengthening India's commitment to enforce its intellectual property laws. Conventionally, IPRs tend to be seen primarily as an economic or legal issue, embodied in the rights to 'ownership' and thus to the exclusive use of innovation. But there is also an argument that there is a broader 'human rights' dimension, illustrated by the fact that the right of inventors to the 'moral and material interests' resulting from their scientific, literary and artistic production is recognized in the 1948 Universal Declaration of Human Rights (UDHR). Although the US companies insist on pushing India to strengthen its IPR regime, it is arguable if the concerned countries with sharp differences in GDP per capita and technology capability should adopt the same, similar or different standards on protection of IPRs. Moreover, before reaching any conclusion, closer research on the effect of IPRs on market structure, technology diffusion, FDI, imitation and innovation needs to be done. This is extremely important in the context of the pharmaceutical sector whose output is not merely an economic good but is vital for the physical well being of the population.

## II

### LITERATURE REVIEW

The Agreement on Trade-Related Aspects of IPRs (TRIPs) stipulates that all members adopt a set of universal minimum standards on IPR protection. The focus of the debate is now whether the South

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<sup>1</sup> In this case the North refers to the group of all industrial countries, which are mostly located in the Northern hemisphere, while the South refers to the group of South Asian Countries such as India, Bangladesh and Pakistan in the context of the Pharmaceutical Industry. The US is a typical and the largest country in the North group, while South Asia is a typical and the largest Southern region. Interestingly many models of North-South trade have been built, such as Grossman and Helpman (1991), Helpman (1993), Lai (1998), Glass and Saggi, (2002), among others.

should harmonize its IPR standards with those of the North. On the one hand, opponents of tighter IPRs argue that by conferring monopoly power on the creators of intellectual property which are large companies based in industrial countries, it affects the ability of local firms to experiment with and assimilate advanced foreign technologies at low cost, and hence slows down the rate of global technological diffusion ( Helpman 1993; Maskus 2000; Ordober 1991; Maskus and McDanniel 1999; Westphal, Kim and Dahlman 1985; McCalman 2001,2004, 2005a, 2005b; Glass and Saggi, 2002; Chaudhuri *et al.*, 2006 ). By contrast, proponents of tighter IPRs argue that it may actually enhance the industrial development process in the South. Since the provision of greater security for IPRs in the South will encourage Multinational Corporations (MNCs) to shift production to the South, and encourage innovation from which all the regions of the world benefit (Lai 1998; Lai and Qiu 2003; Branstetter, et al 2007; Glass and Wu, 2007).

Interestingly, early literature focused the effects of IPRs on innovation and diffusion in the closed economy (Siebeck, *et al.* 1990). Recently, there have been various attempts to model the long-term effects of IPRs on the product innovation, economic growth and terms of trade in the international product cycles. Based on Vernon's (1966) original vision of product cycle, Chin and Grossman (1988), Diwan and Rodrik (1991), and Deardorff (1992) examine the effects of IPRs on the North and South in a static partial equilibrium framework, and provide valuable insights. Helpman (1993) further develops a North-South dynamic general equilibrium model in which all innovation takes place in the North. In this model, tighter IPRs in the South significantly retards Southern industrial development, reduce the South's share of global

manufacturing and the rate at which the production of recently invented goods shifts to the South, worsening Southern terms of trade. Tighter IPRs expands the North's share of global manufacturing – at the expense of the South – but causes the rate of innovation to decline in the long run, relative to the weak IPRs equilibrium, because more Northern resources are tied up in production rather than on innovation. Under Helpman's assumptions, the negative effects of tighter IPRs on both sides contribute to an overall negative welfare effect of tighter IPRs on the South. Even in the North, the decline in the rate of innovation can offset static welfare gains. Lai (1998) builds a dynamic general equilibrium model of the international product cycle, allows the level of FDI in the South to respond endogenously to changes in the tightening of Southern IPRs protection, and overturns Helpman's (1993) conclusions. He finds that the effects of tighter IPRs in South depend crucially on the channel of production transfer from North to South. Tighter IPRs in South increases the rate of product innovation, production transfer and Southern relative wage if FDI is the channel of production transfer, but has opposite effects if production is transferred through imitation. He concludes that tighter IPRs can be more broadly interpreted as an incentive to encourage Northern FDI.

Glass and Saggi (2002) provide a product cycle model in which innovation, imitation, and FDI are all endogenous. They discern two distinct imitations – one that targets the products of Northern firms and the one that targets the products of MNCs, and formalize this idea by assuming that the costs of imitating an MNC's product are lower than costs of imitating a Northern firm's product. They find that tighter IPR protection keeps MNCs safer from imitation, but no more so than Northern firms. Instead, the increased difficulty of

imitation generates resource wasting and imitation disincentive effects that reduce both FDI and innovation. More resources absorbed in imitation leads to reduced FDI and subsequent reduction in innovation, which apparently conflicts with Lai (1998)'s finding. Glass and Wu (2007) try to explore why theories vary about the effects of IPRs protection on FDI and innovation. In their models, Northern firms innovate to improve the quality of existing products and may later shift production to the South through FDI. Southern firms then imitate the products of MNCs. They conclude that the effects of IPR protection depend on the nature of innovation. Tighter IPRs encourage FDI and innovation when innovations are new varieties, but has opposite effect when innovations are quality improvements. Hence, tighter IPRs, by reducing imitation, may shift innovation away from improvement in existing products toward development of new products. The overall effects on innovation and FDI are then unclear. The above-mentioned models are very suggestive; however, there are three drawbacks: first, they don't study the nature of innovation and the resulting market structures; second, the nature and conditions of Southern imitation have not been examined; third, no North-South strategic behavior is considered.

### III

## **RESEARCH QUESTIONS AND OBJECTIVES**

Based on the existent literature and the debate on the effect of tighter IPRs on innovation and FDI, we have studied an extended North-South product cycle model based on select pharmaceutical firms (MNCs and Local) located in select South Asian Economies. In our model, North may be considered as (US and Europe)

innovation-based, South Asian Economies may be considered as imitation-based, and Foreign Direct Investment (FDI) are all endogenous.

a. Our objective is to whether tighter IPRs benefit the North or South depends crucially on the market structure. In an oligopoly market induced by vertical innovation, tighter IPRs hurt both economies; while in a monopolistic competition market induced by horizontal innovation, tighter IPRs benefit both economies as long as the degree of IPR protection is appropriately chosen. In addition we study the existence of an optimal degree of IPR protection in South Asia, which may differentiate it from that in the North.

b. We discuss to contribute to the literature in the areas of policy making in four critical ways: First, we introduce different market structures according to the nature of innovation, and discuss the effects of tighter IPRs on the strategic behavior between the North and South. Second, we may study two imitative activities: the horizontal vs. vertical imitation (Lazonick and Mass 1995; Lazonick 2004). Third, we discern the horizontal FDI activities from the vertical one. Four, we illustrate the possible policy implications on the North-South IPR policy conflict, which may also hold in the context of IPR conflict between any industrial country and developing country.

## **IV**

### **METHODOLOGY AND DATA**

Our approaches are closely intertwined. The first is to attempt to develop a theoretical model of the pharmaceutical sector that

captures the effects of innovation, imitation, FDI and market structures particularly in the context of North-South economic relations. This requires a synthesis of different models available in the published literature as well as introducing new elements and relationships likely to be uncovered from the second approach.

The second approach involves collection of information and data from various secondary sources on the pharmaceutical sector of two South Asian economies such as India and Bangladesh<sup>2</sup>. At the primary level, we examine the effects of tighter IPRs on contribution of the firms to their national economies. Likewise, we also collect information from Bangladesh in order to understand the impact under a less tight IPR regime. In addition, by taking into account the possibility of endogenous innovation encouraged by tighter IPRs in South, we explain different performance in technology upgrading and stages of development. Similarly, the effects of Northern and/or Southern tariffs, technology transfers by licensing agreements, and international labor migration also be studied using this framework.

## V

### **BRIEF CONCLUSIONS**

The framework developed in this study is quite tractable. We have analysed useful issues and also provided important policy implications. First, we have examined the effects of tighter IPRs on welfare of the North (US) and South (India). Second, by extending the model to allow for low and high-skilled labour, we are able to understand how tighter IPRs may affect inequality within and across nations. Third, by taking into account the possibility of endogenous innovation encouraged by tighter IPRs in South, we are able to

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<sup>22</sup> This study is part of the larger study on the topic.



show that in a position to explain different performance in technology upgrading and growth in the South. Four, the effects of Northern and/or Southern tariffs, technology transfers by licensing agreements, and international labour migration are important aspects in this framework.

## VI

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