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## Intellectual property rights and foreign direct investment

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### Abstract

This paper develops a product cycle model with endogenous innovation, imitation, and foreign direct investment (FDI). We use this model to determine how stronger intellectual property rights (IPR) protection in the South affects innovation, imitation and FDI. We find that stronger IPR protection keeps multinationals 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. The greater resources absorbed in imitation crowd out FDI. Reduced FDI then transmits resource scarcity in the South back to the North and consequently contracts innovation. © 2002 Elsevier Science B.V. All rights reserved.

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### 1. Introduction

In recent years, the literature on product cycle models has made some important strides. Yet while Vernon's (1966) original vision of the product cycle assigns a central role to foreign direct investment (FDI), most models capturing his ideas cast imitation as the only channel of international technology transfer from an innovating region (the North) to an imitating region (the South) — see Krugman

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E-mail address: [aglass@econ.tamu.edu](mailto:aglass@econ.tamu.edu) (A.J. Glass).

(1979), Grossman and Helpman (1991) and Segerstrom et al. (1990). Two recent exceptions are Helpman (1993) and Lai (1998); however, imitation is exogenous in these models.

An important contribution of our paper is to provide a product cycle model in which innovation, imitation, and FDI are all endogenous.<sup>1</sup> Starting from the quality ladders model of Grossman and Helpman (1991), we determine the composition of international technology transfer between imitation and FDI. A common perception is that due to local knowledge spillovers, Southern firms can more easily imitate the products of multinationals producing in the South relative to firms producing in the North. We formalize this idea by assuming that the costs of imitating a multinational's product are lower than costs of imitating a Northern firm's product. By distinguishing between imitation that targets the products of Northern firms and imitation that targets the products of multinationals, we are able to determine the effects of parameter changes on the imitation exposure of multinationals relative to Northern firms.

We apply our model to determine the effects of increased intellectual property rights (IPR) protection in the South, which we assume increases the cost of imitation due to stricter uniqueness requirements. This increased cost results in an *endogenous* decline in imitation. While products like books, videos and compact disks receive much press about conflicts over IPR protection, imitating most products is not so simple. Empirical evidence indicates that imitation is a costly activity for a wide range of high technology goods, such as chemicals, drugs, electronics and machinery. For example, Mansfield et al. (1981) finds that the costs of imitation average 65% of the costs of innovation, and very few products were below 20%. Since Southern firms must devote substantial effort to backward engineering products prior to producing imitations, IPR protection may affect the effort required by specifying how similar an imitation can be to the original.

We find that stronger Southern IPR protection makes multinationals more secure from imitation in absolute terms but no more secure from imitation relative to successful innovators still producing in the North. Consequently, stronger Southern IPR protection does not alter the expected profit stream from becoming a multinational *relative* to remaining a Northern firm and hence does not encourage FDI. The past literature could not address relative imitation exposure because imitation was exogenous.

An interesting result of our model is that FDI decreases with a strengthening of Southern IPR protection. This result arises because an increase in the cost of imitation crowds out FDI through tighter Southern resource scarcity. Less efficient imitation absorbs more Southern resources despite the reduction in the rate of imitation stemming from the reduced profitability of imitation. Additionally, the

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<sup>1</sup>Here, FDI is endogenously determined through costly adaptation of technologies, unlike in Glass and Saggi (1999) where FDI opportunities arrived exogenously.

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