



Intellectual Property Rights and International Trade of Agricultural Products

MERCEDES CAMPI^{a,b} and MARCO DUEÑAS^{c,*}

^a *LEM & Institute of Economics—Scuola Superiore Sant’Anna, Pisa, Italy*

^b *IIEP-Baires, UBA-CONICET, Buenos Aires, Argentina*

^c *Department of Economics and Trade—Universidad de Bogotá Jorge Tadeo Lozano, Colombia*

Summary. — The signing of the agreement on Trade-Related Aspects on Intellectual Property Rights (TRIPS) had led to a process of global harmonization and tightening of intellectual property rights (IPRs) systems. As part of this process, the use of IPRs in agriculture has been increasing in the last decades. This paper studies the effect of intellectual property rights on agricultural trade, for the post-TRIPS period (1995–2011), using a new yearly index of IPRs, for 60 developed and developing countries. We study the effect of stronger IPRs on total trade, bilateral trade, and trade margins using different econometric techniques. We found that the strengthening of IPRs has been having a negative and uneven effect on agricultural trade at different levels of disaggregation. The gravity estimation showed that both the IPRs of the importer and the exporter have negative effects on total bilateral trade and that the probability of creating new bilateral trade links increases with the importer’s IPRs. Finally, we found that stronger IPRs have a negative effect on the intensive margin of trade and a positive impact on the extensive margin. Overall, the evidence shows that agricultural trade related to the developing world has been more negatively affected, which calls the attention to the idea that a common system can equally work for all countries.
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Key words — intellectual property rights, international trade, agriculture, gravity model, intensive margin, extensive margin

1. INTRODUCTION

The signing of the agreement on Trade-Related Aspects on Intellectual Property Rights (TRIPS) in 1994 had led to a process of global diffusion and tightening of intellectual property rights (IPRs) systems. While developed countries (DC) have increased the level of existing intellectual property (IP) protection, developing countries (LDC) have adopted new IPR systems with strong levels of protection or have adapted their existing systems to the “minimum standards” demanded by the TRIPS.

This process has implications for innovation, productivity, trade, and economic development. IPRs are theoretically considered as incentives to innovate and, thus, are expected to have a positive effect on economic growth (Gould & Gruben, 1996). However, the role of IPRs as incentives to innovate has been both theoretically and empirically criticized. Moreover, the evidence suggests that the impact of strengthening IPRs is sector and technology specific (Dosi, Marengo, & Pasquali, 2006).

Regarding international trade, changes in IPRs may influence returns to innovation, affecting decisions of firms to trade in different markets. From a theoretical point of view, the net effect of increasing IP protection is unclear. Maskus and Penubarti (1995) argued that stronger IPRs systems are expected to have contrary effects on trade. On the one side, firms should be encouraged to export patentable goods to countries with stronger IP protection because the risk of imitation is lower. Simultaneously, stronger IPRs increase the market power of firms, which may encourage them to behave in a monopolistic way, increasing prices and reducing sales. The net result will depend on the sectors and the level of development of trading partner countries. Therefore, empirical analysis are needed to disentangle the effect of stronger IPRs on trade volumes and bilateral trade flows of different sectors and countries.

The contradictory effects are mostly theorized for manufacturing products. In the agricultural sector, the analysis must also consider some distinct features. Also, most of the empirical literature concentrates on trade flows of manufacturing products and a few empirical studies on the agricultural sector analyze the effect of IPRs on specific products, such as seeds, see for example: Yang and Woo (2006), Galushko (2012), and Eaton (2013). Considering the relevance of both trade and IPRs on the agricultural sector, our study contributes to the empirical analysis of the relation between IPRs and agricultural trade.

The use of IPRs in agriculture (plant breeders’ rights, plant patents and utility patents) has been increasing in the last decades for several reasons: (i) the TRIPS agreement, which demanded IP protection for plant varieties either by patents or a *sui generis* system and patent protection for other related products such as micro-organisms, (ii) changes in the quantity and quality of the demand for agricultural products that resulted in changes in their production, and (iii) technological changes, such as the development of biotechnology applied to agriculture, which have caused an increase in private investments and adjustments in innovation activities.

Therefore, using an IP protection index for the agricultural sector recently created by Campi and Nuvolari (2015), this paper explores the effect of strengthening IPRs systems in the agricultural sector for the post-TRIPS period (1995–2011) on traded volumes, bilateral trade flows and the margins of trade,

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for a set of 60 countries, which includes 28 developed and 32 developing countries.

To do this, we carry out several econometric exercises. First, we study whether the recent tightening of IPRs has had an effect on total trade of agricultural products, at different levels of disaggregation, considering separately imports and exports. Secondly, we use a gravity model to investigate the effect of IPRs on bilateral trade and on the probability for a country to increase the number of trading partners. Additionally, we check the robustness of the estimation results adopting the recent specification of the gravity model suggested by [Anderson and van Wincoop \(2003\)](#) that includes multilateral resistance in the regression. Thirdly, we explore the effect of IPRs on the total number of agricultural sub-sectors with positive trade, which we define as the industry extensive margin, and on the average value of exports by sub-sector, defined as the industry intensive margin.

Overall, our results show that the strengthening of IPRs has been having a negative and uneven effect on agricultural trade. Our main findings are the following: (i) the recent strengthening of IPRs systems has been negatively affecting total agricultural trade; (ii) at a more disaggregated level, the effect is also negative for total trade in most sub-sectors; (iii) the gravity model showed that both the IPRs of the importer and the exporter have negative effects on total bilateral trade, except for developed countries; (iv) the probability of creating new bilateral trade links increases with the importer's IPRs; and (v) stronger IPRs have a negative effect on the average value of exports by sub-sectors (intensive margin), except for developed countries, and a positive impact on the total number of agricultural sub-sectors with positive trade (extensive margin). The evidence shows that agricultural trade related to the developing world has been more negatively affected, which calls the attention to the idea that a common system can equally work for all countries.

The remaining of the paper is organized as follows. The next section briefly discusses the relation between IPRs and international trade, reviewing both theoretical and empirical approaches. Section 3 addresses the issue for the agricultural sector. The fourth section presents the data used for the empirical analysis. The fifth section presents the econometric estimations for the effect of IPRs on trade volumes. Section 6 explores the effect of IPRs on bilateral trade volumes and links, and the intensive and extensive margins of trade. Finally, Section 7 presents the main conclusions.

2. HOW ARE IPRS AND TRADE RELATED?

The effect of stronger IPRs on international trade has recently spurred a great interest among economists. Economic theory and empirical studies have identified contradictory effects and determining the net result seems to be an empirical question.

Different models have concluded that the effect of IPRs on trade is ambiguous ([Grossman & Helpman, 1990](#); [Grossman & Lai, 2004](#)). In models of dynamic general equilibrium of two regions, North and South, where innovation takes place in the North while the South imitates technologies invented in the North, [Helpman \(1993\)](#) identified four channels through which IPRs are likely to affect trade between countries: (i) terms of trade; (ii) inter-regional allocation of manufacturing; (iii) product availability; and (iv) R&D investment patterns. He concluded that the question of whether the strengthening of IPRs is desirable cannot be answered theoretically.

However, his model predicts that “if anyone benefits, it is not the South” ([Helpman, 1993, p. 1274](#)).

Also, [Maskus and Penubarti \(1995\)](#) have shown that we can expect contradictory effects of stronger IPRs on trade. Considering a price-discriminating firm deciding on the distribution of exports to different countries, the authors argue that there is a trade-off between the enhanced market power for the firm created by stronger IPRs systems and the larger effective market size generated by reduced abilities of local firms to imitate the patentable product. The “market-power effect” would reduce the elasticity of demand faced by the foreign firm, inducing it to export less of its patentable product to the market with stronger IPRs. Conversely, the “market-expansion effect” would increase the demand curve faced by the firm and attract larger sales. In addition, in larger markets, we might find a “cost-reduction effect” that would raise exports if stronger IPRs reduce the need of the foreign firm to undertake private expenditures to deter local imitation.

In turn, other factors may also affect market power and market size effects. Decisions of firms to export new patentable products to a particular market will depend not only on IPRs systems, but also on decisions of licensing and foreign direct investment (FDI). In other words, strong IP protection in a market could enhance licensing agreements or FDI instead of trade ([Maskus, 2000](#)). Moreover, imitating is costly, time-consuming and depends on capabilities that vary across countries. Thus, a weak IP protection system in a country with low imitation abilities will not necessarily discourage an innovative firm to enter that market. Finally, changes in IPRs would also interact with and be affected by local market parameters, such as demand and trade barriers.

Several empirical studies have found evidence supporting the hypothesis that the effect of IPRs on trade flows varies according to product sectors. [Maskus and Penubarti \(1995\)](#) investigated whether the distribution of bilateral trade across nations depends on the importing country's patent regime. They found that exporting firms discriminate in their sales decisions across export markets, considering local patent laws, but they concluded that the influence of changes in IPRs on international trade depends on the sector and development level.

[Fink and Primo Braga \(2005\)](#) found that stronger IPRs increase bilateral trade flows of manufactured non-fuel imports but they do not affect trade flows of high technology products. [Delgado, Kyle, and McGahan \(2013\)](#) investigated how implementing IPRs in developing countries under the TRIPS agreement has affected trade in knowledge-intensive goods. They found an increase in developing countries' imports driven by the exchange with high-income countries. They also found that the effect on knowledge diffusion from high-income to developing countries varies across sectors.

Several authors have studied the effect on trade of the interaction of imitation abilities and IPRs. [Smith \(1999\)](#) found for the United States (US) that the link between IPRs and trade depends on the ability of the importer to imitate the exporter's technologies. She found evidence of both a market expansion and a market power effect for the US manufacturing exports, but the latter is more relevant for exports to countries with weak capacity of imitation. [Co \(2004\)](#) studied how sensitive are US exports to importing countries' IPRs regimes. She found that IPRs regimes matter when they are considered together with imitative abilities of importing countries. Also, for a panel of countries, [Falvey, Foster, and Greenaway \(2009\)](#) found that imitative abilities influence the effect of IPRs on trade.

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