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Related Intellectual Property Rights  
Agreement (TRIPS): A Case Study of Basmati  
Rice Exports

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# Geographical Indications and The Trade Related Intellectual Property Rights Agreement (TRIPS): A Case Study of Basmati Rice Exports

Kranti Mulik and John M. Crespi

## **Abstract**

The controversy over the granting of patenting rights to three new strains of Basmati rice by the U.S. Patent and Trademark Office is used as a case study to analyze the impact of incomplete protection of intellectual property. Results suggest that the introduction of a competing product that may infringe on India's geographical indicator has lowered the product differentiation of Indian Basmati rice in key export markets.

**KEYWORDS:** geographical indications, international market, TRIPS, Basmati, intellectual property rights, product differentiation

## 1 Introduction

The Trade Related Intellectual Property Rights (TRIPS) agreement, which seeks to harmonize global intellectual property laws, has been a major factor in strengthening worldwide property rights. However, since its formulation, the TRIPS agreement has been the subject of considerable controversy and a source of concern among some policy makers and producers in developing nations who feel it favors developed countries. Particularly, the protection of traditional knowledge has been a cause of debate over the granting of property rights to firms for minor alterations of traditional practices or varieties. Geographical indications (GIs) are one aspect of intellectual property that may afford protection to traditional knowledge without conferring absolute power to any one individual. Yet, many developing countries have failed to take advantage of this form of protection, arguing that the current TRIPS act does not go far enough to protect traditional products. This has led to allegations of “biopiracy” by developing countries toward firms who use genetic material from traditional varieties.

Though there has been a lot of speculation on the impact of TRIPS and the strengthening of the Intellectual Property Rights (IPR) system in developing countries, there remains a dearth of empirical studies on the actual impact of ineffectual IPRs. The controversy over the granting of patenting rights to three strains of Basmati rice to RiceTec, Inc. by the US Patent and Trademark Office provides a good case study. Basmati, a long-grained rice that has been grown in the Himalayan foothills of northwest India and Pakistan for centuries, is a major source of export revenue. India and Pakistan argue that the US Patent office’s granting of a patent to RiceTec on a variant of Basmati severely harmed their export markets. In this study, export trade in Basmati rice is used as an example to determine the impact of inadequate protection of intellectual property. Thus the main objective of this paper is to determine how much, if at all, the introduction of RiceTec’s Basmati variety harmed India’s export markets. Although the data have limitations, our empirical evidence suggests that there is enough evidence to at least prompt nations to move more quickly to institute policies such as geographical indications and that there may be a need to make these indications more specific in future trade talks in order to protect traditional varieties.

The paper is organized as follows. Section two discusses the TRIPS regulations pertaining to geographical indications and details the controversy surrounding the granting of a patent to RiceTec, Inc. Section three provides a brief description of the Basmati rice industry in India. Section four outlines the theoretical and empirical model specification and the data used in this study. Section five presents the results, with conclusions and implications discussed in section six.

## **2 Background on Geographical Indications and the Trade Related Intellectual Property Rights Agreement (TRIPS)**

The TRIPS agreement, which seeks global harmonization of intellectual property (IP) laws, came into effect in 1995. All countries that are members of the World Trade Organization (WTO) are required to follow the TRIPS guidelines to adopt common global laws for protection of intellectual property or face the risk of trade sanctions (WTO 2011). Developing countries often argue that the TRIPS agreement hampers protection of traditional knowledge, something that is an integral part of the agricultural economies of many countries. The focus of developing countries has largely been patents, the more popular form of protection, which are arguably unsuitable for protection of traditional knowledge, as patents grant legal rights to one person or firm. Other forms of protection of intellectual property such as trademarks and in particular geographical indications (GIs) offer alternatives but have limitations of their own. In this section, we first look at some of the features of GI that facilitate protection of traditional knowledge.<sup>1</sup> Afterward, we discuss how protections via GI could have ameliorated the controversy surrounding the Basmati rice patent granted to RiceTec Inc.

Under TRIPS, GIs are defined as “indications which identify a good as originating in the territory of a member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin” (Article 22(1)).

Article 23 of the TRIPS agreement provides additional protection, but only to wines and spirits. Article 23.1 states that wine and spirit producers may not mislead consumers as to the geographical origin or the production style of the product. Also, this section prohibits use of the terms “kind,” “type,” “style,” and “imitation” (i.e. “this product is a type of Scotch Whiskey”) in order to prevent other producers producing similar products from exploiting the reputation built by producers whose products are protected under this act. The additional protection offered to wines, spirits and other commodities has been contentious because the protected products are so few and seem to indicate a European bias. Negotiations are currently underway to extend Article 23 in order to provide additional protection to other commodities (WTO TRIPS 2011).

Article 24 states some exceptions under which GIs do not hold. If a name associated with a particular geographic origin has become “generic,” that is, it is associated with a number of products, then the particular name can be used

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<sup>1</sup> GIs have limitations of their own, the first being GIs intended to protect indigenous knowledge protect only tangible traditional knowledge and traditional cultural expressions. The knowledge associated with GIs remains unprotected and open to the public due to which there is possibility of misuse by third parties.

outside of the geographic origin, even if the name was originally used to denote a product of that region. Two examples are cheddar cheese and Dijon mustard. Article 24 of TRIPS also states that “there will be no obligation under this agreement to protect geographical indications which are not or cease to be protected in their country of origin” (WTO TRIPS 2011). Thus, nations using GI must protect their products through their own legislation; otherwise the name will be, essentially, up for grabs. This fact is of importance to the present study because India’s legislature moved very slowly to extend GI protection to its agricultural products such as Basmati. One argument that we make here is that “foot dragging” can be costly.

## **2.1 Basmati Rice Patent (US patent No. 5663484)**

Basmati, which means the “perfumed one,” is a high-quality, long-grain, semi-dwarf rice that has been grown in the foothills of the Himalayas for thousands of years. Basmati rice requires deep, fertile soil, a cool climate and a short photoperiod. As such it is difficult to grow Basmati rice for commercial purposes in other areas. Nonetheless, a Texas rice development company, RiceTec, Inc. (RiceTec) began producing and exporting a Basmati-type rice it called “Texmati” in 1985, long before TRIPS. After TRIPS came about, RiceTec sought to obtain a US patent on its rice. On September 2, 1997, RiceTec did obtain a patent titled “Basmati rice lines and grains” on the basis of 20 claims made by the company in its patent application to the United States Patent and Trademark Office (USPTO). The patent was for novel rice lines, methods used to make the different varieties and determine the rice quality. Claims 1-14 of the patent pertained to the general characteristics of rice grown in North America, South America, Central America and the Caribbean. Claims 15 to 17 were for rice grains without any limit to GI. Claims 18 to 20 pertained to the specific methods used by RiceTec to develop the rice lines. All 20 claims made related to cross-bred rice lines and grain developed by RiceTec. Of the 20 specific claims made by RiceTec, claims 15 to 17 seemed especially harmful to the Indian export market since they pertained to particular characteristics of Basmati grain. In these claims RiceTec included a claim to 90% of the rice’s germplasm as well as traditional varieties like Bas 370, Taraori, and Basmati Karnal cultivated in India (Nilacharal 2001; USPTO US Patent No. 5,663,484 1997).<sup>2</sup>

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<sup>2</sup> Specifically, Claim 15 sought patent status on the following characteristics: a rice grain that has a starch index which ranges from 27 to 35; a 2-acetyl-1-pyrroline content around 150 ppb to 2000 ppb.; length around 6.2mm to 8.0mm, width ranging from 1.6 mm to 1.9mm and a length/width ratio of around 3.5 to 4.5; a whole grain index ranging from 41 to 63; a 75% to 150% increase in the length of the grain when cooked, and a chalk index less than 20.

In short, RiceTec's claims of patentable property on its rice lines were in fact typical characteristics of Basmati rice. For example, the 2-acetyl-1-pyrroline content compound is what gives Basmati rice its distinctive aromatic scent. Based on the patent granted to RiceTec by the USPTO, RiceTec next applied for the registration of the trademark "Texmati" (which is marketed as "American Basmati") with the UK Trademark Registry in 1997 (Nilacharal 2001; USPTO US Patent No. 5,663,484 1997). The UK is a very important export destination for Basmati rice, and since the US and UK are members of WTO, upon granting of a trademark in the UK, RiceTec would be able to market its product as a Basmati rice there in direct competition with traditional Basmati from India and Pakistan.

In April 2000, officials of the Indian Agricultural and Processed Food Products Export Development Authority (APEDA), a body established for development of agricultural commodities and furthering their exports, filed a petition with the USPTO to reexamine the Basmati patent, specifically claims 15 through 17. It took APEDA over two years to gather the data to challenge the claim due to the intricacies of RiceTec's claims (Nilacharal 2001; USPTO US Patent No. 5,663,484 1997). Another complication is that under US patent law, a patent can be challenged only after it is granted. Further, challenging an entire patent is complex because if a plaintiff loses on even one count of the claims in the patent the entire patent can be upheld (Ramchandran 2000). Soon after APEDA's challenge, RiceTec gave up the right to claim 4 and claims 15 through 17. Even with this concession, however, the USPTO found that the 16 remainder claims were also questionable.

Subsequently, RiceTec was issued notice by USPTO on March 27, 2001 that its patent was in jeopardy. RiceTec then withdrew the remainder claims except claims 8, 9, 11, 12 and 13 which pertained to new cross-bred lines developed by RiceTec that are not similar to any of the varieties grown in India, although Rice Tec claims that the new rice varieties produce grains "similar or superior to those of good quality Basmati rice" (Nilacharal 2001; USPTO US Patent No. 5,663,484 1997).

At present, RiceTec has a narrow patent on three specific rice varieties developed through the company's own research. However, because it no longer has a patent on Basmati lines, it is prohibited from using the term "Basmati" in marketing its rice. Nevertheless, the revised patent does not prohibit RiceTec from marketing its rice as similar to Basmati (Damodaran 2001; US Patent No. 5,663,484). Thus, there are two aspects to this controversy: one that deals with the actual patent and the other associated with the product.

Though RiceTec and to some extent the Indian government viewed the outcome to be just, Indian advocates of the "traditional knowledge" indicator felt that the name "Basmati" was still under jeopardy as "Basmati" was considered a generic term under US law. At the same time that the Indian government

requested the USPTO reexamine RiceTec's patent, the Research Foundation for Science, Technology and Ecology (RFSTE), a US-based non-governmental organization, filed a petition with the Federal Trade Commission (FTC) to control the use of the word "Basmati" in domestic marketing, arguing that Basmati was not a generic term and the use of such would deceive consumers into believing that the rice they were buying was from South Asia.<sup>3</sup>

RFSTE's petition was rejected by the FTC on two grounds.<sup>4</sup> Firstly, the FTC felt the damage to consumers was overstated. Secondly, the FTC said that there were no agricultural regulations to govern the use of the term "Basmati" for rice originating from a particular region. According to the FTC, Basmati rice is "included as an example of 'aromatic rough rice,' and is not limited to rice grown in any particular country" (Subbiah 2003).

RiceTec markets "Texmati," "Kasmati" and "Jasmati" ("Texmati" and "Kasmati" are marketed as substitutes for Basmati while "Jasmati" is marketed as the American version of Jasmine rice grown in Thailand, which incidentally has a large export market in the US and other countries). Though India was successful in winning the legal battle against RiceTec in the US, it still faced legal battles in about 25 countries for 40 different cases since TRIPS places the onus on the importing nation, not the exporting nation, of deciding whether another nation's GI of its traditional goods is valid. According to APEDA, these cases are varied and the battle ranges from obtaining exclusive control over the Basmati trademark in each country to breaches of the geographical indication of Basmati. In order to cover the legal costs to fight the cases, the All India Rice Exporters' Association has established a Basmati Development Fund which has been collecting Rs. 50/ton (approx \$1.09/ton) for Basmati rice exported from India. India has also obtained the aid of the Trademark Watch Agency to report any new trademark applications for Basmati rice or its variations that are filed overseas (Nilacharal 2001).

Of the 40 cases filed, India has been successful in winning 15 cases around the world including in the UK, Brazil, Greece, Australia, France, Spain, Chile and UAE. In Spain, APEDA has been successful in obtaining a registered trademark for Basmati rice as aromatic rice produced in the sub-continent, thus deterring non-Indian food companies from using Basmati as a brand name. In Brazil, India has been able to overturn an application for using Basmati as a trademark for sweets and condiments. India has also been successful in two other

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<sup>3</sup> For details see U.S. Patent No. 5,663,484, Reexamination Certificate C1 (4525th) (reissued Jan. 29, 2002); Press Release, Federal Trade Commission, Commission Denial of Petition for Rulemaking Proceeding (May 15, 2001), <http://www.ftc.gov/opa/2001/05/fyi0131.htm>.

<sup>4</sup> For details see "Letter Declining to Take Action on Request for Rulemaking to Prevent Such Advertising" (May 9, 2001), <http://www.ftc.gov/os/2001/05/riceletter.pdf>.

cases against RiceTec in Greece and the UK (Nilacharal 2001). A French food company, “Establisments Haudecoeur La Courneuve,” was given two trademarks by the French government to use the name “Basmati,” specifically, “Riz Long Basmati” and “Riz Long Basmati Riz du Monde” (The Economic Times 1998). The Indian government has opposed the trademarks and is still awaiting a decision from the French Trademark Office. In Greece, RiceTec filed an application to register “Texmati,” “Jasmati” and “Kasmati” as trademarks while in the UK an application was filed to register “Texmati” as a trademark.<sup>5</sup> India was able to overturn both applications on the grounds that the names were very similar to Basmati rice and therefore very misleading (Nilacharal 2001).

We argue that India could have avoided the legal battle and strengthened Basmati’s position in the global market if it had registered Basmati as a GI earlier; however, this would have required updating its intellectual property laws, a process which has been slow in a country without a long history of trademark and patent law. It eventually did so, but by then it came at a cost. Further, a revamped TRIPS agreement that extended Article 23 to cover traditional goods, not just wines and spirits, would also have prevented RiceTec from marketing its Kasmati brand rice as “traditional Basmati style” or the Texmati brand as “American Basmati.”

In part because of stories like this, India, Switzerland, the EU, the Czech Republic, and Morocco have advocated stronger and wider protection for agricultural products under GIs. However, the United States, Australia, and New Zealand, who were initially in favor of intellectual property rights and GIs for wines and spirits, are opposed to the widening of Article 23 of the GIs to cover other agricultural products (RAFI 2000). They argue that whether or not to allow imports of products labeled in a manner potentially misleading to the general public should be a discretion exercised by the individual importing country. Indian Basmati is offered protection in some countries. For example, the UK Grain and Feed Trade Association, which is the largest importer of Basmati rice in Europe, specifically states that only long-grain rice from India and Pakistan can be labeled as Basmati rice. Saudi Arabia, which is the largest importer of Indian Basmati, allows only Basmati rice grown in the Indian sub-continent to be labeled as Basmati rice (BRIDGES Weekly Trade News Digest 1998).

A point to note here is that RiceTec applied for a patent after TRIPS came into force. Prior to TRIPS, member countries were not required to adopt common global levels of protection for intellectual property. Therefore, there was little India could do to obtain a GI for Basmati rice in the United States prior to TRIPS.

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<sup>5</sup> RiceTec acquired the trademarks “Texmati” and “Kasmati” in the UK. India challenged the trademark by gathering affidavits from culinary experts and the London Rice Brokers, after which RiceTec decided to surrender its registration of both trademarks. See Nair and Kumar (2005) *Geographical Indications: A Search for Identity*. LexisNexis Butterworths, New Delhi.



As stated in Article 24, in order for GIs to be protected in other member countries, they must be protected under national law in their country of origin, something which India has been very slow to accomplish. The Indian government passed the Geographical Indication of Goods (Registration and Protection) Act in 1999 (Ramchandran 2000) but to date has yet to fully protect Basmati as a GI.<sup>6</sup> As such, Basmati rice from India would seem to be a good case study for analyzing harm from “foot dragging.” Specifically, we wish to determine if there was any harm from the patent granted to RiceTec in the form of losses to India’s key export markets as a result of not providing, or being unable to provide, adequate protection to Basmati rice.

### **3 The Basmati Rice Industry in India**

In the Basmati rice market, India is the largest producer and exporter (ITCIBD 2003). Of the total production of Basmati rice almost two-thirds is exported (Bhattacharjee, Singhal and Kulkarni 2002). The total world demand for Basmati rice is around 1.18 million tons and is valued at \$700 million (Padmanabhan 2003). The majority of the exports are to the Middle-East and the UK with a relatively small percentage to North America. Saudi Arabia is the largest importer of Basmati rice (65% of Indian exports), followed by the United Kingdom (15% of Indian exports), Kuwait (10%), UAE (5%) and other countries (5%) (ITCIBD 2003). The Indian Basmati export market is characterized by approximately 134 registered Basmati exporters with a few of these having very large positions in particular export destinations. Of these the major exporter is KRBL followed by Amira foods, DD International, SunStar Overseas, Sutnam Overseas and United Exports (Damodaran 2001; Asia Pacific Biotech 1999; Business Line 2002; Srinivas 2002).

The goal for the rest of the paper is to establish how much, if at all, the introduction of RiceTec’s products harmed India’s ability to extract any price premia for Basmati rice and, by association, how India hurt itself by not advancing its own GI earlier.

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<sup>6</sup> Though the Indian Cabinet has given APEDA statutory powers to initiate the process for registration of Basmati rice as a GI, it has yet to be registered. For details see “APEDA gets powers to protect Basmati patent rights,” available at <http://www.newkerala.com/topstory-fullnew-24036.html>. One of the reasons for this is due to the differences in selecting the right Basmati variety that has the traits of traditional “Basmati.” Over the years scientists have developed many different strains of Basmati rice, the traits of which have deviated from the traditional Basmati. Another reason for the delay is in identifying the exact geographical area where Basmati is grown since it is now grown in other parts of the country away from its origin in the Dehradun district. For details see Das (2007).

#### 4 Theoretical Framework

The Lerner index (relative markup of price over marginal cost), defined as  $L = (P - MC)/P$  where  $P$  is the output price and  $MC$  is the marginal cost per unit of output, is conventionally used to measure the degree of price premia by a firm in a particular market, with larger Lerner margins implying greater differentiation among competing products. However, in practice it is difficult to calculate the Lerner index since it requires data on price, and the marginal cost of every firm selling a product in a particular industry. This problem becomes more complex in an international market setting where an exporting country has many firms that export products to many destinations and face different competitors in each destination (see Karp and Perloff 1989; Carter and MacLaren 1997; Goldberg and Knetter 1999). Furthermore, in countries like India, gathering sufficient data, especially of a historical nature, is troublesome. Nevertheless, the theoretical relationship between the Lerner index and the residual (inverse) demand curve is well known and makes analyses of product differentiation somewhat easier. For this exercise, we use the concept of the residual demand curve proposed by Goldberg and Knetter (1999) to determine the impact of the patent granted to RiceTec on India's exports.

A residual demand curve shows the relationship between a particular firm's quantity and price while considering supply functions of all other firms in the same market. A flat residual demand curve indicates that a firm has little control over prices in the market (no product differentiation) while a steeper residual demand curve is indicative of the firm's ability to obtain a price premium. Using the relationship between the Lerner index and the residual demand elasticity,  $\varepsilon_d$ , such that  $L = \frac{P - MC}{P} = \frac{1}{|\varepsilon_d|}$ , we can determine the

extent of differentiability enjoyed by Basmati exporters. Our simple test of harm to India from an ineffectual protection of intellectual property will be the extent of any change in its export Lerner index in key markets after RiceTec entered the market. To test for the robustness of our estimates, we will compare this index in markets where Basmati has a large share of the rice market (indicating a strong consumer preference for Basmati) with the estimation for markets in which Basmati has a small share of total rice demand.

A complete analysis of the impact of RiceTec's products on Basmati demand would need a great deal of data to ascertain the two goods' substitutability. Unfortunately, specific variety-level data by export nation are scarce. Here, we propose a model that will nonetheless allow inference to be drawn based upon aspects of the market that are observable. We concede at the outset that such estimations are likely only suggestive rather than exhaustive, yet we have undertaken great care and consideration in obtaining the data that we use

here. Indeed, the data gathering necessitated travel to India to examine government agricultural statistics in several locations. We see our analysis in this paper as putting forward two arguments. First, the descriptive evidence that a potential for harm exists was laid out in sections II and III. Second, in the sections that remain, we use what data we have to ascertain any statistical evidence that would corroborate the circumstantial evidence previously described. Future analysis should necessarily try to improve upon our study, but as the first paper to try and document a potential harm from insufficient GI protection, we feel this is an important contribution even with the data limitations.

The analysis we have adopted as proposed by Goldberg and Knetter (1999) is straightforward: the residual demand elasticity obtained will be used to determine whether the Indian Basmati exports enjoy any price premia in the importing countries. Along with its facility in cases where data are limited, the Goldberg and Knetter model has the advantage of avoiding “implausible aggregation assumptions (such as symmetry of firms)” and demand curves can be of a general nature “so that the competing products may or may not be perfect substitutes” (p. 37). Such conditions are appropriate to the case we have described for Basmati rice and RiceTec’s brand. Using this model, we ascertain whether premia for Indian Basmati exist and, if they do exist, whether they were diminished after the entry of RiceTec’s products into competing markets. A lessening of the residual demand elasticity after RiceTec entered the market may be corroborating evidence that India has not done enough to protect the distinct image of Basmati rice through GI protections. Further, as discussed in Goldberg and Knetter (1999), the benefit of the econometric approach we undertake is that it is not necessary to estimate cross-price elasticities of demand, marginal costs or conduct parameters and is thus useful in a setting where data are limited to mostly aggregate figures as we have.

For illustrative purposes, consider the following model where India (I) and other (R) producers who market a competing rice to Basmati are considered. For simplicity assume these other producers are in a single country like the US (or a single firm like RiceTec as the Goldberg and Knetter model can be used in cases with one or several competing products). Let  $P^I$  be the price of exports from India, and  $Q^I$  be the total exports from India such that  $Q^I = \sum_{i=1}^N q_i^I$ , where  $q_i^I$  is the quantity exported by firm  $i$ . Define  $Z$  as a vector of demand shifters. Similarly  $P^R$  is the price of the other rice in the case of a single competing country/firm, or a price vector in the case of multiple countries/firms, and  $Q^R$  is the total quantity of these competing firms. Thus, the residual demands for Indian and other rice are given by

$$P^I = D^I(Q^I, P^R, Z) \quad (1)$$

$$P^R = D^R(Q^R, P^I, Z) \quad (2)$$

Both Indian and other producers ship to another destination country so that  $P^I$  and  $P^R$  are measured in the currencies of the importing nation. Firm  $i$  in India chooses quantity to maximize its profits in the destination country according to the following profit function:  $\pi_i^I = P^I q_i^I - e^I C_i^I$ . Here  $e^I$  is India's exchange rate and  $C_i^I$  is the cost of production and marketing of  $q_i^I$  in Indian currency. Similarly firm  $i$  in the competing nation will maximize its profit function:  $\pi_i^R = P^R q_i^R - e^R C_i^R$  where,  $e^R$  is the exchange rate and  $C_i^R$  is the cost in R's currency. Assuming  $\frac{\partial q_i^k}{\partial q_j^l} \neq 0$  (conjectural variation)  $i \neq j$ ;  $k, l = I, R$ , then  $\forall i = 1, \dots, N$  the  $i^{\text{th}}$  first-order conditions for the Indian and other firm are as found in Goldberg and Knetter (1999, pp. 36-37). Using the notation of our model gives the first-order condition for the Indian firm:

$$\begin{aligned} P^I &= e^I MC_i^I - q_i^I \frac{\partial D^I}{\partial Q^I} \left( 1 + \sum_{i \neq j}^N \frac{\partial q_j^I}{\partial q_i^I} \right) \left( 1 + \sum_{i \neq j}^N \frac{\partial D^I}{\partial P^R} \frac{\partial D^R}{\partial P^I} \right) \\ &= e^I . MC_i^I - q_i^I \frac{\partial D^I}{\partial Q^I} \theta_i^I \phi . \end{aligned}$$

Incorporating market shares and summing across firms, Goldberg and Knetter (1999) derive the share-weighted industry-average, first-order equation as given in (3):

$$P^I = e^I MC^I - Q^I \Psi^I \quad (3)$$

where  $\psi^I = \theta^I \phi$  is the industry-average conduct parameter where zero implies that the firms are perfectly competitive while one indicates that the firms act collusively. Following a similar procedure for the competing firm(s) obtains

$$P^R = e^R MC^R - Q^R \Psi^R, \quad (4)$$

Simultaneously solving equations (2) and (4) reveals the other nation's reaction function with respect to Indian Basmati as

$$Q^{R*} = Q^R(e^R, MC^R, \Psi^R, Z, Q^I) \quad (5)$$

From (5) we solve for the residual demand for India, denoted  $P^{I,RES}$ , as follows:

$$P^I = P^I(Q^I, Q^{R*}, Z) = P^{I,RES}(Q^I, e^R, MC^R, Z, \Psi^R) \quad (6)$$

Thus, the reduced-form equation,  $P^{I,RES}$  is no longer a function of  $Q^R$ . Also  $e^I$  and  $MC^I$ , being excluded from the equation, become natural cost shifters and can be used as instruments to determine the inverse demand.

#### 4.1 Empirical Model

Using the methodology described above, our estimating equation for the residual demand curve takes the following general linear form:

$$P_m^I = \lambda_m + \eta_m Q_m^I + \alpha_m Z_m + \beta_m W_m^n + \gamma D_0 + \delta D_0 \cdot Q_m^I + \varepsilon_m, \quad (7)$$

where the subscript  $m$  denotes a specific destination market.  $P_m^I$  is the per-unit export price of Indian Basmati,  $Q_m^I$  is the quantity of Indian Basmati exports to market  $m$ ,  $Z_m$  is a vector of demand shifters for destination  $m$ ,  $W_m^n$  is a vector of cost shifters for the  $n$  competitors India faces in a particular destination market (but does not include any cost shifters for India) and  $\varepsilon_m$  is the error term. The dummy variable  $D_0$  measures the shift in demand after RiceTec's entry in 1985, where 1 represents RiceTec's presence and 0 otherwise. Finally,  $D_0 Q_m^I$  is an interaction term measuring the change in slope of the demand curve for Indian Basmati after RiceTec's entry.<sup>7</sup> Separate inverse residual demand equations will be specified for the different destinations to which India exports Basmati rice. The vector of cost shifters is comprised of two elements. One element consists of the cost shifters such as wages expressed in the competitor's currency and the second element consists of the exchange rate between the competitor's currency and the specific destination market. As Goldberg and Knetter note, exchange rates are especially useful in identifying the residual demand curve since they shift the relative costs of different exporting countries. Since, the quantity exported is an endogenous variable, it needs to be instrumented. The appropriate instruments that can be used are cost shifters for India that are not included in the estimating equation but are correlated with quantity due to the first-order condition. Therefore the exchange rate between India and the specific destination country serves as an ideal instrumental variable.

#### 4.2 Data Sources

Because of data limitations and the need to find nations that also had a long history of imports of both Indian and RiceTec rice, we chose to examine Indian exports to four countries: the US, Canada, the UK and Kuwait. These can be seen as minor export markets (the US and Canada) and major export markets (the UK and Kuwait). Our prior was that we would find Lerner indices near zero for the US and Canadian export markets, but we would find price premia for the UK and

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<sup>7</sup> We also experimented with an additional dummy and interaction variable to measure changes in the slope of the demand curve after the granting of a patent to RiceTec in 1997, but, as the related coefficients were not statistically significant, nor did they alter the results in any significant way, we dropped these variables from our model specification to conserve degrees of freedom.

Kuwaiti export markets where consumers show a strong preference for Basmati. Data on the quantity and value of Basmati rice exports from India were obtained from the *Foreign Trade Statistics of India* (DGCI&S 1970-2006). These publications publish the annual quantity of Basmati rice exports (in MT) and the value (in Rupees) by destination. The sample period for the study was set from 1970/71 to 2005/06.<sup>8</sup> Prior to 1979, the *Foreign Trade Statistics of India* did not have a separate classification for Basmati rice from which to distinguish it from other rice. Therefore, after discussions with experts in India, rice under the classification “rice other than parboiled” is assumed to be Basmati rice.

Data on the annual exchange rates, wholesale price indices, wage rates and producer price indices for India and the destination importing countries and the competitors and the destination countries were obtained from annual volumes of the *International Financial Statistics* (IMF 1970-2006) over the period 1970-2006.

## 5 Results and Discussion

Using the empirical methodology specified above, a residual demand curve was estimated for Indian exports. A joint estimation for the four destination markets, United States, Canada, Kuwait and United Kingdom, was performed using the Three Stage Least Squares (3SLS) approach to account for the endogenous quantity and the probable contemporaneous correlation among the error terms of the four equations.

The dependent variable in all four equations was the per unit export price to the destination market expressed in the destination market currency. The independent variables used were the cost shifters, specifically, the wholesale price indices (wage indices were not available) in Pakistan (WPK) and Kuwait (WКУ), producer price index in Thailand (WTH), and wage indices in the US (WUS) and UK (WUK). In addition, the exchange rates between the competitors and the destination market (competitor currency per destination market currency) were also used. PAKUS, PAKUK, PAKCA and PAKKU represent the exchange rate between Pakistan and the destination markets US, UK, Canada and Kuwait. Similarly, USUK, USCA, USKU are the exchange rates between the United States and the destination markets UK, Canada and Kuwait, respectively. Finally, THUS, THUK, THCA and THKU are the exchange rates between Thailand (which produces a competing aromatic, non-Basmati rice) and the obvious destination markets.

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<sup>8</sup> Because of unavailability of the complete set of volumes from 1970-2006, data for three years, 1977, 1980, and 1986, had to be extrapolated by taking the average of the preceding and the following year.

The endogenous variables are QUS, QUK, QCA and QKU, which are the quantities (in tons) exported by India to the destination markets. D0 is the dummy variable, which measures the shift in demand after RiceTec's entry in the market, where 1 represents entry of RiceTec's Texmati (from 1985) and 0 otherwise. D0US, D0UK, D0CA and D0KU are interaction variables between D0 and the quantity exported for US, UK, Canada and Kuwait, respectively, measuring the change in the slope of the residual demand curve after Texmati's entry in the market. The instrumental variables used for the endogenous quantity are the wholesale price index for India and exchange rates between India and the four destination markets.

Results for the four destination markets are reported in Table 1. The  $R^2$  for all four equations ranged from 66% to 85%. The quantity coefficients were negative for all four equations but, in line with our expectations mentioned earlier, significant for only UK and Kuwait. This means that the best guess for the residual demand is that it is flat for the US and Canada, corresponding to a price premia of zero in these markets. However, in the important export markets of the UK and Kuwait, the negative and statistically significant slope indicates that a price premium exists for Basmati rice producers.

In the UK equation, the quantity coefficient was negative and significant at the 1% level of significance. The coefficient on the exchange rate between the US and UK also had the expected positive sign, indicating that an increase in the exchange rate between US and UK increases the US's cost of selling to the UK and thus allows India to charge a higher export price to the UK. The coefficient on the dummy variable, D0, was also significant at the 1% level as was the coefficient on D0UK.<sup>9</sup> In the Kuwait equation, the coefficient on quantity exported was negative and significant at the 1% level. The coefficient on the dummy variable (D0) and interaction term (D0KU) was also significant at the 1% level, indicating that there was a shift in demand after the entry of RiceTec. Finally, as noted, the lack of sizable demand effects for Basmati in the US and Canadian markets is reflective of the fact that India's Basmati rice exports to these countries have been relatively minor in terms of world trade, increasing only in the last few years.

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<sup>9</sup> We also used Chow's breakpoint test for structural change to test for any differences in export demand for Basmati rice prior to and after the entry of RiceTec. We partitioned the data into two sub-samples. The first sub-sample covered the period prior to the entry of RiceTec, that is, from 1970-1984. The second sub-sample was from 1985-2005 when RiceTec entered the market. Results of the Chow test indicate that there is evidence of a structural change for India's exports to the US, UK and Canada (significant at the 1% level) at the time of RiceTec's entry.

**Table 1: 3SLS Estimates for Indian Basmati Rice Exports to the US, Canada and Kuwait**  
**Dependent Variables: Export Price of Indian Basmati Rice Exports in Destination Currency**

Variable	United States	United Kingdom	Canada	Kuwait
Constant	59.32*** (21.48)	1.716 (3.45)	1.36 (10.60)	10.56 (10.06)
QUS	-0.0004 (0.0011)			
QUK		-0.0004*** (0.00006)		
QCA			-0.0033 (0.0030)	
QKU				-0.0003*** (0.0001)
PAKUS	-46.73 (54.50)			
PAKUK		35.04 (45.07)		
PAKCA			32.06 (42.12)	
PAKKU				-4.84 (69.44)
THUS	-172.58 (414.66)			
THUK		-115.31 (213.04)		
THCA			-77.76 (255.19)	
THKU				-235.81 (504.79)
USUK		18.18** (7.79)		
USCA			31.25*** (10.02)	
USKU				-0.535 (31.52)
WUS	-0.68 (0.55)	-0.18 (0.195)	-0.056 (0.449)	-0.194 (0.149)
WPK	-0.54** (0.26)	-0.181** (0.103)	-0.596*** (0.199)	-0.242* (0.101)
WTH	0.81*** (0.73)	0.392 (0.263)	0.642*** (0.558)	-0.348 (0.232)
WUK		-0.195** (0.092)		
WCA			-0.252*** (0.092)	

Continued.



**Table 1: 3SLS Estimates for Indian Basmati Rice exports to the US, Canada and Kuwait**  
**Dependent Variables: Export Price of Indian Basmati Rice Exports in Destination Currency –**  
**Continued**

Variable	United States	United Kingdom	Canada	Kuwait
WKU				0.095 (0.699)
D0	-4.32 (6.54)	-6.47*** (2.13)	-7.71 (6.47)	-8.27*** (2.56)
D0US	0.0004 (0.0011)			
D0UK		0.0004*** (0.00006)		
D0CA			0.0035 (0.0030)	
D0KU				0.0003*** (0.0001)
Hausman Test	17.80			
R <sup>2</sup>	0.775	0.839	0.847	0.661
DW-stat	1.393	1.482	1.479	1.898

\*\*\*, \*\*, \* indicates significance at the 1%, 5%, and 10% levels, respectively. Instruments used include all independent variables, the exchange rate between India and each destination and the wholesale price index in India.

We calculated the Lerner indices in two ways. First, we used the variable averages for the periods before and after the emergence of RiceTec (“Lerner I”), and second we estimated the Lerner index at each observation and then averaged these estimates in each period (what we denote as a “Lerner II”). While each method will give different magnitudes, the story is very similar. The Lerner indices are reported in Table 2. By comparison, the Lerner indices for the US and Canadian market were small to begin with and changed little with or without the presence of RiceTec. Given that the underlying coefficients on the quantity variables in these markets were insignificant, concluding that these two Lerner indices are zero before and after the introduction of RiceTec is reasonable as it is suggestive of a very flat inverse demand function to begin with.

On the other hand, the Lerner indices in the UK and Kuwaiti markets, where both Indian and RiceTec exports are substantial, are interesting. Before the entry of RiceTec, the Lerner I index is 31% in the UK market and 35% in Kuwait. After the entry of RiceTec, these indices drop to 6% in the UK market<sup>10</sup> and 15% in the Kuwaiti market. Lerner II indices for the UK and Kuwaiti markets tell the same story, dropping from 52% to 10% in the UK and 39% to 25% in Kuwait

<sup>10</sup> A point to note: our results in the UK also correspond to the fact that prior to January 2006, there was no code of practice in the UK for Basmati rice specifying the characteristics that a particular rice must have in order to use the description “Basmati.” See Grain and Feed Trade Association, Code of Practice, available at, <http://www.food.gov.uk>.

after RiceTec arrives on the market. The decline in the Lerner indices after RiceTec's entry is consistent with the story that India lost some of its distinct "brand" power for Basmati in these two key export markets.

**Table 2: Lerner Indices**

Country	Before entry of RiceTec		After Entry of RiceTec	
	Lerner I <sup>1</sup>	Lerner II <sup>2</sup>	Lerner I <sup>3</sup>	Lerner II <sup>4</sup>
United States	1.93%	2.28%	0.52%	0.86%
Canada	5.99%	4.88%	6.88%	10.59%
United Kingdom	31.54%	52.36%	6.53%	10.57%
Kuwait	35.62%	39.88%	15.89%	25.04%

<sup>1</sup>calculated using average quantities and prices prior to 1984

<sup>2</sup>calculated using quantities and prices for each year prior to 1984 and averaged for the period

<sup>3</sup>calculated using average quantities and prices after 1984

<sup>4</sup>calculated using quantities and prices for each year after 1984 and averaged for the period

## 6 Conclusion and Implications

Different forms of intellectual property rights protection such as trademarks, geographical indications and patents have been around for a long time.<sup>11</sup> But unlike industrialized countries that have a long history of protecting their intellectual property, the legal protection of intellectual property is still relatively new to developing countries. In developing markets, much emphasis has been placed on reducing tariffs and quotas with relatively little attention paid to strengthening intellectual property rights systems. With the advent of TRIPS all developing countries are required to strengthen their IPR system. Yet, many developing countries have failed to take much action in this regard or, as in the case of India with Basmati rice, have taken action very slowly.

We examined the impact of incomplete protection of intellectual property by using the controversy regarding Basmati rice as an example. First, we argued why India's Basmati rice exports were likely a good case study for economic harm from incomplete GI protection after the entry of a serious competitor, RiceTec. Next, we estimated the inverse residual demand curve for India's Basmati rice exports to key importing nations. The relationship between the inverse residual demand curve and a price premium was used to determine the extent of damage caused to India after the entry of RiceTec. Our analysis

<sup>11</sup> Protected designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Specialty Guaranteed (TSG) are increasingly popular in the EU as a means for enhancing the creditability of a product and offering it protection. A recent study by Bouamra-Mechemache and Chaaban (2010) highlights the importance of PDO labels and examines the efficiency of PDO and the costs and benefits of PDO certification.

indicates that of the four markets studied, the distinctiveness of Indian Basmati rice in the important export markets of the UK and Kuwait fell after the entry of RiceTec but there was no real change in markets for which the Basmati “brand” carried little premia (the US and Canada). This leads to the question of what might have happened had India been proactive in trademarking its Basmati variety or had TRIPS been more encompassing of traditional commodities as some nations wish.

While further analysis is warranted, our findings are consistent with the impact of a substitute good in a differentiated products market.<sup>12</sup> While further analysis is warranted, our findings suggest that India’s claim that Indian Basmati is losing its distinct image in certain export markets may have merit. The future of Indian Basmati rice exports may depend largely on how effectively RiceTec is able to market its rice as well as how successfully India preserves the distinct image of Basmati rice.

As increasing numbers of countries seek protection of their traditional commodities (e.g., Jasmine rice in Thailand or Parmesan cheese in Italy), it is perhaps essential to revisit the TRIPS agreement. At the same time, for developing countries to be competitive in the international market, it is as important for them to strengthen their intellectual property system as it is to open their markets. Without proper national legislation governing intellectual property or extension of Article 23 to commodities other than wine and spirits, TRIPS as it is currently written may provide little help to developing countries trying to protect their traditional goods and practices.<sup>13</sup> In the case of India, at the very least, it could have avoided the time and money spent in the legal battles over Basmati around the world had it improved its intellectual property system or had TRIPS been more encompassing.

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<sup>12</sup> Evidence from Europe indicates that products that are protected as GI command a distinct position in terms of higher price. In 2004, the turnover for GI protected products in France accounted for 15% of the global industry turnover while exports of GI protected products accounted for 30% of total food exports. See Stephane Passeri, Protection and Development of Geographical Indications in Asia, Conference on IP in Hong Kong and Mainland China, Best Practices and International Impact, 22 March 2007, 8. Similarly, evidence from China, indicates that the average price of Zhanhgui scallions has increased by 20-30% after being registered as a certification mark while the price for Pinggu peaches increased by 30% compared to regular peaches and by 50% for premium Pinggu peaches. See Xin and Ai Jie, Chinese Farmers Cash in on Intellectual Property Rights, September 2007, <http://www.chinatoday.com.cn/17ct/17e/1013/e101.htm>.

<sup>13</sup> A recent study by Rangknekar (2010) looks at the limitations of TRIPS in protecting transborder GIs like Basmati and discusses alternatives for joint registration of Basmati by India and Pakistan to overcome TRIPS requirement of protection of GI in the home country.

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