Indian Antidumping Policy and its Impact on the Markups of Domestic Firms*

Work in progress - Please do not cite without permission of the authors!

Christian Viegelahn†, Hylke Vandenbussche‡

December 31, 2010

Abstract Over recent years, India has become one of the most frequent users of antidumping measures. Indian firm-level panel data at hand, our paper estimates the effects of antidumping protection on the market power of domestic import-competing firms. Controlling for the potential endogeneity of antidumping protection, our findings indicate that markups of protected firms increase when antidumping measures are imposed. We find that the effect is stronger the longer protection is in place. For firms in relevant control groups, we do not find any increase of markups during the same period. This paper is amongst the first to provide firm-level evidence on the effects of antidumping protection in a developing country.

Keywords: Antidumping policy; Firm-level data; India; Markup; Matching; Policy evaluation; Price-cost margin; Trade policy

JEL classification: F13; L41; C2

*We thankfully acknowledge financial support from the Belgian French-speaking Community through FSR and through the convention ARC 09/14-019 on *Geographical Mobility of Factors*.

†Corresponding author; IRES, Université catholique de Louvain, Place Montesquieu 3, 1348 Louvain-La-Neuve, Belgium; Telephone: +32 10 47 39 84; E-mail: christian.viegelahn@uclouvain.be.

‡IRES, Université catholique de Louvain, Belgium; CORE, Université catholique de Louvain, Belgium; LICOS, Katholieke Universiteit Leuven, Belgium.

1 Introduction

Antidumping (AD) is a contingent trade policy tool that allows governments to impose restrictions against foreign imports within the rules of the GATT.[1] While policy makers tend to regard dumping as an unfair trade practice of foreign firms that needs to be punished, economic theories predict that dumping is only harmful in the unlikely case of predatory dumping, when low prices are aimed at driving all competitors out of the market to capture monopoly profits later on. Many economists therefore worry that AD merely serves governments as protectionist device accomodating protectionist pressures from domestic producers at the cost of other agents in the economy.[2]

Until the end of the 1980s, AD policy was almost exclusively applied by the so-called traditional users EU, US, Canada and Australia. However, developing countries have become predominant in the use of AD policy over the recent years (Vandenbussche and Zanardi, 2008). Between 1990 and 2000, at least 40 developing countries adopted an AD law.[3] The share of AD measures imposed by these countries has increased tremendously from 2% prior to the 1990s to 57% in 2008.[4] While the existing empirical evidence on AD focusses on the EU and the US, the empirical literature on AD in developing countries has just started to emerge. In order to assess the increased use of AD by developing countries, however, it is important to learn more about the economic impact of AD in these countries. The economic impact may differ from the one in developed countries because institutional settings and motivations for the use of AD policy are country-specific.[5] Furthermore, countries have considerable scope in the design of AD laws and their application within the GATT rules.

In this paper we investigate the impact of Indian AD policy on domestic firms' markups calculated as price-cost margins. Using an Indian firm-level dataset, we contribute to the growing empirical trade literature that uses micro data and provide first firm-level evidence on the effects of AD policy in a developing country. The effect of AD protection on firms' market power constitutes an important building block of the overall assessment of AD protection which motivates the thematical focus of our paper.

An AD tariff is theoretically similar to an import tariff. Static models of imperfect competition predict a rise in markups due to a tariff (Helpman and Krugman, 1989). However, import diversion due to the

[1] Dumping is legally defined as a price of an imported product being lower than its normal value. The normal value usually corresponds to the price that the foreign importer charges for the product in its home country. Together with an injury finding of the domestic industry and the establishment of a causal link of dumping and injury, governments can impose AD measures where mostly a tariff is chosen as measure.

[2] Especially during the recent global economic crisis, the fear of an abuse of the AD rules of the GATT was prevalent. Data showed a worldwide increase of AD intiations by 31% and an increase of AD measures by 19% in 2008 compared to 2007 as reported in the WTO (2009a) AD statistics.

[3] This number was derived from Table 1 in Zanardi (2004a) who gives a comprehensive overview of the proliferation of AD laws. The classification of developing countries is based on IMF (2009).

[4] The first number comes from WTO (2009b, p.139). The second number was calculated based on WTO (2009a).

[5] Bown (2008) provides evidence for substantial heterogeneity in the determinants of AD use at the industry level across countries.

discriminatory imposition of AD measures, tariff jumping of foreign firms or entry of domestic firms into the market may at least dampen such a rise in markups, such that the impact of AD protection on markups finally remains a question of empirics. Konings and Vandenbussche (2005) find for the EU that domestic firms' markups increase significantly during periods of AD protection. Nieberding (1999) provides three case-studies on the effect of US AD law on market power of domestic firms and observes as well a positive impact. In contrast, Blonigen et al. (2007) do not find any effect of AD protection on the market power of US steel producers. Given these rather ambiguous results, further empirical evidence for other countries, especially developing countries, is needed.

India is a particularly interesting country to focus on as it is currently the main user of AD policy worldwide.[6] After the adoption of an AD law in 1985, India initiated its first AD case in 1992. While the number of cases until 1998 was still relatively low, the number of initiations and measures imposed by Indian authorities drastically increased from 1998 on. In six of the seven years between 2002 and 2008, India was the country with the worldwide largest number of AD case initiations. However, while there exists a large body of literature on Indian trade policy concerned with the effects of the 1991 initiated trade liberalization reforms in India, the literature on Indian AD policy is quite new.[7] We therefore believe to make an important contribution not only to the empirical trade literature in general, but as well to the one on India's trade policies in specific.[8]

The rest of this paper is organized as follows. In the next section we describe the data. In section 3 we outline the empirical methodology that is applied in order to identify the effect of AD protection on markups. Section 4 contains results of the estimations and their interpretation. Section 5 concludes.

2 Data

In our study we mainly draw from two databases. The first database, *Prowess*, contains Indian firm-level data that is collected by the Centre for Monitoring Indian Economy (CMIE), a private company based in Mumbai. *Prowess* reports information from balance sheets and income statements of Indian firms. It contains only data for medium and large size enterprises, a restriction that needs to be taken into account when interpreting our results. However, Goldberg et al. (2010a) who study the response of domestic variety to trade liberalization and use the same dataset report that *Prowess* contains data on firms that account for 60% to 70% of organized industrial activity in India, 75% of the Indian government's cooperate tax revenue

[6] Figure 1 shows the evolution of the number of AD case initiations and measures imposed by Indian authorities. Figure 2 illustrates the number of AD measures in force over time.

[7] For example, Narayanan (2006), Baruah (2007), Ganguli (2008) and Malhotra and Malhotra (2008).

[8] According to Vandenbussche and Zanardi (2010), the trade-depressing impact of AD measures in India has been far from negligible, largely offsetting the positive impact of the trade liberalization reforms that lowered the average import tariff from more than 90% in 1990 to around 30% in 2000 as reported by Topalova (2007).

and 95% of revenues from excise duties which gives us confidence in the dataset coverage. Firms are assigned to industries according to two classification systems: NIC which is a 5-digit industry classification that is only used by Indian statistical agencies[9] and a more detailed economic activity classification that is internally used by CMIE. For this study, we use data on firms' sales, raw material expenses, salaries and wages and net fixed assets of manufacturing firms. Nominal values are deflated using a sector-specific Wholesale Price Index (WPI) published by the Office of the Economic Advisor to the Ministry of Commerce and Industry. As salaries and wages are to a large extent only available from the year 2000 onwards, the examination period is restricted to the years from 2000 to 2007. We end up with an unbalanced panel of 4183 manufacturing firms with in average 3216 observations of markups in each year of the examination period. Some descriptive statistics of the *Prowess* data are given in Table 1.

For the second database, hereafter referred to as AD database, we collect data on all Indian AD cases from 1992 until 2007.[10] For each case, the Indian government publishes notifications on initiation, preliminary and final findings and on the imposition of antidumping measures in the government journal *Gazette of India*. Our database draws upon these notifications that are mostly made available on the official websites of the Indian Ministry of Industry and Commerce and the Ministry of Finance. Where some information is missing, the semi-annual reports of India to the WTO and Eximkey[11], a private internet portal containing government notifications on trade policies, are used as secondary complementary sources. For each AD case we retrieve the name of the product for which protection was filed and the corresponding HS codes at the 6- or 8-digit level as reported in the notifications. Our databases includes as well target countries, relevant dates and measures recommended and imposed if any. Furthermore, the notifications contain the names of firms that file or support an AD petition and of other firms in the industry which we extract.

Tables 2-5 and Figures 1-2 provide some descriptive statistics of the AD database. On the whole, 486 AD cases were initiated between 1992 and 2007 of which 375 resulted in protection and 98 were either withdrawn or ruled negatively such that no AD measure was imposed.[12] In these cases 411 different firms are mentioned in the notifications, some of them several times. These firms are reported to account in average for a production share of at least 78% in their industries. Most cases were initiated against China (102), the European Union (38) and South Korea (38). The vast majority of cases (67%) is initiated in the chemicals industry, followed by basic metals (9%) and electrical machinery (5%).

Now we face the difficult task to match the AD database with the firm-level database in order to identify

[9] On the 4-digit level the NIC classification (Rev. 1998) corresponds perfectly to the internationally used ISIC (Rev. 3) industry classification.

[10] The Global AD Database (v3.0) compiled by Chad Bown serves as starting point. However, we extend this database until 2007, complement it with additional information, check all the data for correctness and do necessary corrections where appropriate.

[11] See http://www.eximkey.com.

[12] 13 cases were still under investigation in June 2009, the time the database was updated for the last time.

those firms that are involved in AD cases. This is not a straight-forward exercise as *Prowess* does not contain any standardized information on the set of products that each firm produces and sells while AD duties are imposed on specific products.[13] However, we apply four alternative methods to identify these firms and will henceforth refer to these methods as *firm*, *all NIC*, *all EA* and *HS-NIC* method, respectively. First (*firm*), we just take the firms that we directly extracted from the notifications and try to find them in the firm-level database. We do this manually taking into account variations in spellings and possible changes of firm names[14] and are able to identify almost 70% of all the firms that are mentioned in the notifications. Second (*all NIC*), as there are possibly more firms that are affected by AD cases, we check which 5-digit NIC industry code *Prowess* assigns to the firms that are mentioned in the notifications and consider all other firms in *Prowess* that belong to the same industry also as involved in the AD case. Third (*all EA*), we check which economic activity code *Prowess* assigns to the firms in the notifications and consider all other firms with the same economic activity code as involved in the AD case. Fourth (*HS-NIC*), we make use of the HS product codes that we extracted for each case. We match these codes to the NIC industry classification at the 4-digit level using several correspondence tables published by UN (2009).[15] All the firms that are assigned to the matched NIC industry are then considered to be involved in the respective AD case.

For each of these four groups of firms we create an AD protection profile containing the information if a firm was protected or not by an AD measure in a certain year. We count a year as "protection year" if there was an AD measure in place for at least six months.

Besides *Prowess* and the AD database, we use data on imports from the *Export Import Databank* of the Indian Ministry of Commerce and Industry, where imports are deflated by the Wholesale Price Index (WPI). The import penetration ratio at the industry level is calculated as industry imports over the sum of industry imports and industry sales, where industry sales are aggregated from *Prowess*. This is likely to yield a downward biased measure of import penetration which is, however, non-avoidable as we do not have other data on industry sales at hand. Tariff data for the years 1996 and 2000 stem from the *Integrated Data Base* (IDB) of the WTO. Summary statistics for import and tariff data are reported in Table 6.

[13] In principle, firm-product-level data is available in *Prowess*, but it does not follow any norm such that the level of detail in reporting and the spelling of product names differ across firms. Up to now this data therefore cannot be used in the analysis.

[14] If no direct match is found at first hand, we try to find some information on firms' webpages if the firm possibly changed its name. If this is the case, we try to identify the firm in *Prowess* under its new name.

[15] Most studies using Indian data, for example Goldberg et al. (2010b), rely on a concordance table by Debroy and Santhanam (1993) which matches HS to 3-digit NIC codes. I match at the more disaggregate 4-digit level using the fact that NIC (Rev. 1998) matches one-to-one to ISIC (Rev. 3) at this level. HS can be matched to ISIC with the available concordance tables, where few AD cases were assigned to more than one NIC sector. The matching was checked manually for correctness.

3 Empirical methodology

3.1 Measuring markups

Markups as measure for the market power of firms are rarely directly observable as we do not have data on price P and marginal cost C at hand. Markups have to be indirectly inferred where different methods are at our disposal. One popular method that is discussed by Tybout (2003) and used in our paper is the calculation of the price-cost-margin (PCM) as proxy for the Lerner index of monopoly power,

$$PCM_{it} = \frac{P_{it}Q_{it} - P_{M,it}M_{it} - W_{N,it}N_{it}}{P_{it}Q_{it}} = \frac{P_{it} - C_{it}}{P_{it}}, \tag{1}$$

where $P_{it}Q_{it}$ are sales, $P_{M,it}M_{it}$ are material costs and $W_{N,it}N_{it}$ is the wage bill of firm i in year t. If we assume that all short-run marginal costs are covered by wage bill and material costs and if we assume that unit labor and material costs are linear with respect to output, the second equality in (1) holds.

3.2 Estimating the effect of protection

Generally, we are interested in what is commonly known as the *average treatment effect on the treated*, where treatment corresponds in our case to AD measures imposed. Hereby we face the common problem in the non-experimental policy evaluation literature: we do observe treated, protected firms only when they get treatment, but not in the counterfactual situation when they do not get any treatment. In order to overcome this problem, we separately estimate the following regression equation for two groups of firms, those that get protection and an appropriately chosen control group of firms:

$$PCM_{it} = \alpha_i + \alpha_1 PR_{it}\ X\ YEAR\_S_{it} + \alpha_2 \left(\frac{K_{it}}{P_{it}Q_{it}}\right) + \alpha_3 \left(\frac{P_{it}Q_{it}}{\sum_{i\in j} P_{it}Q_{it}}\right) + \alpha_4 YEAR_t + \epsilon_{it}. \tag{2}$$

α_i is an unobserved firm-specific fixed effect and ϵ_{it} is an idiosyncratic error term. PR_{it} takes on a value of one if firm i is protected by an AD measure in year t and zero otherwise. PR_{it} is interacted with a vector of dummy variables $YEAR\_S_{it}$ that indicates the year relative to the first year of AD protection. For example, $YEAR\_2_{it}$ takes on a value of one in the second year an AD measure is in force and zero otherwise. This way of proceeding allows us to detect the strength of the effect year by year after the imposition of the AD measure, considering possible time heterogeneity. A vector of year dummies, $YEAR_t$, accounts for macroeconomic shocks that have an impact on markups of firms in all industries. Following Tybout (1996), Roberts (1996), Grether (1996), Konings and Vandenbussche (2005) and others, we include as well the capital over sales ratio $\frac{K_{it}}{P_{it}Q_{it}}$ as control. As illustrated by Tybout (2003) the impact of AD protection should be

zero after controlling for capital over sales if industries are perfectly competitive. Finally, to control for scale effects, we add the market share of firm i in industry j, $\left(\frac{P_{it}Q_{it}}{\sum_{i\in j} P_{it}Q_{it}}\right)$, as additional regressor on the right-hand-side.[16] Due to potential endogeneity problems, we instrument the capital over sales ratio and the market share with their past values at t - 1 and t - 2.

3.3 Selecting control groups

The choice of an appropriate control group of firms is not a straight-forward task, but it is a crucial one. We would like to know what would have happened if the protected firm had not been protected. If AD measures were assigned randomly across firms, such that protected and unprotected firms had on average the same characteristics determining the PCM trajectory and differed only by the fact that protected firms are treated while unprotected firms are not, the PCM trajectory of all unprotected firms could serve as a counterfactual. In reality, however, AD protection is unlikely to be randomly assigned across firms. It may be endogenous as two stages of selection are involved before a firm gets protection. In the first stage, firms self-select themselves by filing a petition for AD protection. In the second stage, the government decides upon if protection is granted or not based on its injury and dumping findings.[17]

The first control group that we consider is the group of firms that are involved in termination cases, firms that belong to a sector for which the Indian AD authorities decide not to grant AD protection or firms that withdraw their petition after filing. We check if we can find a change in markups after the year of initiation of a termination case and compare the results with the ones for the treated group of firms where AD measures were really imposed. The choice of this control group is likely to eliminate the first stage self-selection bias. On the other hand, however, treatment assignment across these firms by the government or the decision to withdraw a case is still likely to be non-random.

To find an alternative second control group, we follow the microeconometric evaluation literature and draw upon matching techniques (Heckman et al., 1998). Matching methods being originally applied to cross-sections of data have recently started to be used as well for panel data.[18] The use of matching techniques to tackle policy endogeneity avoids problems related to the use of other policy evaluation methods as discussed by Blundell and Costa Dias (2009).

For the matching process, we assume that all differences between protected and unprotected firms that affect treatment assignment, markups and their evolution can be fully captured by a vector of observable pre-treatment characteristics, making use of our relatively rich dataset as described in the previous section.

[16] Due to the partly small number of firms in the samples, we do not interact protection with the market share which would allow us to analyse if firms with a larger market share may benefit more from AD protection.

[17] See footnote 1.

[18] For example, see De Locker (2007) or Konings and Vandenbussche (2008).

It is our aim to associate to each protected firm an unprotected "twin" firm that is as similar as possible in these observables to the protected counterpart prior to protection. Rosenbaum and Rubin (1983) suggest to summarize the multidimensional vector of pre-treatment characteristics within a one-dimensional index, the propensity score p_{it}, and therewith reduce the number of variables that enter the matching function to one in order to overcome the "curse of dimensionality". To obtain the propensity score, I estimate the following pooled probit model on the sample of treated firms and firms that never get protection as potential control group. The group of treated firms is restricted to include only those firms that get protection from an AD case initiated between 2002 and 2007, but not before. This allows us to match on pre-treatment characteristics, considering the limited period from 2000 to 2007 for which firm-level data is available:

$$\begin{aligned} Pr\{INIT_{it} = 1\} = \Phi(&\beta_0 + \beta_1 PCM_{i,t-1} + \beta_2 PCMGWTH_{i,t-1} + \beta_3 IMPGWTH_{j,t-1} \\ &+\beta_4 IMPP_{j,t-1} + \beta_5 LOGCAP_{i,t-1} + \beta_6 TAR9600DIFF_j + \beta_7 YEAR_t). \end{aligned} \tag{3}$$

The dependent variable $INIT_{it}$ equals one if a firm i initiates for the first time in year t a case for which protection is granted and zero otherwise. $\Phi(.)$ is the normal cumulative distribution function, j is an industry index at the NIC 4-digit industry level. The independent variables are required to capture all characteristics that have an impact on both PCM and the probability of getting protection. The selection of characteristics takes into account some findings of the recent literature.

We include the price cost margin, PCM, and its growth rate, $PCMGWTH$. If the PCM follows the same trend before protection for both groups of firms, we may expect the same trend to persist for both groups of firms if protection does not have any effect on the PCM. Furthermore, market power of firms and industry concentration as proxied by the PCM level may be relevant for the decision of the Indian government to grant protection as shown by Baruah (2007). We as well include import growth $IMPGWTH$ which is an important factor that the Indian governments considers when it establishes the link between dumping and injury during the AD investigations. $IMPP$ is the import penetration ratio defined as imports over the sum of domestic industry sales and imports and is important for the determination of AD policy decisions (Konings and Vandenbussche, 2005; Blonigen and Park, 2004). As a measure for firm size, we include $LOGCAP$, the logarithm of deflated net fixed assets of a firm. $TAR9600DIFF$ is the difference between the average applied tariff levels of 2000 compared to 1996. Bown and Tovar (2009) show that especially firms in those sectors that experienced a large decrease in import tariffs during the Indian trade liberalization period are the ones that get AD protection. Finally, we include a set of year dummies. All independent variables are introduced with a lag, taking into account that governments grant protection based on past firm performance and minimizing the risk of endogeneity due to ex-ante behavioural adjustments of firms.

Given the propensity score, we apply nearest-neighbour matching where we choose for each treated firm a single nearest neighbour. In order to guarantee unbiased results, we restrict our sample to the common support of the propensity score. Matching is done without replacement such that a firm is dropped from the dataset once it is matched and cannot be matched to another treated firm. Considering each firm only once reduces the variance of our estimates and is unlikely to create a relevant bias as a considerable number of untreated potential control firms is available for a match within each interval of the common support. This avoids the problem of matching two different firm-year observations belonging to the same firm to two different treated firms. To guarantee that results do not depend on factors related to the matching order, this order is generated randomly as proposed by Caliendo and Kopeinig (2008).

We end up with a control group of matched firm-year observations where we consider the year in which a firm is matched as the hypothetical year of initiation of an AD case. We check if the PCM of these firms changes signficantly in the years afterwards by estimating equation (2).

4 Results

4.1 Matching procedure: Pooled probit model and nearest neighbour matching

First, we discuss the results of the matching procedure as outlined in the previous section. The results of the pooled probit estimation introduced in (3) are reported in Table 7. Although the regression itself is not in the focus of our paper, we get some confidence about the choice of variables when looking at the estimated coefficients. These mostly carry the expected sign when significant: An incease of foreign competition measured by import growth tends to have a positive effect on the likelihood of protection. Where import growth does not play any significant role, a high level of foreign competition measured by the import penetration ratio tends to positively affect the probability of AD protection. If firms are in sectors that experienced a decrease in import tariffs between 1996 and 2000, they are more likely to get protection which is in line with the findings of Bown and Tovar (2009). Furthermore, large firms with more market power as measured by the PCM and a lower growth rate of the PCM are more likely to initiate a case for which protection is granted.

Figures 3-6 show the kernel density estimates of the propensity scores before and after the matching for the four methods. Although there are quite large differences in the distributions before the matching, the common support restriction is never binding in the sense that there are no observations for treated firms outside the common support that we need to drop. After the matching procedure, the estimated density functions are almost identical. In Tables 8-11 we report the means of the matching arguments for treated

and matched firms and perform t-tests for the inequality of these means. For all variables and all methods with the exception of one case, we cannot reject the null at a significance level of 5% that the independent variables' means of treated firms and firms in the selected control group are equal which by and large confirms our success in matching.

4.2 Effect of AD protection on markups: Single-difference equations

Now let us turn to the results of our main interest, the estimation of the effect of AD protection on markups. Results of fixed effect (FE) regressions are reported in Tables 12-14 for all four methods: *firm*, *all NIC*, *all EA* and *HS-NIC*.[19] For all regressions, we observe that standard errors of the estimated coefficient of PR_{it} X $YEAR\_S_{it}$ tend to increase in S. This is what we expect. There are far more observations of the PCM for the first year of protection than for the fifth year of protection: For an AD case for which protection is granted from 2003 on, we observe the PCM for the first as well as for the fifth year of protection while for an AD case for which protection was granted not earlier than 2007, we just observe the PCM in the first year of protection. We always test for the validity of instruments chosen for the capital over sales ratio and the market share. As we use more than one instrument, we can test overidentifying restrictions. At the 5% significance level, the heteroskedasticity robust Hansen's J test cannot reject the exogeneity of instruments with respect to the PCM. We as well compute the Cragg-Donald F-Statistic in order to check for weak identification and find reasonable values that are mostly above the critical ones derived by Stock and Yogo (2005).

Irrespective of the method used to identify protected firms, we find a sigificantly positive effect of AD protection on the PCM of these firms as shown in Table 12. For three of the four methods, this positive effect does not yet significantly show up in the first period of protection. This is possibly due to the fact that we count a year as "protection year" even if protection is in place for less than twelve months (but more than six months) of this year. For one method, *all EA*, the significantly positive effect shows up only in the fifth year protection is in place. However, what all regressions for treated firms have remarkably in common is the pattern of the positive effect that is found in the regressions: the effect of AD protection tends to become stronger over time, a finding that is to our knowledge new in the literature. There are five explanations that could possibly explain such a pattern: First, higher prices that lead to a larger PCM may not need to be easily absorbed by price-sensitive consumers such that a slow upward adjustment of prices over time may be more profitable for firms. Second, as Konings and Vandenbussche (2008), based on the model by Lileeva

[19]We compute the Hausman test statistic to compare FE with random effects (RE) regressions. For no regression we can reject the more efficient RE estimation. However, as the two methods yield almost identical results and as the use of FE methods is much more common in the relevant literature, we report only the results of the FE regressions. For these, consistency does not rely on the additional assumption of zero correlation between the firm-specific effect and the other regressors.

and Trefler (2007), argue, some firms possibly undertake productivity-improving investments induced by a larger market created by AD protection. Such cost reducing investments may generate larger PCMs, but need some time to leave rents. Third, scale effects may play a role such that firms reduce their costs by producing more in order to fill the protection-induced gap in supply. Fourth, firms may strategically try to push their prices up in later periods in order to make further dumping findings against other target countries or a confirmation of the current AD measures in reviews more likely. Fifth, some firms are granted increased protection by the government resulting from other AD cases initiated after the first AD case. This may result in a stronger average effect found for later years of protection.

The magnitude of the effect is quite large: from an increase of the PCM of between 3.8 and 7.4 percentage points (pp) in the second protection year relative to years in which there is no protection up to an increase of between 8.8 and 14.0 pp in the fifth protection year. For the sample of firms that are mentioned in the AD notifications, the magnitudes of the effect tend to be relatively large: among these firms there are those that file or support a petition willing to incur the fixed costs of filing and providing information to governments in order to get protection. It seems reasonable to assume that these firms are likely to have a lot to gain from protection. The magnitudes of our estimates are comparable to the 4 pp increase in the PCM due to AD policy that is found by Konings and Vandenbussche (2005) for EU firms.

In order to verify that the PCM of Indian firms increases due to the imposition of AD measures, we need to compare the results obtained for treated firms to the ones derived for control firms. As Tables 13 and 14 show, we indeed do not find any significantly positive effect of AD protection on the PCM for both control groups in most of the cases. There are, however, two exceptions: First, for two of those control groups that contain firms involved in termination cases, we find a significantly positive effect in the fifth protection year (first and fourth column of Table 13), in the first column following a pattern of increasing coefficients similar to the one found for treated firms. This result suggests that firms that withdraw their cases or do not get any protection may nevertheless benefit from the mere initiation of an AD case albeit to a smaller extent. Here, collusive behaviour of firms may play a role as discussed by (Zanardi, 2004b). Second, for the matched control groups, two significantly positive coefficients show up when the *HS-NIC* method is used for the identification of protected firms (second column of Table 14). Exact reasons for this still have to be explored.[20] On the whole, however, these exceptions do not seem to alter our conclusion that Indian AD protection seems to have a positive effect on the PCM of Indian import-competing firms.

[20]One reason could be that the standard errors reported in the regressions for the matched control group are likely to underestimate the true standard errors, potentially indicating significance when there actually is none. This is because the uncertainty generated by the fact that we match on the estimated and not on the true propensity score is not taken into account (Blundell and Costa Dias, 2009). A solution could be bootstrapping which, however, would cause inconsistency problems in our case for nearest neighbour matching (Abadie and Imbens, 2008).

5 Conclusions

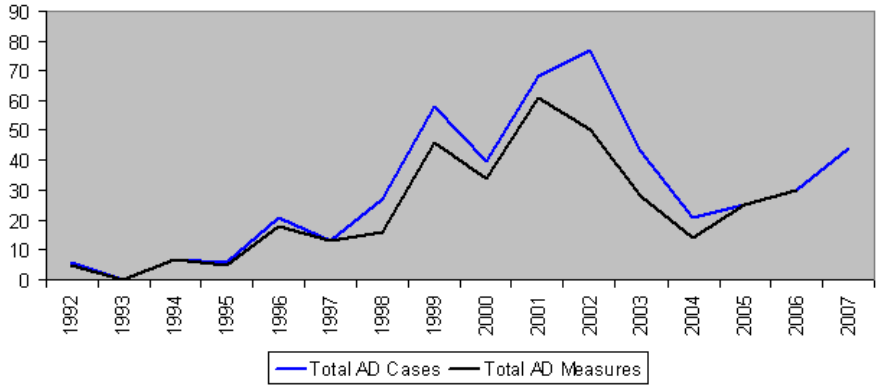
This is one of the first studies examining the firm-level effects of AD policy in a developing country. Focusing on India, we use a rich firm-level dataset in order to analyse the effects of AD protection on markups of protected firms. We find a significant increase of the PCM when treated firms are protected by an AD measure while such a finding is absent for basically all control groups of firms involved in termination cases as well as for most of the control groups that are identified through the use of matching techniques. The magnitude of the effect is quite significant and increases with the number of years that firms are protected.

Further research is needed in order to determine through which channel the observed increase of the PCM of domestic import-competing firms occurs, whether it involves only a price effect or as well an effect on marginal costs. Future studies may as well make use of more elaborate methods to estimate markups such as the Roeger (1995) method as applied by Konings and Vandenbussche (2005) and Vandenbussche and Zarnic (2008).

Although our results suggest that domestic import-competing firms benefit to a large extent from AD protection, the significant increase of market power due to AD protection is likely to lower the degree of competition in the industry, hereby adversely affecting consumers. Also the effect of Indian AD protection on domestic import-using and exporting firms is not considered in this study. While the former may be directly affected when using the imported good on which an AD duty is levied as input into production, the latter may indirectly face retaliatory trade protection when exporting to India's trade partners. In order to provide a broader picture of Indian AD policy and its implications on the domestic economy, these other agents need to be taken into account as well. This is the path of future research on which we intend to embark.

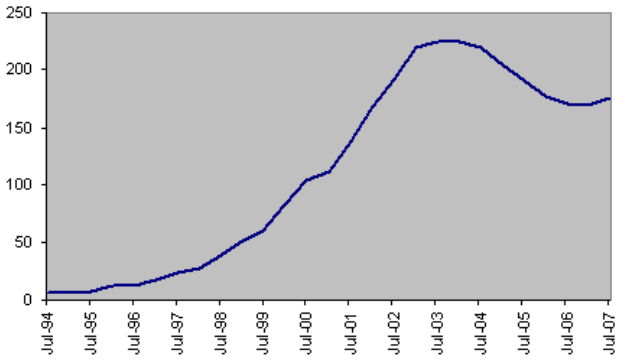
Appendix

Figure 1: Number of Indian AD initiations and measures



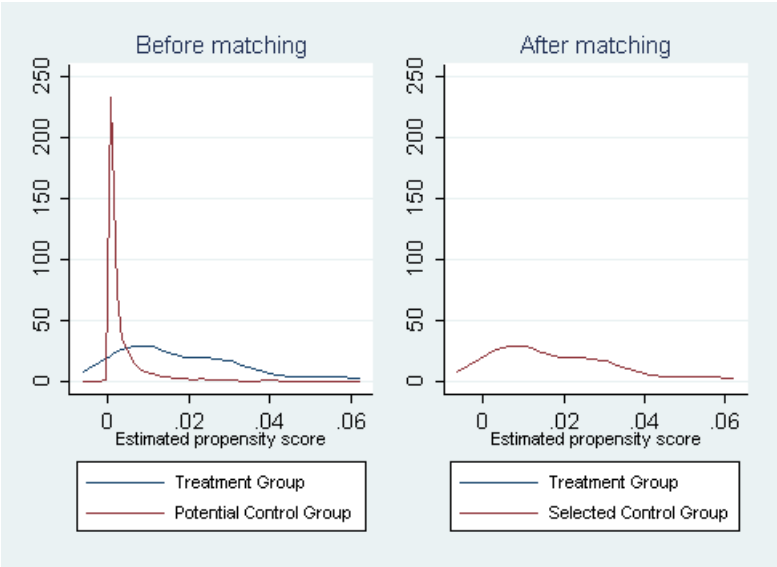
Source: Own database with information from Indian government notifications and semi-annual reports to the WTO.

Figure 2: Number of Indian AD measures in force



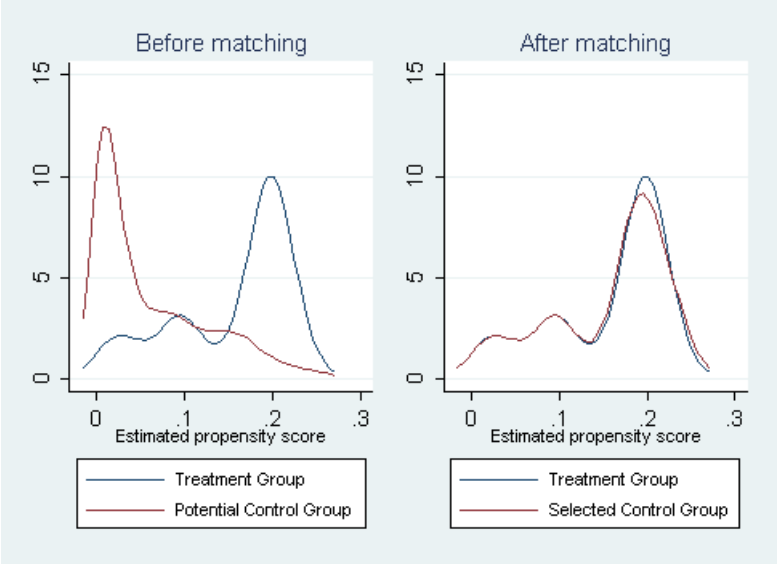
Source: Own database with information from Indian government notifications and semi-annual reports to the WTO.

Figure 3: Kernel density estimates of the propensity score - *firm* method



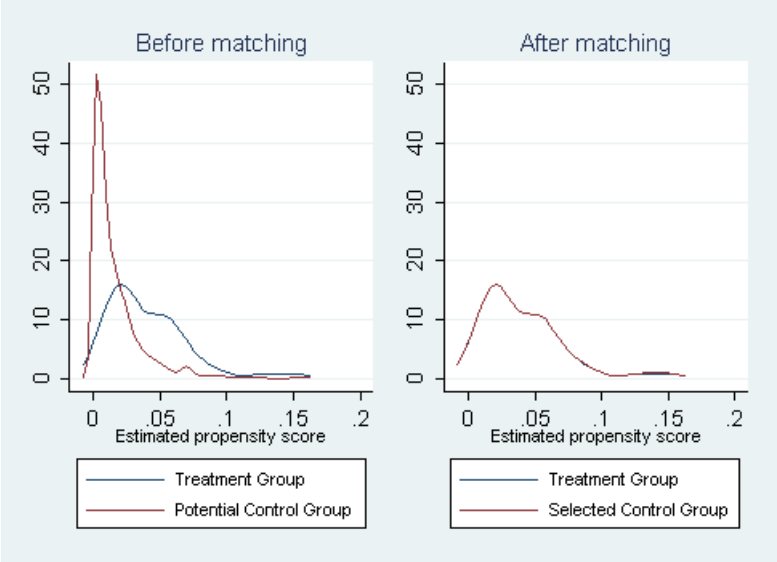
Notes: Potential control group includes all firm-year observations of firms never involved in AD cases. Treatment group includes all firm-year observations of protected firms in the year in which they initiated the AD case. Propensity score estimates are based on the probit model in equation (3).

Figure 4: Kernel density estimates of the propensity score - *HS-NIC* method



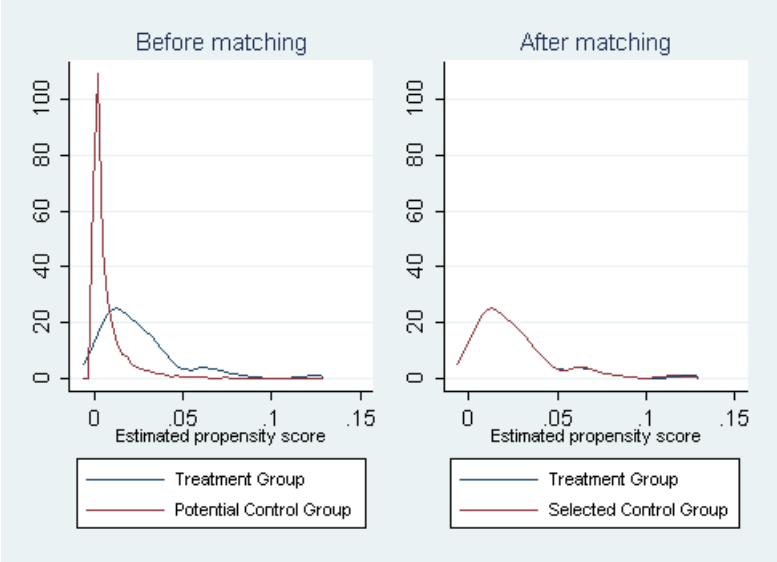
Notes: See Figure 3.

Figure 5: Kernel density estimates of the propensity score - *all NIC* method



Notes: See Figure 3.

Figure 6: Kernel density estimates of the propensity score - *all EA* method



Notes: See Figure 3.

Table 1: Prowess descriptive statistics for all manufacturing firms, 2000-2007

Variable	Mean	Std. Dev.	Min.	Max.	Average # obs. per year
Sales	164.90	1271.74	0.00	73861.39	3387
Domestic Market Share	0.032	0.096	0.00	1.00	3387
Raw Materials	73.35	494.51	-33.40	27258.28	3310
Wages	6.89	35.95	0.00	2026.81	3351
Net Fixed Assets	67.82	417.38	-1.23	22046.64	3411
PCM	0.45	0.19	0.00	1.00	3216

Source: Own calculations based on Prowess. Notes: PCM is calculated based on equation (1). Domestic market share in industry was computed as sales over sum of all firms' sales in a 4-digit NIC industry. Sales, raw material expenses, wages and net fixed assets are WPI deflated (Base-year 1993-1994) and reported in 10 Mio. Rupees. Statistics reported for cleaned data.

Table 2: AD cases and their outcomes by initiation year

Outcome	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07
Aff. Find. AD measure	5	0	7	5	18	13	18	46	34	61	51	28	14	25	30	20
Aff. Find. No measure	0	0	0	0	3	0	2	2	0	0	0	0	0	0	0	0
Neg. Find. No measure	1	0	0	0	0	0	6	9	3	1	25	12	5	0	0	0
Withdrawn No measure	0	0	0	1	0	0	1	1	3	6	1	3	2	0	0	11
Under investigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
TOTAL	6	0	7	6	21	13	27	58	40	68	77	43	21	25	30	44

Source: Own database with information from Indian government notifications and semi-annual reports to the WTO.

Table 3: AD initiations by target country

Target Country	Number of Initiations
China	102
European Union	38
South Korea	38
Taiwan	36
USA	27
Japan	24
Singapore	21
Thailand	21
Indonesia	19
Russia	16
Others	144

Source: Own database with information from Indian government notifications and semi-annual reports to the WTO.

Table 4: AD initiations in the manufacturing sector by industry

NIC	Sector	Number of initiations
15	Food products and beverages	7
17	Textiles	11
19	Leather	1
21	Paper and paper products	15
22	Publishing and printing	1
23	Coke, petroleum products, nuclear fuel	2
24	Chemicals and chemical products	336
25	Rubber and plastic products	11
26	Other non-metallic mineral products	10
27	Basic metals	45
29	Machinery and equipment	14
31	Electrical machinery and apparatus	25
32	Radio, TV and communication equipment	8
33	Medical, precision and optical instruments	5
34	Motor vehicles, trailers, semi-trailers	1

Source: Own database with information from Indian government notifications and semi-annual reports to the WTO. HS codes of each case were matched to one or in few cases to several NIC codes using the procedure described in footnote 15.

Table 5: Firms that are mentioned in the AD notifications

Multiple counting of firms	
Number of all firms mentioned in AD notifications	710
Production share that they at least account for in average	0.78
Number of firms identified in Prowess	560
By status:	
Petitioners	177
Supporters	340
Other firms	188
Status unknown	5
Single counting of firms	
Number of all different firms mentioned in AD notifications	411
Number of firms identified in Prowess	285

Source: Own database with information from Indian government notifications.

Table 6: Descriptive statistics for import and tariff data

Variable	Mean	Std. Dev.	Min.	Max.	Average # obs. per year
Industry Import Penetration	0.281	0.288	0	1	129
Industry Import Growth	-0.004	2.061	-57.838	0.822	130
Import Tariff Change 96-00	-7.010	15.576	-131.286	19.251	113

Source: *Export Import Databank* of the Indian Ministry of Commerce and Industry, *Prowess*, *Integrated Data Base* (IDB) of the WTO. Notes: Import Tariff Change 96-00 is in percentage points.

Table 7: Results of probit regression

	(1) Firm	(2) HS-NIC	(3) all NIC	(4) all EA
Lagged Industry Import Penetration	0.747***	-1.325***	-0.343	0.705***
	(0.231)	(0.255)	(0.318)	(0.185)
Lagged Industry Import Growth	0.060	0.609***	-0.036	0.057
	(0.119)	(0.067)	(0.026)	(0.096)
Industry Import Tariff Change 96-00	-0.013***	-0.018***	-0.009***	-0.005*
	(0.004)	(0.004)	(0.003)	(0.003)
Lagged log(Net Fixed Assets)	0.292***	0.036**	0.206***	0.195***
	(0.034)	(0.017)	(0.036)	(0.032)
Lagged PCM	0.387	0.339**	-0.311	0.000
	(0.268)	(0.161)	(0.292)	(0.224)
Lagged PCM Growth	-0.532**	-0.397***	-0.194	-0.088
	(0.223)	(0.133)	(0.314)	(0.200)
Year dummies	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Observations	14050	3852	2709	10278

Notes: ***, ** and * indicate a significance level of 1%,5% and 10%, respectively. Reported are coefficients, not marginal effects. Reported standard errors are cluster robust.

Table 8: Matching results and test for balancing property - *firm* method

Variable	Protected firms N=35	Potential control group N=13880		Selected control group N=35	
	Mean (Std. Dev.)	Mean (Std. Dev.)	p-value of t-Test	Mean (Std. Dev.)	p-Value of t-Test
Lagged Ind. Import Penetr.	0.208 (0.201)	0.191 (0.197)	0.64	0.146 (0.193)	0.20
Lagged Ind. Imp. Growth	0.071 (0.209)	-0.008 (1.746)	0.05	-0.034 (0.619)	0.35
Ind. Imp. Tar. Change 96-00	-9.287 (5.956)	-5.501 (9.822)	0.00	-7.366 (7.505)	0.24
Lagged log(Net Fixed Assets)	4.602 (1.443)	2.226 (1.698)	0.00	4.815 (1.590)	0.56
Lagged PCM	0.533 (0.142)	0.451 (0.187)	0.00	0.525 (0.193)	0.84
Lagged PCM Growth	-0.026 (0.112)	0.031 (0.309)	0.01	-0.038 (0.161)	0.71
Propensity Score p	0.017 (0.015)	0.002 (0.007)	0.00	0.017 (0.015)	1.00

Notes: N is the number of observations. Protected firms and Selected control group columns include firm-year observations belonging to different firms. Potential control group column also includes several firm-year observations belonging to one firm. Seven year dummies not reported. p-value of t-test refers to the p-value of a two-sided t-test on mean equality.

Table 9: Matching results and test for balancing property - *HS-NIC* method

Variable	Protected firms N=279	Potential control group N=3019		Selected control group N=279	
	Mean (Std. Dev.)	Mean (Std. Dev.)	p-value of t-Test	Mean (Std. Dev.)	p-Value of t-Test
Lagged Ind. Import Penetr.	0.118 (0.139)	0.203 (0.215)	0.00	0.119 (0.142)	0.95
Lagged Ind. Imp. Growth	0.224 (0.086)	-0.381 (3.745)	0.00	0.232 (0.270)	0.65
Ind. Imp. Tar. Change 96-00	-10.962 (1.896)	-5.178 (12.144)	0.00	-6.874 (9.496)	0.00
Lagged log(Net Fixed Assets)	2.570 (1.612)	2.150 (1.822)	0.00	2.533 (1.892)	0.80
Lagged PCM	0.480 (0.155)	0.447 (0.192)	0.00	0.492 (0.211)	0.45
Lagged PCM Growth	-0.023 (0.178)	0.033 (0.321)	0.00	-0.043 (0.237)	0.27
Propensity Score p	0.156 (0.067)	0.066 (0.080)	0.00	0.156 (0.067)	0.99

Notes: See Table 8.

Table 10: Matching results and test for balancing property - *all NIC* method

Variable	Protected firms N=46	Potential control group N=2606		Selected control group N=46	
	Mean (Std. Dev.)	Mean (Std. Dev.)	p-value of t-Test	Mean (Std. Dev.)	p-Value of t-Test
Lagged Ind. Import Penetr.	0.166 (0.184)	0.237 (0.225)	0.01	0.128 (0.156)	0.28
Lagged Ind. Imp. Growth	-0.117 (0.474)	0.002 (0.773)	0.10	-0.027 (0.497)	0.38
Ind. Imp. Tar. Change 96-00	-8.706 (5.572)	-6.269 (10.005)	0.01	-8.417 (10.746)	0.87
Lagged log(Net Fixed Assets)	3.438 (1.712)	1.973 (1.650)	0.00	3.130 (1.671)	0.38
Lagged PCM	0.454 (0.151)	0.447 (0.195)	0.77	0.452 (0.202)	0.96
Lagged PCM Growth	-0.004 (0.364)	0.039 (0.309)	0.43	-0.020 (0.155)	0.78
Propensity Score p	0.041 (0.031)	0.016 (0.022)	0.00	0.041 (0.030)	1.00

Notes: See Table 8.

Table 11: Matching results and test for balancing property - *all EA* method

Variable	Protected firms N=67	Potential control group N=9948		Selected control group N=67	
	Mean (Std. Dev.)	Mean (Std. Dev.)	p-value of t-Test	Mean (Std. Dev.)	p-value of t-Test
Lagged Ind. Import Penetr.	0.275 (0.198)	0.221 (0.210)	0.03	0.243 (0.231)	0.38
Lagged Ind. Imp. Growth	0.049 (0.162)	0.072 (0.446)	0.25	0.080 (0.202)	0.32
Ind. Imp. Tar. Change 96-00	-7.483 (5.708)	-6.001 (9.353)	0.04	-5.670 (8.485)	0.15
Lagged log(Net Fixed Assets)	3.386 (1.722)	2.059 (1.617)	0.00	3.287 (1.583)	0.73
Lagged PCM	0.482 (0.141)	0.446 (0.188)	0.04	0.446 (0.182)	0.20
Lagged PCM Growth	0.007 (0.262)	0.028 (0.303)	0.52	-0.007 (0.275)	0.77
Propensity Score p	0.024 (0.022)	0.006 (0.011)	0.00	0.024 (0.021)	0.98

Notes: See Table 8.

Table 12: Regressions for treatment groups

	Dependent variable: PCM			
	(1)	(2)	(3)	(4)
	Firm	HS-NIC	all NIC	all EA
Market Share	-1.067*	-0.421***	0.570	-0.630
	(0.549)	(0.127)	(0.598)	(0.514)
Capital over Sales	0.142*	-0.016	-0.008	0.037**
	(0.074)	(0.014)	(0.010)	(0.015)
$PR\ X\ YEAR\_1$	0.018	0.006	0.046***	-0.004
	(0.014)	(0.011)	(0.016)	(0.018)
$PR\ X\ YEAR\_2$	0.038**	0.045**	0.074***	0.002
	(0.019)	(0.018)	(0.028)	(0.019)
$PR\ X\ YEAR\_3$	0.055*	0.056***	0.079***	0.030
	(0.030)	(0.016)	(0.026)	(0.027)
$PR\ X\ YEAR\_4$	0.081**	0.065***	0.126***	0.053
	(0.037)	(0.020)	(0.035)	(0.033)
$PR\ X\ YEAR\_5$	0.116**	0.092***	0.140***	0.088**
	(0.055)	(0.029)	(0.047)	(0.044)
$PR\ X\ YEAR\_6$			0.110*	
			(0.061)	
Year dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
R-squared	0.311	0.108	0.232	0.060
Hansen's J test p-value	0.53	0.25	0.19	0.08
Observations	242	1728	308	441
Number of firms	35	279	46	67

Notes: ***, ** and * indicate a significance level of 1%,5% and 10%, respectively. Reported standard errors are cluster robust. "Capital over Sales" and "Market Share" are instrumented with their lagged values at t-1 and t-2.

Table 13: Regressions for termination control groups

	Dependent variable: PCM			
	(1)	(2)	(3)	(4)
	Firm	HS-NIC	all NIC	all EA
Market Share	-0.131	-0.527**	-0.972**	-0.177
	(0.462)	(0.259)	(0.493)	(0.516)
Capital over Sales	0.007	0.017***	-0.025	0.067
	(0.005)	(0.004)	(0.024)	(0.061)
$PR\ X\ YEAR\_1$	-0.035	-0.038***	-0.008	0.052
	(0.030)	(0.014)	(0.031)	(0.045)
$PR\ X\ YEAR\_2$	-0.018	-0.020	-0.033	0.040
	(0.027)	(0.019)	(0.038)	(0.037)
$PR\ X\ YEAR\_3$	0.041	-0.035	-0.072	0.047
	(0.048)	(0.026)	(0.063)	(0.081)
$PR\ X\ YEAR\_4$	0.046	-0.035	-0.114	0.117
	(0.043)	(0.034)	(0.085)	(0.077)
$PR\ X\ YEAR\_5$	0.087**	-0.044	-0.088	0.113**
	(0.042)	(0.042)	(0.128)	(0.052)
Year dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
R-squared	0.266	-0.037	-0.061	-0.043
Hansen's J test p-value	0.27	0.89	0.15	0.23
Observations	116	1260	334	281
Number of firms	17	236	58	51

Notes: ***, ** and * indicate a significance level of 1%,5% and 10%, respectively. Reported standard errors are cluster robust. "Capital over Sales" and "Market Share" are instrumented with their lagged values at t-1 and t-2.

Table 14: Regressions for matched control groups

	Dependent variable: PCM			
	(1)	(2)	(3)	(4)
	Firm	HS-NIC	all NIC	all EA
Market Share	-0.060	-0.010	-0.617	-0.194
	(1.138)	(0.184)	(0.393)	(0.300)
Capital over Sales	0.124	-0.001	0.016***	-0.018**
	(0.673)	(0.016)	(0.003)	(0.007)
$PR\ X\ YEAR\_1$	0.009	0.027**	-0.043	-0.041**
	(0.021)	(0.013)	(0.048)	(0.021)
$PR\ X\ YEAR\_2$	-0.016	0.019	-0.101*	-0.020
	(0.029)	(0.026)	(0.061)	(0.023)
$PR\ X\ YEAR\_3$	0.004	0.038	-0.140**	0.001
	(0.059)	(0.031)	(0.071)	(0.037)
$PR\ X\ YEAR\_4$	-0.020	0.045	-0.192	-0.006
	(0.092)	(0.028)	(0.153)	(0.050)
$PR\ X\ YEAR\_5$	-0.036	0.085**	-0.233	0.007
	(0.144)	(0.037)	(0.152)	(0.061)
Year dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
R-squared	0.000	0.024	0.032	-0.064
Hansen's J test p-value	0.45	0.75	0.42	0.40
Observations	234	1672	305	435
Number of firms	35	279	46	67

Notes: ***, ** and * indicate a significance level of 1%,5% and 10%, respectively. Reported standard errors are cluster robust. "Capital over Sales" and "Market Share" are instrumented with their lagged values at t-1 and t-2.

References

Abadie, Alberto and Guido W. Imbens (2008) "On the Failure of the Bootstrap for Matching Estimators," *Econometrica*, Vol. 76, No. 6, pp. 1537–1557.

Baruah, Nandana (2007) "An Analysis of Factors Influencing the Anti-Dumping Behaviour in India," *The World Economy*, Vol. 30, No. 7, pp. 1170–1191.

Blonigen, Bruce A. and Jee-Hyeoung Park (2004) "Dynamic Pricing in the Presence of Antidumping Policy: Theory and Evidence," *American Economic Review*, Vol. 91, No. 1, pp. 134–154.

Blonigen, Bruce A., Benjamin H. Liebman, and Wesley W. Wilson (2007) "Trade Policy and Market Power: The Case of the US Steel Industry." NBER Working Paper 13671, National Bureau of Economic Research, Cambridge (MA).

Blundell, Richard and Monica Costa Dias (2009) "Alternative Approaches to Evaluation in Empirical Microeconomics," *Journal of Human Resources*, Vol. 44, No. 3, pp. 565–640.

Bown, Chad P. (2008) "The WTO and Antidumping in Developing Countries," *Economics and Politics*, Vol. 20, No. 2, pp. 255–288.

Bown, Chad P. and Patricia Tovar (2009) "Trade Liberalization, Antidumping, and Safeguards: Evidence from India's Tariff Reform." Working Paper, Brandeis University, Waltham (MA).

Caliendo, Marco and Sabine Kopeinig (2008) "Some Practical Guidance for the Implementation of Propensity Score Matching," *Journal of Economic Surveys*, Vol. 22, No. 1, pp. 31–72.

De Locker, Jan (2007) "Do Exports Generate Higher Productivity? Evidence from Slovenia," *Journal of International Economics*, Vol. 73, No. 1, pp. 69–98.

Debroy, B. and A.T. Santhanam (1993) "Matching Trade Codes with Industrial Codes," *Foreign Trade Bulletin*, Vol. 24, No. 1.

Ganguli, Bodhisattva (2008) "The Trade Effects of Indian Antidumping Actions," *Review of International Economics*, Vol. 16, No. 5, pp. 930–941.

Goldberg, Pinelopi K., Amit Khandelwal, Nina Pavcnik, and Petia Topalova (2010a) "Imported Intermediate Inputs and Domestic Product Growth: Evidence from India," *Quarterly Journal of Economics*, Vol. 125, No. 4, pp. 1727–67.

——— (2010b) "Multi-Product Firms and Product Turnover in the Developing World: Evidence from India," *Review of Economics and Statistics*, Vol. 92, No. 4, pp. 1042–49.

Grether, Jean-Marie (1996) "Mexico, 1985-90: Trade Liberalization, Market Structure, and Manufacturing Performance," in Mark J. Roberts and James R. Tybout eds. *Industrial Evolution in Developing Countries: Micro Patterns of Turnover, Productivity, and Market Structure*, Oxford: Oxford University Press, Chap. 11, pp. 260–284.

Heckman, James, Hidehiko Ichimura, and Petra Todd (1998) "Matching as an Econometric Evaluation Estimator," *Review of Economic Studies*, Vol. 65, No. 2, pp. 261–294.

Helpman, Elhanan and Paul Krugman (1989) *Trade Policy and Market Structure*, Cambridge (MA): MIT Press.

IMF, International Monetary Fund (2009) "World Economic Outlook, Emerging and Developing Countries List, Database: WEO Groups and Aggregates Information." http://www.imf.org/external/pubs/ft/weo/2009/01/weodata/groups.htm#ae [August 19, 2009].

Konings, Jozef and Hylke Vandenbussche (2005) "Antidumping Protection and Markups of Domestic Firms," *Journal of International Economics*, Vol. 65, No. 1, pp. 151–165.

——— (2008) "Heterogeneous Responses of Firms to Trade Protection," *Journal of International Economics*, Vol. 76, No. 2, pp. 371–383.

Lileeva, Alla and Daniel Trefler (2007) "Improved Access to Foreign Markets Raises Plant-Level Productivity ... for Some Plants." NBER Working Paper No. 13297, National Bureau of Economic Research, Cambridge (MA).

Malhotra, Nisha and Shavin Malhotra (2008) "Liberalization and Protection: Antidumping Duties in the Indian Pharmaceutical Industry," *Journal of Economic Policy Reform*, Vol. 11, No. 2, pp. 115–122.

Narayanan, Prakash (2006) "Anti-dumping in India: Present State and Future Prospects," *Journal of World Trade*, Vol. 40, No. 6, pp. 1081–1097.

Nieberding, James F. (1999) "The Effect of U.S. Antidumping Law on Firms' Market Power: An Empirical Test," *Review of Industrial Organization*, Vol. 14, No. 1, pp. 65–84.

Roberts, Mark J. (1996) "Colombia, 1977-1985: Producer Turnover, Margins, and Trade Exposure," in Mark J. Roberts and James R. Tybout eds. *Industrial Evolution in Developing Countries: Micro Patterns of Turnover, Productivity, and Market Structure*, Oxford: Oxford University Press, Chap. 10, pp. 227–259.

Roeger, Werner (1995) "Can Imperfect Competition Explain the Difference between Primal and Dual Productivity Measures? Estimates for U.S. Manufacturing," *Journal of Political Economy*, Vol. 103, No. 2, pp. 316–330.

Rosenbaum, Paul R. and Donald B. Rubin (1983) "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika*, Vol. 70, No. 1, pp. 41–55.

Stock, James H. and Motohiro Yogo (2005) "Testing for Weak Instruments in Linear IV Regression," in Donald Andrews and James H. Stock eds. *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*, Cambridge: Cambridge University Press, pp. 80–108.

Topalova, Petia (2007) "Trade Liberalization and Firm Productivity: The Case of India." March 2007 paper, originally published as IMF Working Paper WP/04/28, International Monetary Fund, Washington DC.

Tybout, James R. (1996) "Chile, 1979-1986: Trade Liberalization and its Aftermath," in Mark J. Roberts and James R. Tybout eds. *Industrial Evolution in Developing Countries: Micro Patterns of Turnover, Productivity, and Market Structure*, Oxford: Oxford University Press, Chap. 9, pp. 200–226.

——— (2003) "Plant- and Firm-level Evidence on New Trade Theories," in K. Choi and J. Hartigan eds. *The Handbook of International Trade 1*, Oxford: Blackwell Publishing.

UN, United Nations (2009) "United Nations Statistics Division: Classifications Registry." http://unstats.un.org/unsd/cr/registry/regs.asp?Lg=1 [August 21, 2009].

Vandenbussche, Hylke and Maurizio Zanardi (2008) "What Explains the Proliferation of Antidumping Laws?" *Economic Policy*, Vol. 23, pp. 93–138.

——— (2010) "The Chilling Trade Effects of Antidumping Proliferation," *European Economic Review*, Vol. 54, pp. 760–77.

Vandenbussche, Hylke and Ziga Zarnic (2008) "US Safeguards on Steel and the Markups of European Producers," *Review of World Economics*, Vol. 144, No. 3, pp. 458–490.

WTO, World Trade Organization (2009a) "Statistics on Anti-Dumping." http://www.wto.org/english/tratop_E/adp_e/adp_e.htm#statistics [July 16, 2009].

——— (2009b) *World Trade Report 2009: Trade Policy Commitments and Contingency Measures*, Geneva.

Zanardi, Maurizio (2004a) "Anti-dumping: What are the Numbers to Discuss at Doha?" *World Economy*, Vol. 27, No. 3, pp. 403–433.

——— (2004b) "Antidumping Law as a Collusive Device," *Canadian Journal of Economics*, Vol. 37, No. 1, pp. 95–122.