Trade Effects of EU Antidumping Measures

by

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Abstract

This paper investigates the trade effects of EU antidumping measures. While other studies consider the extent to which trade diverts from named to non-named countries, we narrow down our analysis and examine how each named country responds to the duty it faces. We also extend our analysis to investigate how other countries, both named and non-named, benefit from the duty imposed on a particular country. Our results suggest that the duty size, though insignificant in other studies, is significantly responsible for a reduction in trade from dumping country. Moreover, in contrast to conventional belief, we find that producers from non-market economies are more sensitive to the duty, controlling for other factors.

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1. Introduction

The implementation of antidumping (AD) measures can alter the incentives and behaviour of firms engaged in antidumping cases. Although the theory literature on AD is well developed, we still know little about firms' responses in the presence of a third country whose producers are not subject to antidumping action. It is also difficult in theory to incorporate the fact that different firms in the same antidumping case actually face different degrees of protection. Some empirical studies do attempt to analyse the effects of AD on named countries as well as on non-named. The key finding is that action reduces imports from the named countries but increases them from non-named ones. This effect is referred to as “trade diversion”. Three major analysis of the phenomenon are Prusa (1997), Brenton (2001), and Konings et al. (2001).

Prusa (1997) considers US antidumping cases initiated between 1980 and 1988 and finds that the increased imports from non-named countries are large enough to offset the fall in imports from named countries. This suggests that trade diversion in the US is so strong that it could mitigate the effect of AD action or even hurt US producers. For the EU, Konings et al. (2001) examine AD cases filed between 1985 and 1990 while Brenton (2001) covers those filed between 1989 and 1994. Both also find evidence of trade diversion; however, it is not as strong as in the US.

Staiger and Wolak (1994) argue that the threat of antidumping activity could undermine trade from named countries even if the findings turn out to be negative. Producers named in a petition significantly reduce their exports destined to the US during the period of investigation. This implies that, whether or not the case is successful, the existence of antidumping law can distort firm behaviour. This effect is referred to as the “investigation effect”.

In this paper, we investigate the trade effects of EU antidumping measures. Even though it can be classed in the same category as those which focus on trade diversion, the main question is slightly different. Whereas other papers examine the trade effect on named and non-named countries as a whole, we analyse the effect on each dumping country. Thus we treat different countries in the same petition difficulty separately. The rationale for this is that, though named in the same petition, different producers face different AD measures.

Whereas other work takes into account all AD cases filed and these include cases ending up with a negative decision, antidumping duties or price undertakings. We narrow our focus and consider EU cases with definitive duties only, to highlight the extent to which the size of duty, which reflects the level of protection, influences the volumes of dumped imports.

As is evident in Staiger and Wolak (1994), the initiation of an antidumping petition discourages trade from named countries even if the real antidumping action does not take place. Moreover, in the EU, price undertakings are frequently agreed. Therefore, if one tries to emphasise how dumping firms respond to the AD duties, it would be complicated to separate the effect of duty out of the others' when AD cases with other types of action are also included. Hence we exclude these and concern ourselves only with cases where definitive duties are levied. By doing this, we are unable to compare the effects of different types of AD action, but will understand the role of AD duty more clearly. The final feature that distinguishes this study from others is time span. Here we take our sample from more recent cases. All EU cases with definitive duties which were first imposed between 1989 and 1998 are brought into the analysis.

The remainder of the paper is organised as follows. Section 2 gives an overview of EU antidumping activities. In section 3, we analyse the data and summarise some descriptive statistics. The following section focuses on model specification and econometric framework. In section 5, we report and discuss our results. Finally, concluding remarks are given in section 6.

2. EU Antidumping Activities

In this section, we begin by giving a brief overview of EU antidumping activities[1]. We then present an overview regarding EU affirmative cases with duties being imposed. Due to data limitations and different sources of information, we are unable to cover the same time period as above. The limitation of trade data used in

[1] The source of information is the WTO website (www.wto.org). This summarises the statistics regarding antidumping initiations and antidumping measures of the member countries from 01/01/95 to 31/12/03 which is up to date as compared to what is presented in the existing literature. This provides a broad picture of recent EU antidumping practice. For a thorough summary of antidumping practice worldwide, see Zanardi (2004).

our formal analysis forces us to consider the EU antidumping cases with duties being first collected in the years 1989 to 1998.

Overview of EU Practice

From 1995 to 2003, the EU was the third heaviest initiator of antidumping action, after India and the US. As shown in Table 1, the top five AD initiators were India, the US, the EU, Argentina and South Africa.

Table 1: AD initiations

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	*Total*
India	6	21	13	27	65	41	79	81	46	379
United States	14	22	15	36	47	47	76	35	37	329
EU	33	25	41	22	65	32	29	20	7	274
Argentina	27	22	14	8	23	45	26	14	1	180
South Africa	16	33	23	41	16	21	6	4	6	166

The EU initiated 274 cases from 01/01/95 to 31/12/03. In contrast to India data for the EU does not show a significant upward trend, but short-run fluctuations are observable. The EU average number of initiations is 33 per year. This peaks at 65 cases in 1999 and bottoms at 7 in 2003. The low number in 2003 is striking and mirrored elsewhere. Thus the number for Argentina drops from 14 in 2002 to only 1 in 2003; that for India is 81 in 2002 but 46 in 2003. For all WTO members, the number of AD initiations in 2003 is 210, the lowest since 1995. A possible explanation could be the large number of existing cases which have already restrained trade. This may explain why a number of developing countries that have recently become more aggressive users of AD have a low number of filings in 2003. These are, for example, Turkey, Thailand, Peru and India.

Of 274 petitions filed by the EU, 187 are affirmative. As we rank the top five countries that pursue antidumping action, the list is identical to those top initiators. Table 2 shows the numbers of AD measures in the top five. These are again India, the US, the EU, Argentina and South Africa. To interpret this, one has to keep in mind that the data for each year normally stems from cases initiated one year before. For example, if the EU imposes 25 AD measures in 1996, these are unlikely to come from

the cases filed in 1996 but mostly from those filed in 1995. The success rate of EU antidumping filings is approximately two thirds. This is consistent with those for other countries except that for Argentina which has a success rate slightly over 75%, exceptionally high as compared to most WTO members.

Table 2: AD measures

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	*Total*
India	7	2	8	22	57	38	38	64	53	273
United States	33	11	20	16	32	33	33	24	12	205
EU	15	23	23	26	41	13	13	25	3	187
Argentina	13	20	11	12	15	15	15	24	19	138
South Africa	0	8	18	14	13	5	5	15	1	108

As with AD initiations, the data on EU measures does not show a long-run upward trend but reveals some fluctuation. The average number of EU antidumping measures is about 20 per year. The highest number is 41 in 2000, the lowest is 3 in 2003.

It is well known that one type of antidumping action frequently pursued by the EU is price undertaking. If a dumping firm agrees to raise the price to a negotiated level, the duty will not be levied. This type of action is not widely used elsewhere. Therefore, of all successful EU cases, some end up with price undertakings, some with duties. In addition, even in the same antidumping cases, some firms could agree to perform undertakings whereas others would prefer to pay duties. Hence, due to data availability, it is not possible to report here what proportion of EU dumped imports is subject to price undertakings and what proportion is subject to duties.

The sector that initiates most filings is base metals and articles of base metals. There were 92 filings made by this sector which account for aprroximately one third of all AD initiations over 1995-2003. The industry coming second is chemical and allied products which initiated 45 cases. These two are the same as their US counterparts (as well as those in many other countries). There are a few papers that investigate the role of political factors in determining the outcomes of AD filings, and it turns out that those factors are significant. These papers are Moore (1992) and Baldwin and Steagall (1994) for the US, and Tharakan and Waelbroeck (1994) for both the EU and US. Moreover, as pointed out by Irwin (2002), the costs associated

with AD are high. Thus it is more likely that the industries in which a large market share is in the hands of a few big producers would file AD cases since it is easier for them to form a link with the government. Also, as the costs of filing are high, the free-rider problem is less likely to occur in industries in which there are only a few large firms. Accordingly, it is easier for these industries to coordinate.

AD Cases with Definitive Duties

From 1989 to 1998, there are 104 AD petitions that are affirmative and result in duties. This number may not be accurate since, in some petitions, the decisions for different producers named in the same petition are not made at the same time. However, this is rare. Not all are new. Some are renewed after their termination, due to the fact that EU antidumping cases automatically terminate after 5 years, so if the EU producers would like to extend the length of time over which the duties are imposed, it is necessary that they renew the cases. There are 6 renewed cases in our sample, 3 of which are against China.

The unweighted average number of countries is 2.64 per case; the maximum number is 7 per case. In the sample, all AD decisions where more than 4 countries are subject to duties are made after 1994. In 1998 alone, there are 2 affirmative decisions that levy duties on more than 5 countries. One is on stainless steel fasteners (6 countries) the other is fax machine (7 countries).

The increasing cumulation of countries in the same petition could be explained by the "super additivity effect". According to Hansen and Prusa (1996) and Tharakan et al. (1998), it is evident in both the EU and US that, holding market share of dumped imports constant, an increase in the number of named countries significantly increases the probability of an affirmative finding. If the complainants have become more aware of this effect, it is not surprising to see cumulation in more recent cases and in the future.

Table 3: EU antidumping targets

Country	*No. of Measures*
China	35
Korea	18
Japan	14
Thailand	12
Russia	9

As regards countries subject to AD duties, there are 31 countries filed against by the EU. Among these, the main targets are from the Far East and Eastern Europe. Table 3 ranks the top five. China is the principal target, subject to duties in 35 EU cases, twice that of Korea, which has 18 cases resulting in duties. As above, the two industries involved most with the EU antidumping measures are steel and chemicals. However, Japan and Korea systematically differ from countries in that dumped imports tend to be of high-tech products. These include, among others, fax machines, photocopiers, TV camera systems and CD players. This implies that not only does the EU pursue AD action against low-cost countries, but also against those that have comparative advantage in particular products.

3. Data Analysis

For each antidumping case, where data is complete, we collect trade volumes from the named countries for 8 consecutive years starting from two years before the duties are imposed until five years after they are first collected (if from t=-2 to t=5).

Our source of trade volumes is EUROSTAT, while contains reports data in both quantity and value terms. Data is available from 1988 to 1998. There are many AD cases where import volumes cannot be obtained for all 8 years. We do not exclude but treat missing years as missing data. The level of disaggregation is 8 digit as categorised in Combined Nomenclature since this is the level of used in almost all AD cases. In rare petitions where dumped products are classified at 6 digit, we use trade data that level.

Earlier, we noted that there were 104 cases in our sample. On average, there is more than one named country in one petition. Thus if we treat one country in one petition as one case and another in the same petition as another case, we have 190

cases. We do not aggregate trade volumes from different countries named in the same petition because different producers pay different duties. By separating them, we will be able to understand more clearly the behaviour of each named country when subject to AD measures.

We calculate growth rates of imports from dumping countries in both value and quantity terms, and compute percentage changes of imports from named countries as compared to the year t=-1 and t=-2 respectively. For clarification, note that, for any case, t=0 is the first year definitive duties are levied. Therefore, in most cases, t=-1 is the year the petition is filed and t=-2 the last year of free trade. Growth rates of dumped imports from named countries are caluculated as $gv_t = (v_t - v_{t-1})/ v_{t-1}$ and $gp_t = (q_t - q_{t-1})/ q_{t-1}$ where v and q are value and quantity of imports respectively.

Table 4: Growth rates of EU imports

Variable	No. of Observations	Average	Standard Deviation
gv_{-1}	156	0.16	0.89
gv_0	176	-0.16	0.78
gv_1	149	3.82	45.68
gv_2	119	0.2	1.03
gv_3	91	0.76	4.77
gv_4	81	0.07	0.66
gv_5	57	0.56	1.62
gp_{-1}	156	0.18	0.94
gp_0	176	-0.18	0.75
gp_1	149	4.62	55.06
gp_2	118	0.23	1.12
gp_3	90	0.37	1.51
gp_4	79	0.04	0.62
gp_5	57	0.24	1.16

From Table 4, we see that number of cases differs across years because of unavailability of data for some AD cases. As trade data is available only up to 1998, the cases initiated in that year or a few years earlier will have shorter time series compared to those initiated earlier.

The figures on gv_{-1} and gp_{-1} suggest there is an increase in imports from named countries in both value and quantity terms from the last year of free trade to the year the cases are initiated. The growth rates in value and quantity are 16% and 18% respectively. Then the dumping exporters reduce their trade in the first year AD duties

are collected. Afterwards, imports from these countries keep growing at a positive rate. It is noticeable that the standard deviations are high. From t=0 to t=1, the average growth is remarkably high, 382% in value and 462% in quantity. Moreover, the standard deviations are more than 10 times bigger than the mean (These numbers raise concern about outliers in the data set, and it is important to deal with this problem. We will discuss the technique used in mitigating it in a later section).

At this point, it is worth looking into some examples of outliers who dump onto the EU market. There are several cases which have trade data so peculiar that the overall results of this study could be significantly changed if the problem was not dealt with. We select two for illustrative purposes. First, Russia was subject to EU antidumping duties on hematite pig-iron. There were three other countries also named in this petition including Brazil, Poland and Ukraine. The affirmative decision was made on 16/07/94 which means that the definitive duties were collected from that day for 5 years. The import value of hematite pig-iron from Russia was 51,129,000 ECU in 1994, more than 3 times that in the year 1993 (15,128,000 ECU). In 1992, the number was only 2,559,000 ECU. The value peaked at 71,058,000 ECU in 1995, one year after the decision was made. After that, the imports fall. This pattern clearly contrasts with intuition and the evidence in the literature.

The second example is ammonium nitrate also against Russia. The European Commission received the petition on 09/06/94 and determined the case to be affirmative on 23/08/95. The value of imports from Russia grew from 16,987,000 ECU in 1993 to 24,097,000 ECU in 1994. Then, in 1995 (year t=0), imports did not drop but went up to 56,822,000 ECU. The number continued to grow to 114,157,000 ECU in the following year.

There are a few factors that could explain this unusual behaviour. First, the European Commission may refer to a price in a third country, instead of that in the exporting country, as a comparable price, and this could result in wider dumping margin. If only one or a few producers from a particular country are subject to duties based on this method, the true cost of dumping would be exaggerated. Second, although some exporters have to pay duties, others from the same country may accept price undertakings, and this could significantly mitigate the effect of AD measures. Third, despite duties being levied, exports' prices may still be low due to exchange rate volatility. This last explanation applies rather well to the above two examples as

the Russian currency depreciated dramatically after the collapse of the Soviet Union and the currency was not stabilised until 1996.

Table 4 reports growth rates of imports from named countries. In what follows, we show percentage changes of imports compared to t=-1 and t=-2 respectively.

Table 5: Percentage changes in EU imports comparing to t = -1

Variable	No. of Observations	Average	Standard Deviation
pv_0	176	-0.16	0.78
pv_1	143	-0.09	1.15
pv_2	116	0.08	1.40
pv_3	90	0.37	1.73
pv_4	80	0.54	2.16
pv_5	59	0.56	3.00
pq_0	176	-0.19	0.75
pq_1	143	-0.12	1.15
pq_2	116	0.01	1.36
pq_3	90	0.30	1.76
pq_4	80	0.48	2.27
pq_5	59	0.56	3.37

In table 5, percentage changes of EU imports, compared to t=-1 are presented, recalling that t=-1 in the year most petitions are filed. We compute percentage changes as $pv_t = (v_t - v_{t=-1})/ v_{t=-1}$ and $pq_t = (q_t - q_{t=-1})/ q_{t=-1}$ where pv is the percentage change in value and pq is that in quantity.

In the first year of definitive duties, as compared to the year before, imports from named countries drop by 16% in value and by 19% in quantity. Then they start to go up but are still lower than in the year the petitions were filed (t=-1). In the following year, they get back to the levels slightly above those in t=-1 and exceed those from the benchmark year. This pattern reveals that although each EU antidumping measure lasts for five years, named countries do not necessarily export less for the whole period. This is because the case could be revised upon request by the dumping firms. Moreover, new entrants from the named countries who are not subject to AD could export to the EU more aggressively.

The table also reports descriptive statistics. The value of imports grows from t=-2 to t=-1 at 16% and quantity grows by 18%. Then imports fall significantly but, in value terms, they do not fall below those in the absence of an AD threat (t=-2) while,

in quantity term, they fall below those in free trade by 2%. Once again, for year t=0, the standard deviations are extremely high relative to the means. Ignoring this for the moment, the imports then start to go up until t=4 and fall again in t=5.

Table 6: Percentage changes in EU imports comparing to t = -2

Variable	No. of Observations	Average	Standard Deviation
pcv_{-1}	156	0.16	0.89
pcv_0	156	0.07	2.29
pcv_1	124	0.20	2.93
pcv_2	102	0.30	2.29
pcv_3	79	0.95	3.58
pcv_4	69	1.12	4.03
pcv_5	49	0.50	2.29
pcq_{-1}	156	0.18	0.94
pcq_0	156	-0.02	1.61
pcq_1	124	0.08	2.08
pcq_2	120	0.39	3.30
pcq_3	79	1.11	4.98
pcq_4	69	1.24	5.06
pcq_5	49	0.52	2.64

In table 5 and 6, the extreme mean numbers are removed. Nonetheless, the standard deviations are still high. Some variables generate standard deviations that are extremely large compared to the means. We therefore can believe that the problem of outliers is serious in this study, and will control for it in our regressions.

4. Econometric Analysis

Model Specification

To emphasise the role of AD duties and investigate how different countries respond to different duties applied to them, it is essential to treat different countries, though named in the same petition, as different observations. Moreover, it is also important to apply different duties to different dumpers. The issue is complicated in that EU antidumping practice is conducted against imports from specific firms, not all firms from specific countries, thus imports from the same country could be subject to several measures. As trade data is not available at the firm level but duty is firm

specific, the question arising here is which duty should be applied to each country. We will discuss this matter shortly.

We also control for other factors that could be responsible for changes in the volumes of EU imports from named countries. These are the size of named country *(size),* the number of countries named in the petition *(ne),* whether or not the named country is a non-market economy *(trans),* import penetration of the named country *(prop),* and time dummies. Each is discussed individually below.

The basic estimating equation can be written as

$$y_{it} = b_0 + b_1 duty_i + b_2 size_{it} + b_3 trans_i + b_4 ne_i + b_5 prop_{it} + \sum b_6 t_{j=0\text{-}5} + e_{it} \qquad (1)$$

The left-hand-side variable, y_{it} is defined as the ratio of import volumes from country i at time t to import volumes from that country two years before the duty is first imposed $v_{it}/ v_{it=-2}$. As mentioned above, in most cases, t=-2 is the last year before the petition is filed and we put $v_{it=-2}$ as the denominator so that the year without AD threat would be our base year when making comparisons between cases, or within the same case but different years. In other words, this is the reason why this variable is defined in relative terms; otherwise trade volumes across cases (different products) are not comparable. It is difficult to compare changes in imports of different products if we express the dependent variable in absolute terms. For each country in each AD case, we have values of y_{it} from t=-1 to t=5. Note that, as *i* refers to one country named in one petition, “different contries in the same petition” and “same country named in different petitions” are treated equally. What makes them different are the initial trade volumes and the values of right-hand-side variables.

The variable *duty* is the size of duty imposed on the named product from country *i* as calculated by the European Commission. Before the affirmative decision is made, the European Commission usually announces provisional duties and levies them for a few months. After that, the definitive duties start being collected. Because of differences in the law, the definitive duties in many countries tend to be the same

as provisional ones but, for the EU, this is not necessarily the case. It is not unusual in the EU for definitive duties to be slightly lower than their provisional counterparts[2].

As pointed out above, AD measurers are firm, not country specific. It is important to pick a reasonable representative duty for each AD case. An ideal way to overcome this complication is to calculate the weighted average duty for each country, but this cannot be done due to data limitations. Using unweighted averages is not appropriate since it would lead to some degree of bias. We respond to this by using the maximum duty levied on each country in each AD case. Although this does not apply to all firms in the same country, one major advantage of it over all other measurers is that every firm that does not respond to the European Commission and those that do not complete the questionaire (regarding alleged dumping behaviour) in time are likely to be subject to the maximum duty imposed on other firms. Once again, to make duties from different petitions comparable, we express them in percentage terms.

Before moving on, two points are worth mentioning. First, the duty in year t=-1 is zero, whereas from year 0 to 5 it is positive. Second, for each case, this size of duty is time invariant, but in practice the European Commission can revise the case and adjust duties if the named firms request. So the duty is not always fixed over time. However, it is unlikely that we can track the changes of duties in all antidumping cases. Thus we treat it as a time invariant variable but will use time dummies to remedy this problem. The estimated coefficient on this variable is expected to be negative.

The variable *size* refers to the market size of the dumping country. The hypothesis on this is drawn purely from the theoretical model of Falvey and Wittayarungruangsri (2006). The results from which suggest that a reduction in imports from a large country tends to be larger than that from a smaller country. Thus the sign of the coefficient is expected to be negative.

We define *size* in two ways. One is the volume of domestic production of country *i* plus imports minus exports. Ideally, the level of disaggregration should be the same as that of dumped imports named in the petitions. However, data is not available for most countries outside the EU. We then use trade and production data

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[2] Notwithstanding the fact that the two types of duties may not be the same, the provisional duties are applied only for a short period and the difference between the two tends to be small. That being the case, we believe that this problem is negligible and use only definitive duties in our regressions.

provided by the World Bank and the data is as classified as ISIC 3 digit. The other measure of size as GDP (deflated to 1995). Measured in this way, we have less of a problem with missing data.

The variable *trans* is a dummy taking a value of 1 if country i is an economy in transition, and 0 otherwise. As we saw earlier, China and Russia are among the top five targets of EU antidumping measures. Taking into account all countries subject to EU duties, non-market economies, especially China and those from Eastern Europe, account for a large number of EU cases. When looking at raw data, imports from those countries sometimes even rose sharply despite being subject to AD. This may differ from imports from market economies in a systematic way. Moreover, once producers face trade protection, interference by the government could be stronger in emerging countries and these producers may be less hurt than those in market economies. Therefore, we suspect that, producers from countries in transition are less sensitive to AD action. This dummy variable is expected to have a positive coefficient.

The countries in transition are like those in Miranda (1998) and Zanardi (2004). These include Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, China, Czech Republic, Cuba, Estonia, Georgia, Hungary, Latvia, Kazakhstan, Kyrgyzstan, Lithuania, Republic of Macedonia, Moldova, Poland, Romania, Russia, Serbia and Montenegro, Slovak Republic, Slovenia, Tajekistan, Turkmenistan, Ukraine, Uzbekistan and Yugoslavia.

ne is the number of countries named in the same petition, In cases where not all countries named are subject to definitive action, we include only those that are. The literature regarding trade diversion views this as a factor responsible for the degree of diversion. Prusa (1997) hypothesises that if many countries are named in the same AD case, trade diversion should be weaker. However, his finding turns out to be that diversion is in fact stronger when more countries are named. This result is striking but he does not give any explanation of why it is the case. Brenton (2002) follows the technique used by Prusa (1997) and finds the same result for the EU. Again, there is no explanation given. Our hypothesis is that the coefficient of this variable should be positive. If many countries are named in the same petition, it is more likely that dumped imports are responsible for higher market share of the EU imports than when a few countries are named.

From the viewpoint of a dumping firm, if a large amount of trade volumes from other countries are also subject to AD (proxied by the number of countries), the effect of AD on that firm would be mitigated because the cost disadvantage does not belong to that firm only but also to many others.

prop is the proportion of EU imports from country i to EU imports from all countries. On the one hand, if prop for a named country is large, that country may be a big producer and it could be the main target of EU antidumping. Hence it may want to switch to non-EU markets to avoid AD. On the other hand, *prop* may be high because the EU is its main market. In this respect, the effect of AD is lessened if the EU is important for the producers in that named country. The coefficient sign for this variable is therefore uncertain.

We include *t* as time dummies capturing year 0 to year 5, that is, year -1 is our benchmark slope coefficient. The time dummies are important because there are always some unobservable characteristic changes occurring over time, due to AD revision. The change of AD duty arising from revision is firm specific and time variant, but we are unable to let duty vary over time in our model because the data used here is country specific and we stick to the maximum duty. The revision could also end up with price undertakings and it is not possible to say what proportion of imports meet price negotiation. Coeffiecients are expected to be negative because the impact of real action should be stronger than that of an AD threat. The magnitudes of these dummies reveals how responses by dumping firms evolve over time.

For trade value, equation (1) is rewritten as

$$rv_{it} = b_0 + b_1 duty_i + b_2 countrysize_{it} + b_3 trans_i + b_4 ne_i + b_5 propv_{it} + \sum b_6 t_{j=0\text{-}5} + e_{it} \quad (2)$$

and

$$rv_{it} = b_0 + b_1 duty_i + b_2 marketsize_{it} + b_3 trans_i + b_4 ne_i + b_5 propv_{it} + \sum b_6 t_{j=0\text{-}5} + e_{it} \quad (3)$$

where *rv* is the variable *y* in value term, *countrysize* is GDP in logarithm and *marketsize* is domestic market size in logarithm

The equations in quantity terms are

$$rq_{it} = b_0+b_1duty_i+b_2countrysize_{it}+b_3trans_i+b_4 ne_i + b_5propq_{it}+ \sum b_6 t_{j=0-5} +e_{it} \quad (4)$$

and

$$rq_{it} = b_0+b_1duty_i +b_2marketsize_{it}+b3trans_i+b_4ne_i + b_5propq_{it}+\sum b_{6\,j=0-5}+e_{it} \quad (5)$$

where *rq* is the variable *y* in metric tons. Note that when the left-hand -side variable is expressed in value terms, prop is also expressed in value. Similarly when *y* in quantities, *prop* is measured in quantity term. We also experiment by splitting our sample between market and non-market economies in order to check the robustness of the results. When this is done, the dummy *trans* is not put into the regressions. Though we do not focus on trade diversion effects, it is worth performing simple regressions to examine whether imports from other countries benefit from AD action faced by a particular named country. We exclude the variable *size* and *trans* from this set of regressions since they are specific to a dumping country, but should not significantly affect the volumes of imports from other countries as a whole.

The basic equation for this type of regression in value terms is written as

$$nrv_{it} = b_0+b_1duty_i+b_2ne_i+b_3propv_{it}+\sum b_4t_{j=0-5}+e_{it} \quad (6)$$

For each case, nrv_{it} is the proportion of import value from all countries except the particular named one to import value from everywhere.

In quantity terms, the equation is written as

$$nrq_{it} = b_0+b_1duty_i+b_2ne_i+b_3propq_{it}+\sum b_4t_{j=0-5}+e_{it} \quad (7)$$

where nrq_{it} is in quantity terms.

One might argue that defining the dependent variable in this way would take into account imports from other countries named in the petition. However, it is reasonable to do so if our objective is to examine how AD action encountered by a dumping country influences trade from other exporters. In the literature concerning trade diversion, dumping countries and non-dumping countries are separated so that we can examine whether trade diversion is strong enough to cause perverse effects in such a way that the domestic filers are hurt from AD action. Nevertheless, in our case,

we perform our regressions simply to check responses of other exporters when a particular country is subject to an AD duty. Excluding other named countries and considering only non-named countries in each AD case would distort the overall result.[3]

Econometric Method

As far as econometric estimation is concerned, we perform regressions using two techniques, OLS and robust regression. The existence of outliers raises concerns regarding classic OLS. When the assumption of normality does not hold, t-tests and F-tests may not be reliable. In such a case, it is better to use an alternative. Vandenbussche et al. (1999) use OLS, robust regression, and the Heckman selection model. The qualitative results are not sensitive to the technique chosen. However, the scope of Vandenbussche et al. (1999), the time span, and way model specification is set out are different from this study. Besides, our sample has clear evidence of outliers which seems to be serious as seen from the descriptive statistics above. We suspect that OLS and robust regression would provide somewhat different results.[4]

The main intuitive distinction between robust regression and OLS is that, while OLS gives the same weight to all observations, robust regression assigns higher weight to the observations that produce small residuals and lower weight to those with larger residuals. There are many types of robust techniques and different ways of assigning weight to each observation. As our regressions are run in STATA 7, we follow the methodology developed by Hamilton (1991). This assigns weights, using two functions: Huber Weighting and Biweight. The two functions have different advantages and drawbacks. To compromise different features of the two, STATA starts with Huber Weighting until the maximum weight difference is below 0.05, then finishes with the biweight when the maximum difference becomes less than 0.01.

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[3] For clarification, we can take one example. A petition on potassium permanganate was made in 1997 and the definitive duties were first levied in 1998. Two countries subject to the measures were India and Ukraine whose duties were 5.6 % and 36.2 % respectively. Where we focus the observation regarding Ukraine, taking into account only non-named countries is misleading because India, despite being subject to AD, also benefits from the duty imposed on Ukraine as the duty imposed on India is far smaller.

[4] Hamilton (1991) argues that if the error terms are influenced by explanatory variables, then the problem of heteroskedasticity is present. However, if the residuals are mainly influenced by the dependent variable, performing a robust regression would be a remedy.

Hamilton (1991) suggests that the cost of applying robust technique when OLS is more appropriate is low. However, in case where some extreme residuals skew the distribution, the cost of applying OLS when robust regression is a better option is very high. Therefore, based on the efficiency of estimators and the presence of outliers in our data set, robust regression seems to be appropriate to apply here. However, we run both types of estimation so that we can compare and contrast the results.

5. Results and Discussion

Results from OLS and robust regressions differ significantly. This is not consistent with the results found elsewhere but, as noted earlier, this study is different from others in some respects and if the outliers do not play a crucial role, this obvious distinction should not have been observed.

The overall performance of OLS is poor. In addition, OLS results are not robust to changes in variable definition. For example, the magnitude of the same coefficient differs greatly across equations. Most coefficients are also not consistent with our expectation and many lack significance.

Robust regression improves the results considerably. Most coefficients have the expected sign: furthermore, signs and magnitudes from different equations are consistent with one another. This evidence confirms our prior belief that this technique is more appropriate as far as our study is concerned. Therefore, we do not report the results from OLS and base our discussion only on those obtained from robust regressions.[5]

[5] See Appendix for results from both types of regressions.

Table 7: Result from full sample

Variables	***rv***	***rv***	***rq***	***rq***
duty	-0.41***	-0.41**	-0.45***	-0.41**
countrysize	0.01**		0.01**	
marketsize		-0.04**		-0.01**
trans	0.17*	0.09	0.14**	0.14**
ne	0.05***	0.05***	0.03*	0.03*
propv	1.10***	1.18***		
propq			0.22***	0.20***
t_0	-0.16*	-0.15	-0.18**	-0.21**
t_1	-0.19**	-0.18**	-0.28***	-0.28***
t_2	-0.20**	-0.20*	-0.28***	-0.28***
t_3	-0.13	-0.14	-0.15	-0.15
t_4	-0.08	-0.14	-0.16	-0.21*
t_5	-0.14	-0.22*	-0.17	-0.22*
Constant	0.36***	0.98***	0.59***	0.98***
Observations	613	523	613	523
F-stat	11.57	9.19	8.48	6.53
Prob>F	0.00	0.00	0.00	0.00

Table 7 reports result from Full Sample.[6] The first two columns are those for value equations, the last two for quantity equations. For each AD case, trade volumes from t=-1 to t=5 are considered; this means we take into account trade data for 6 years. There are 190 AD cases in our sample. Hence, when the data is complete, there should be 1,140 (6 times 190) observations in the sample. When the regressions are performed, however, the number of observations reduces to 613 and 523 when size is measured as *countrysize* and *marketsize* respectively. These numbers are identical to

[6] In all tables of results, we indicate the significance level at 1%, 5% and 10% by ∗∗∗, ∗∗, and ∗ respectively.

the number of observations in OLS. That is, no observations are dropped by the iterative process.

In general, most variables are significant and have the expected sign. Regarding *duty*, this variable produces a negative coefficient with at least 5% significance, in line with our hypothesis. If duty is high, the producer will export less to the EU due to increasing trade costs. Interestingly, the magnitudes of coefficients from the value and quantity equations are almost identical. This points out that the extent to which AD duties could reduce trade is similar in value and quantity, holding other things constant. The high significance of this variable strengthens our hypothesis that duty size is important in determining volumes of trade. Nonetheless, the role of duty is not clear-cut in the literature. Prusa (1997) argues that low duty has very little impact on trade. Brenton (2002) even finds that duty is not significant.

Before moving on, it is worth discussing duty further. As antidumping action is selective and duty is firm specific, the best one could do is to choose an appropriate duty to apply to each country. Even if this is done properly, one also has to keep in mind that not all firms in a named country are dumping, but when we use trade data at the country level, trade from all firms is taken into account. Therefore, it is not surprising that the results in some papers appear to be different. We suspect the significance of this variable is sensitive to the way it is defined.

As concerns non-market economies, the coefficient of *trans* is positive and significant from most equations except equation (3), again in line with our hypothesis. The positive sign of the coefficient suggests that, once subject to AD action, producers from countries in transition do not reduce their exports to the EU as much as those from market economies. Nevertheless, the effect of being a country in transition seems to be more significant on EU import quantities than import values.

For *ne*, we always obtain a positive coefficient as expected. The coefficient is significant at the 1% level when y is expressed in value terms, and at the 10% level when measured in quantity terms. This result suggests that the impact of the AD measure on a country's trade is mitigated if there are many countries named in the same filing. To think about the intuition, one could follow this example. Suppose there is only one firm named in a petition. All other firms would benefit from this dumping firm being subject to AD as it is the only one which has a cost disadvantage due to an AD measure. The other firms can then take this opportunity to export more

aggressively. By contrast, if all firms are named, the degree of cost asymmetry would be softened and those who can benefit most are only EU producers.

As for *prop*, our hypothesis on this is that the sign of the coefficient is uncertain. It turns out that it generates a positive coefficient which is always significant at the 1% level. That is, if a named country has a large market share in EU imports, the impact of AD action on that country would be weaker. One possible explanation is that, given a large market share in EU imports, that country may have viewed the EU as its important market. Where this is the case, even though the duties are levied, producers from that country would be more reluctant to shift trade elsewhere. In other words, if they are big suppliers to the EU, they may want to keep exporting to the EU market.

Considering the coefficient magnitudes for this variable when expressed in value *(propv)*, these are much larger than those when expressed in quantity *(propq)* and this is interesting. It could be that, from the viewpoint of the dumping firm, the share in quantity term may not be as important as that in value term. However, it is beyond the scope of this work to explore this further.

With regard to *size*, the coefficient is always significant at the 5% level, but its sign is positive when measured as *countrysize* but negative when measured as *marketsize*. This seems strange at first glance. However, it is explicable. Market size in Falvey and Wittayarungruangsri (2006) refers to that of a particular product while what we measure are industry and country size, because of data limitations. Considering these two measures, the size of industry, though crude, could reflect the size of a specific market to some extent, but it is not reasonable to think of the size of the economy as a good proxy. As a result, these two measures may not be expected to influence the volumes of dumped imports in the same way and this could be why the signs of the coefficients from the two are significant but opposite.

The negative coefficient of *marketsize* (production + imports - exports) suggests that if the size of industry in a dumping firm's country is large, the reduction in its exports to the EU would be large too. The explanation is that, when subject to AD in the EU, the named firms would find it more attractive to sell less in the EU and sell more at home. Not only do the dumping firm’s sales shift to other countries, they can also shift back to the firm's domestic country if the local market size is sufficiently large.

The coefficient of *countrysize*, by contrast, is positive. This factor has not been analysed in other papers. The significance of this variable in both value and quantity as well as stability of coefficient magnitude implies that the characteristics of named countries are important in influencing the trade volumes of dumped exports. The positive coefficient suggests that producers located in a larger country are less sensitive to EU antidumping activity. One possible explanation is that producers is a richer country may be larger and more willing to bear the cost of duty than those in a poorer country.

Time dummies are by and large negative and significant as expected from year 0 to 2. From year 3 to 5, however, they are mostly insignificant but still have the expected sign. Our base year *(t=-1)* is the year in which the petition is filed. The negative coefficient confirms the intuition that the effect of AD threat is not as strong as real action. Considering the evidence found elsewhere, it is not surprising that dummies from year 3 to 5 are not always significant. The reason is that the market structure and the restrictions on each dumping firm have been changed by that time due to revision. As time changes, many firms face lower duties and some raise the prices to eliminate material injury. In addition, some evidence suggests that after year 2, imports from named countries to the EU, as well as to the US, rebound and exceed the levels prior to the AD action.

Concerning regressions for non-market and market economies, we split the sample and run regressions for two groups of countries. Table 8 tabulates the results for the former while Table 9 reports the results for the latter. Where the sample is split, the overall results deteriorate. Some coefficients lose their significance and the lower F-stats imply that the explanatory variables as a whole perform less well. However, this may not be worrisome since the number of observations in each equation drops sharply. What is intriguing is the results on some individual variables.

Table 8: Result for non-market economies

Variables	***rv***	***rv***	***rq***	***rq***
duty	-0.79**	-0.44	-0.81***	-0.47
countrysize	-0.01		-0.01	
marketsize		-0.04		-0.04
ne	0.11***	0.11***	0.11***	0.10***
propv	1.08***	1.25***		
propq			1.08***	1.24***
t_0	-0.11	-0.20	-0.04	-0.13
t_1	-0.18	-0.25	-0.11	-0.19
t_2	-0.19	-0.24	-0.11	-0.19
t_3	-0.12	-0.22	-0.03	-0.13
t_4	0.14	-0.07	0.10	-0.06
t_5	0.13	0.03	0.23	0.15
constant	0.78***	0.95**	0.70***	0.81**
Observations	226	194	226	194
F-stat	6.24	5.01	9.59	7.81
Prob>F	0.00	0.00	0.00	0.00

To begin with, consider time dummies. The sign and magnitude of these for market economies are similar to those for the whole sample. For non-market economies, the dummies still have negative coefficients most of the time but none are significant. This suggests that during the period of 5-year AD action, imports from non-market economies do not systematically evolve over time. One reason could be government interference. Another possible reason could be that the producers from those countries hardly ever ask the European Commission to revise the case. To understand this more clearly, one has to compare the frequency of revision for countries in transition to that of other countries. Our data set does not allow us to do that.

Regarding size, the sign of *countrysize* for countries in transition is negative but not significant. The coefficient on *marketsize* for this group of countries is not

significant either. As for market economies, the results are consistent with those reported earlier. The size of economy has a positive impact on exports to the EU whereas the size of domestic industry has a negative impact.

Table 9: Result for market economies

Variables	***rv***	***rv***	***rq***	***rq***
duty	-0.09	-0.30	-0.29*	-0.48**
countrysize	0.02***		0.01**	
marketsize		-0.04*		-0.03
ne	0.00	0.01	0.00	0.02
propv	1.12***	1.45***		
propq			0.18***	0.15***
t_0	-0.23**	-0.17*	-0.20*	-0.16***
t_1	-0.24**	-0.18	-0.27**	-0.19
t_2	-0.26**	-0.20*	-0.26**	-0.19
t_3	-0.18	-1.24	-0.14	-0.07
t_4	-0.22	-0.19	-0.20	-0.16
t_5	-0.25	-0.30**	-0.24*	-0.23*
constant	0.34**	1.01***	0.56***	1.08***
Observations	387	329	387	329
F-stat	8.27	5.51	4.88	4.10
Prob>F	0.00	0.00	0.00	0.00

For *prop*, the results from the full sample as well as the split samples reveal that import penetration may be the most significant factor that influences changes in EU imports from the named countries. The coefficients from all regressions are positive and significant at the 1% level. In value terms, the sizes of this coefficient from all equations are similar. In quantity, this factor seems to be more important to non-market economies than to others. The coefficient sizes of *propv* and *propq* for

non-market economies are almost the same. This suggests that import penetration in quantity term is as important as in value terms for this group of countries.

Surprisingly *ne* is significant at the 1% level as far as countries in transition are concerned, but not significant for the other sample. This suggests that, for market economies, the number of countries named in the same petition does not significantly influence the reduction in EU imports from a named country. Prusa (1997) and Brenton (2002) also find a peculiar result whereby trade diversion is stronger when there are more countries named.

In contrast to market economies, this factor positively affects imports from emerging countries. It is also seen that the coefficient sizes from different regressions are almost identical. Where more countries are subject to AD, the cost disadvantage arising from duties is spread across producers, so imports from a non-market economy does not fall as much as when only a single or a few countries are named.

The most striking finding is on *duty*. When the sample is split, this loses its significance in some regressions, but is still negative. Moreover, coefficient magnitudes are larger for countries in transition than market economies. This implies that the prior belief that duties matter less to non-market economies arises in part because of some outliers'. The technique we use here controls for this and the finding suggests that if outliers are given less weight, it should be the case that EU antidumping duties have more impact on producers in non-market economies and this may also be the reason why those countries are the main target of EU antidumping practice.

Before proceeding to the next regression, a few comments are worth mentioning. First, the numbers of observations in the split samples are relatively low. If the data is more complete, the regressions may perform better especially for time dummies. Second, as seen from the different results for the whole and split samples, countries of different types may respond to an AD action differently in a systematic way. The result found for a specific group may not be easily generalised. Third, as emphasised before, AD duty is a tricky issue. The improvement in micro-level data will clearly provide more accurate results and better understanding of AD in general.

For the last set of regressions we perform checks as to whether, when a specific country is subject to an AD measure, other countries benefit from that AD action. Table 10 reports the results. Note again that we are not interested in the strength of trade diversion, but we verify how other countries respond to an AD duty

imposed on a dumping country. The positive and significant coefficient for duty confirms that if the duty levied on a country is high, producers from elsewhere will benefit more from it. These countries also include other countries named in the same petition but subject to different duties.

The coefficients of *propv* and *propq* are significant and negative as expected. If the import penetration for a named country is high, that country may view EU as its main market and would not reduce its export to the EU much despite the duty being levied. It is then difficult for other firms to export more aggressively.

Table 10: Result for other countries

Variables	rv	rq
duty	0.42**	-0.17**
ne	0.02**	0.04***
propv	-1.15***	
propq		-0.94***
t_0	-0.15***	-0.10*
t_1	-0.05	-0.04
t_2	-0.13	0.09
t_3	0.06	0.16**
t_4	0.07	0.19***
t_5	0.14	0.20***
constant	0.97	0.89***
Observations	783	783
F-stat	33.31	132.85
Prob > F	0.00	0.00

The variable *ne* has a positive and significant coefficient. This seems strange at first glance. However, it is explicable since this type of result reflects the fact that where trade diversion takes place, trade diverts more to other named countries than to non-named countries. This strengthens the result found in other papers that the trade

diversion effect in the EU is weaker than in the US. The result also reveals that when the EU producers file an AD case, they tend to target imports that are responsible for a large market share. The issue of trade diversion among named countries is still left unaddressed in the literature and our results suggest that it is worth exploring. When a particular country is subject to AD, not only non-named countries, but also other named countries, benefit from it.

6. Conclusion

This paper investigates the trade effects of EU antidumping duties on imports from named countries. Unlike other studies, we treat different countries named in the same petition separately in order to examine how each responds to EU antidumping action. The AD cases ending up with definitive duties first imposed from 1989 to 1998 are taken into account. By analysing raw data, it is clear that some outliers have a crucial impact, so we use robust regression techniques to control for this.

Our results from econometric models provide some new evidence. The main focus of this work is on the role of AD duty and we find that, in contrast to some existing evidence, the size of duty is important in reducing trade from a named country. It should be noted, however, that this chapter is concerned only with AD cases with definitive duties whereas others take account of those with a negative decision and price undertakings as well. Strikingly, when we split the sample between market and non-market economies, producers from the latter tend to export less to the EU given the same duty size. Although the results from the split sample suggests this, a dummy on countries in transition from the full sample points out that, other things being equal, emerging economies are less sensitive to the AD action. This can be seen in the way that it is not duty but some unobservable characteristics of those countries that make them less sensitive to the EU measures.

Import penetration seems to be the most important factor that determines trade volumes from named countries. It positively affects EU imports from named countries. Other factors that have a positive impact on import volumes are country size and the number of countries named in a petition. While the result on the former is new, the latter has been studied in the literature but what we find here is different as far as all dumping countries are concerned. However, as for market economies only,

the number of named countries is not significant. Combining this with the results found elsewhere, this is a puzzle left unaddressed.

We also found that producers from a country in which the domestic industry is larger tend to export less to the EU once subject to AD. This implies that, in addition to a third country, trade could be shifted back to the domestic country if the market size is sufficiently large.

We check whether other countries benefit from AD duty faced by a particular named country. These countries include both non-named and other named countries. It turns out that they benefit from an AD measure imposed on a particular country. Other named countries benefit from it since the level of duty varies across countries though named in the same filing. We also have an interesting result in that EU trade diversion among named countries is strong and this issue has been overlooked hitherto.

APPENDICES

Appendix A

The primary source of information regarding EU antidumping petition and antidumping actions are annual reports of Commission of the European Communities on the Community's anti-dumping and anti-countervailing activities, and various issues of Official Journal of the European Communities. The former summarises EU antidumping activities over a specific year whereas the latter contains details concerning each antidumping case. Each Official Journal contains information on the sizes of duties and number of dumping exporters in the same petition. The sizes of duties are used directly in our regressions and they are expressed in percentage terms. However, there are many AD cases where duties are not ad valorem but fixed in absolute terms. Where this is the case, we overcome the problem by using provisional duties or dumping margins where appropriate. As for the number of dumping exporters, we count the number of countries in which the dumping firms are located instead of the number of named firms because trade data is not available at the firm level.

Our trade data is obtained from EUROSTAT, Comext CD-Rom, Intra- and Extra-EU trade, as categorised in Combined Nomenclature (8 digit). In some rare cases where dumped products are classified at the 6 digit level, we use trade data at this level as well. EUROSTAT contains the data in both quantity and value terms and both are used in our analysis. The data is available only until 1998. Therefore, there are many AD cases where we are unable to observe trade volumes of dumping firms for the whole 5 years after the duties were first levied.

To measure market size, we collect data from the World Bank Trade and Production Database. The market size of each dumping country is roughly calculated as domestic production (total outputs) plus imports minus exports. The data on market size is crude because it actually measures size of industry, not a market for a specific product. The reason is that the level of disaggregation here is 3 digit (ISIC revision 2) whereas that of trade data from EUROSTAT is at 8 digit HS. As the two sources are in different systems, concordance tables are required to convert one to another. In doing this, some error is inevitable. The relevant tables are available online at Jon Haveman's Industry Concordances web page.

Country size is measured by GDP in US dollars deflated to 1995. The International Financial Statistics Yearbook, provided by the IMF, gives all information needed to calculate country size.

Economies in transition are same as in Miranda (1998) and Zanardi (2004). These are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, China, Czech Republic, Cuba, Estonia, Georgia, Hungary, Latvia, Kazakhstan, Kyrgyzstan, Lithuania, Republic of Macedonia, Moldova, Poland, Romania, Russia, Serbia and Montenegro, Slovak Republic, Slovenia, Tajekistan, Turkmenistan, Ukraine, Uzbekistan and Yugoslavia

Appendix B

This appendix reports the results from robust regressions and OLS. The significance level at 1%, 5%, and 10% are indicated by ***, **, and * respectively. Standard errors are in parentheses.

Table A1: Robust regression: result from full sample

Variables	***rv***	***rv***	***rq***	***rq***
duty	-0.41***(0.15)	-0.41**(0.18)	-0.45***(0.15)	-0.41**(0.18)
countrysize	0.01** (0.01)		0.01**(0.005)	
marketsize		-0.04**(0.02)		-0.01**(0.005)
trans	0.17***(0.06)	0.09 (0.06)	0.14** (0.06)	0.14** (0.06)
ne	0.05***(0.02)	0.05***(0.02)	0.03*(0.016)	0.03*(0.018)
propv	1.10***(0.13)	1.18***(0.16)		
propq			0.22***(0.04)	0.20***(0.04)
t_0	-0.16*(0.09)	-0.15 (0.10)	-0.18**(0.09)	-0.21**(0.10)
t_1	-0.19**(0.09)	-0.18**(0.10)	-0.28***(0.09)	-0.28***(0.10)
t_2	-0.20**(0.10)	-0.20*(0.10)	-0.28***(0.10)	-0.28***(0.10)
t_3	-0.13 (0.11)	-0.14 (0.11)	-0.15 (0.10)	-0.15 (0.11)
t_4	-0.08 (0.11)	-0.14 (0.11)	-0.16 (0.10)	-0.21*(0.11)
t_5	-0.14 (0.11)	-0.22*(0.11)	-0.17 (0.11)	-0.22*(0.11)
constant	0.36***(0.14)	0.98***(0.19)	0.59***(0.13)	0.98***(0.19)
Observations	613	523	613	523
F-Stat	11.57	9.19	8.48	6.53
Prob > F	0.00	0.00	0.00	0.00

Table A2: Robust regression: result for non-market economies

Variables	***rv***	***rv***	***rq***	***rq***
duty	-0.79**(0.33)	-0.44 (0.35)	-0.81***(0.27)	-0.47 (0.29)
countrysize	-0.01 (0.01)		-0.01 (0.01)	
marketsize		-0.04 (0.04)		-0.04 (0.03)
ne	0.11***(0.03)	0.11***(0.04)	0.11***(0.03)	0.10***(0.03)
propv	1.08***(0.22)	1.25***(0.24)		
propq			1.08***(0.16)	1.24***(0.18)
t_0	-0.11 (0.19)	-0.20 (0.21)	-0.04 (0.15)	-0.13 (0.17)
t_1	-0.18 (0.19)	-0.25 (0.21)	-0.11 (0.15)	-0.19 (0.18)
t_2	-0.19 (0.20)	-0.24 (0.22)	-0.11 (0.16)	-0.19 (0.18)
t_3	-0.12 (0.21)	-0.22 (0.23)	-0.03 (0.17)	-0.13 (0.19)
t_4	0.14 (0.22)	-0.07 (0.23)	0.10 (0.18)	-0.06 (0.19)
t_5	0.13 (0.24)	0.03 (0.24)	0.23 (0.19)	0.15 (0.19)
constant	0.78***(0.27)	0.95**(0.38)	0.70***(0.22)	0.81**(0.92)
Observations	226	194	226	194
F-Stat	6.24	5.01	9.59	7.81
Prob > F	0.00	0.00	0.00	0.00

Table A3: Robust regression: result for market economies

Variables	***rv***	***rv***	***rq***	***rq***
duty	-0.09 (0.16)	-0.30 (0.20)	-0.29*(0.17)	-0.48** (0.22)
countrysize	0.02***(0.005)		0.01**(0.005)	
marketsize		-0.04*(0.02)		-0.03 (0.02)
ne	0.00 (0.02)	0.01 (0.02)	0.00 (0.02)	0.02 (0.02)
propv	1.12***(0.16)	1.45***(0.25)		
propq			0.18***(0.04)	0.15***(0.04)
t_0	-0.23**(0.10)	-0.17*(0.10)	-0.20*(0.10)	-0.16***(0.11)
t_1	-0.24**(0.10)	-0.18 (0.11)	-0.27**(0.11)	-0.19 (0.12)
t_2	-0.26**(0.10)	-0.20*(0.11)	-0.26**(0.11)	-0.19 (0.12)
t_3	-0.18 (0.11)	-1.24 (0.12)	-0.14 (0.12)	-0.07 (0.13)
t_4	-0.22 (0.11)	-0.19 (0.12)	-0.20 (0.12)	-0.16 (0.13)
t_5	-0.25 (0.12)	-0.30**(0.13)	-0.24*(0.13)	-0.23*(0.14)
constant	0.34**(0.14)	1.01***(0.22)	0.56***(0.15)	1.08***(0.24)
Observations	387	329	387	329
F-Stat	8.27	5.51	4.88	4.10
Prob > F	0.00	0.00	0.00	0.00

Table A4: Robust regression: result for other countries

Variables	***rv***	***rq***
duty	0.42**(0.08)	0.17**(0.08)
ne	0.02**(0.01)	0.04***0.01)
propv	-1.15***(0.08)	
propq		-0.94***(0.03)
t_0	-0.15***(0.05)	-0.10*(0.056)
t_1	-0.05 (0.05)	-0.04 (0.06)
t_2	-0.13 (0.06)	0.09 (0.06)
t_3	0.06 (0.06)	0.16**(0.06)
t_4	0.07 (0.06)	0.19***(0.07)
t_5	0.14**(0.07)	0.20***(0.07)
constant	0.97***(0.05)	0.89***(0.05)
Observations	783	783
F-Stat	33.31	132.85
Prob > F	0.00	0.00

Table A5: OLS: result from full sample

Variables	***rv***	***rv***	***rq***	***rq***
duty	0.56 (0.42)	-0.56 (0.52)	3.21***(0.70)	-0.97 (0.59)
countrysize	0.04***(0.01)		0.07***(0.02)	
marketsize		-0.11*(0.057)		-0.08 (0.06)
trans	-0.13 (0.16)	-0.19 (0.16)	-0.40 (0.27)	-0.22 (0.18)
ne	0.06 (0.05)	0.05 (0.05)	0.03 (0.07)	0.06 (0.06)
propv	1.10***(0.13)	2.30***(0.47)		
propq			0.29 (0.20)	0.20***(0.04)
t_0	-0.48*(0.25)	-0.06 (0.28)	-1.40***(0.41)	-0.03 (0.32)
t_1	-0.47*(0.26)	-0.04 (0.29)	-1.36***(0.43)	-0.03 (0.33)
t_2	-0.28 (0.28)	0.12 (0.31)	-1.02**(0.45)	0.14 (0.35)
t_3	0.29 (0.29)	0.71**(0.32)	-0.21 (0.48)	-0.15 (0.11)
t_4	0.29 (0.30)	0.61*(0.32)	-0.17 (0.50)	0.86**(0.36)
t_5	0.30 (0.32)	0.70**(0.34)	-0.47 (0.52)	-0.22*(0.11)
constant	-0.07 (0.38)	0.98***(0.19)	-0.20 (0.63)	0.69*(0.36)
Observations	613	523	613	523
F-Stat	4.34	4.27	4.72	2.74
Prob > F	0.00	0.00	0.00	0.00

Table A6: OLS: result for non-market economies

Variables	***rv***	***rv***	***rq***	***rq***
duty	0.45 (0.67)	0.72 (0.76)	0.23 (0.55)	0.51 (0.62)
countrysize	0.00 (0.03)		0.01 (0.02)	
marketsize		0.02 (0.08)		-0.01 (0.06)
ne	0.07 (0.06)	0.06 (0.08)	0.09 (0.05)	0.07 (0.06)
propv	0.96**(0.44)	1.10**(0.51)		
propq			0.86***(0.32)	1.03***(0.38)
t_0	-0.54 (0.38)	-0.62 (0.43)	-0.51*(0.31)	-0.63* (0.36)
t_1	-0.63 (0.39)	-0.69 (0.45)	-0.56* (0.32)	-0.65* (0.37)
t_2	-0.60 (0.41)	-0.67 (0.47)	-0.57* (0.34)	-0.64 (0.39)
t_3	0.32 (0.43)	0.30 (0.49)	0.09 (0.35)	0.05 (0.40)
t_4	-0.27 (0.45)	-0.39 (0.50)	-0.41 (0.37)	-0.53 (0.41)
t_5	-0.11 (0.47)	-0.15 (0.51)	-0.25 (0.39)	-0.32 (0.42)
constant	0.76 (0.55)	0.59 (0.84)	0.63 (0.45)	0.83 (0.69)
Observations	226	194	226	194
F-Stat	1.80	1.64	2.18	1.95
Prob > F	0.06	0.10	0.02	0.04

Table A7: OLS: result for market economies

Variables	***rv***	***rv***	***rq***	***rq***
duty	0.76 (0.55)	-1.26*(0.71)	4.60**(1.01)	-2.17**(0.88)
countrysize	0.05***(0.02)		0.08**(0.03)	
marketsize		-0.25***(0.08)		-0.21**(0.09)
ne	0.06 (0.07)	0.03 (0.07)	0.00 (0.11)	0.09 (0.08)
propv	1.30**(0.54)	4.30***(0.87)		
propq			0.32 (0.24)	0.12 (0.16)
t_0	-0.47 (0.33)	0.19 (0.36)	-1.64**(0.61)	0.38 (0.45)
t_1	-0.41 (0.35)	0.20 (0.38)	-1.56**(0.64)	0.40 (0.47)
t_2	-0.12 (0.37)	-0.20*(0.11)	-0.97 (0.67)	0.70 (0.49)
t_3	0.27 (0.39)	0.43 (0.40)	-0.16 (0.71)	1.42***(0.52)
t_4	0.57 (0.40)	0.82*(0.42)	0.14 (0.73)	1.50***(0.51)
t_5	0.51 (0.43)	1.02**(0.44)	-0.33 (0.78)	1.57***(0.54)
constant	-0.34 (0.48)	2.79***(0.78)	-0.68 (0.88)	2.64***(0.95)
Observations	387	329	387	329
F-Stat	3.31	4.89	3.98	4.10
Prob > F	0.00	0.00	0.00	0.00

Table A8: OLS: result for other countries

Variables	***rv***	***rq***
duty	0.28 (0.28)	0.05 (0.29)
ne	-0.05 (0.04)	-0.04 (0.04)
propv	-1.46***(0.28)	
propq		-0.98***(0.01)
t_0	-0.15 (0.18)	0.01 (0.19)
t_1	-0.06 (0.19)	0.13 (0.20)
t_2	0.17 (0.20)	0.33 (0.21)
t_3	-0.04 (0.21)	0.17 (0.22)
t_4	-0.04 (0.22)	0.19 (0.23)
t_5	0.47**(0.23)	0.30 (0.24)
constant	1.37***(0.16)	1.20***(0.16)
Observations	783	783
F-Stat	4.37	11.72
Prob > F	0.00	0.00

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