– Work in Progress –

Trade Diversion and Destruction Effects of Antidumping Policy:

Empirical Evidence from Mexico

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Version 1.0
September 2003

Abstract: This paper aims to make a contribution to the empirical literature on the trade effects of antidumping policy, which has focussed on the USA and the EU and not on the 'emerging' antidumping users. The paper finds that antidumping measures in Mexico have significant trade destruction effects on the named countries—both in import volume and import value terms. The effects are particularly strong for cases against non-US imports, developing countries and the processed food, textile and rubber industries. The paper does not find evidence of trade diversion, ie, imports from the non-named countries have no statistical relationship with the imposition of antidumping measures. There is some evidence of a reputation effect of antidumping in Mexico.

* Thanks to Joe Francois, Adriaan ten Kate and Maurizio Zanardi for their helpful comments, and to Gaby Villegas and colleagues at the Mexican Federal Competition Commission for their statistical support. The views expressed in this paper are those of the author.

1. Introduction

The ultimate objective of antidumping measures is to dampen the competitive impact of dumped imports on domestic producers. This occurs when the price at which these imports are sold in the domestic market goes up and their quantity goes down. Relatively few empirical studies exist on whether antidumping measures indeed have such trade effects in practice. Furthermore, those studies focus exclusively on the USA and the EU. This study aims to contribute to the literature by empirically assessing trade effects of antidumping policy in Mexico. This country is one of the so-called 'new' or emerging antidumping users, and is already among the most active in the world.[1] The analysis covers a total of 70 Mexican antidumping investigations initiated in the period 1992–1997.

Two main questions are addressed. First, do antidumping measures indeed have the effect of raising prices and reducing imports from the foreign countries found to have been dumping (hereinafter referred to as the 'named countries')?[2] This can be called the 'trade destruction' effect of antidumping. Second, is it indeed domestic firms who benefit from antidumping, or are imports from named countries simply replaced by imports from 'non-named' countries (ie, those countries that were not subject to the investigation)? This can be called the trade diversion effect of antidumping. The study also addresses two other questions. One is whether the initiation of the antidumping investigation itself already has an effect on imports, even before a decision is made. This is sometimes referred to as the 'harassment effect' of antidumping investigations (see, for example, Staiger and Wolak, 1994). The other question is whether antidumping measures can actually lead non-named countries to raise their price or

[1] See Miranda et al (1998) and Zanardi (2002) for data on the use of antidumping by country.

[2] The study is undertaken at the level of exporting countries rather than individual exporting firms level, because import data for Mexico are only available by country of origin.

reduce their sales as well. This could be for two reasons: non-named countries may fear that they will be targeted next by the antidumping authorities—this is a 'reputation effect' of antidumping—or they may join the domestic and named producers if the latter have used antidumping measures to reach a cartel outcome—the 'collusion' effect of antidumping.[3] The structure of this paper is as follows. Section 2 gives an overview of existing empirical studies on the trade effects of antidumping. Section 3 describes the data set of Mexican antidumping cases used for this study. The results of the estimations are discussed in Section 4. Section 5 concludes.

2. Existing empirical studies

The existing empirical studies on trade effects of antidumping cover either the USA or the EU.[4] An early, and probably the most extensive, study is that of Staiger and Wolak (1994), who analyse the effects of antidumping investigations on domestic production and imports.[5] Covering US cases from 1980 to 1985, the authors find that both preliminary and final affirmative findings have a significant negative effect on imports, and a significant positive effect of almost the same magnitude on domestic production. This suggests that domestic producers take over the lost market share of the named countries after an antidumping measure. By

[3] An extensive literature has developed on the collusion effect of antidumping. See, among others, Staiger and Wolak (1992), Prusa (1992), Hartigan (1995), Veugelers and Vandenbussche (1999) and Zanardi (2001). In contrast, the reputation effect of antidumping has not received much attention in the literature.

[4] One exception is Miranda (1995) who finds some anecdotal evidence of trade diversion effects of antidumping in Mexico. Further, a number of papers have assessed the price effects of antidumping duties, but do not deal with import quantity or value effects (for example, Boltuck, 1987, and Blonigen and Haynes, 2002). These papers are not covered in the discussion below.

[5] Blonigen and Prusa (2001) describe this Staiger and Wolak study as 'perhaps the most sophisticated econometric model used in the antidumping literature to date'.

implication there is likely to be little trade diversion (although Staiger and Wolak do not explicitly address trade diversion effects). This study further concludes that cases with a negative finding also have a significant negative impact on imports from the named countries, indicating the existence of harassment effects.[6] A number of subsequent papers explicitly analyse trade diversion effects between named and non-named countries (but, unlike Staiger and Wolak, these papers do not assess the effects of antidumping on domestic production). Krupp and Pollard (1996) focus on US antidumping cases in the chemicals sector from 1976 to 1988. They find evidence of trade diversion to non-named countries in about half of these cases. Prusa (1999) covers all US cases (more than 700 in total) between 1980 and 1994. Using pooled regressions with seven annual observations per year (three years before initiation, the year of initiation and three years after the initiation), the author assesses the effects of antidumping on import values, volumes and prices. He finds evidence of strong trade destruction effects on imports from named countries, of a harassment effect, and of a trade diversion effect to non-named countries. In a similar study, Konings et al (2001) assess the trade effects of 246 EU antidumping investigations initiated between 1985 and 1990. Using pooled regressions with nine annual observations per case (two years before initiation, the year of initiation, and six years after), the authors find no significant evidence of import diversion. Lasagni (2000) reaches a similar conclusion in a study covering EU cases in the period 1982–1992. These findings for the EU contrast with those of Brenton (2001). Analysing 98 EU cases from 1989 to 1994, and time series of seven years per case (two years before initiation, the year of initiation, and four years after), this author finds statistically significant evidence that antidumping actions in the EU do result in trade diversion from named countries to non-named countries outside the EU. Finally, in a different type of empirical study, Lloyd et al (1998) use an

[6] Indeed, Staiger and Wolak make the explicit distinction between 'outcome filers', who aim for an affirmative outcome, and 'process filers', who expect that the investigation itself will already reduce imports.

intervention analysis to assess the effect of a price undertaking on time series of import prices (unit values) and import volumes. Applying this to a 1982 EU antidumping action against polypropylene film imports from Japan, and considering monthly data over a period of 12 years, the authors find that the undertaking was associated with a general increase in import prices and a fall in the import share of Japan in the product concerned. The effect on imports from non-named countries was not assessed.

3. Description of the data

The empirical analysis in this section follows the same basic methodology as the Prusa (1999), Konings et al (2001) and Brenton (2001) papers discussed above. It covers a total of 70 Mexican antidumping investigations that were initiated in the period 1992–1997. Of the 70 cases, 17 were initiated in 1992, 34 in 1993, seven in 1994 and four each in 1995, 1996 and 1997. It should be noted that the way the number of cases is counted may be different from that in other sources. The named countries in each investigation are grouped together to count as one case since the objective is to assess trade effects on named versus non-named countries (other sources sometimes count each named country as a separate case). However, in two investigations some named countries were cleared while others were subject to a duty, and both these investigations have been split into two (one with a negative outcome and one with an affirmative outcome).[7] Finally, it should be noted that one investigation opened by the Mexican antidumping authority in this period has been excluded because it involved thousands of different products from eight different countries,

[7] The first of these cases was filed in October 1993 and involved hot-rolled steel from six different countries. Brazil, Canada and the Netherlands were subject to a duty while Germany, South Korea and Venezuela were cleared. The other case was filed in November 1993 and involved urea from six former Soviet states. Only the Ukraine was subject to a duty.

making it impossible to discern any meaningful trade destruction and diversion effects.[8]

Table 1 gives an overview of the 70 antidumping cases covered in the study. This information is taken from various issues of the *Diario Oficial de la República* which publishes the decisions (both preliminary and final) of the Mexican antidumping authority. A total of 54 of the investigations resulted in an antidumping measure (a duty in 53 cases and a price undertaking in one case); the other 16 had a negative finding. Table 1 also breaks down the antidumping investigations by clusters of target countries and industries. This is relevant for the analysis below which considers whether the trade diversion and destruction effects differ by cluster. As to target countries, 21 investigations were against the USA, nine against other developed countries and 40 against developing countries. The significance of the USA as target country is not surprising since 73% of total Mexican imports in the period under consideration came from the USA.[9] The steel, chemicals and plastics industries accounted for 39 of the 70 antidumping investigations. These industries are generally characterised by strong economies of scale and high market concentration, and are frequent users (and targets) of antidumping policy around the world.[10] Antidumping filings in these industries somtimes have retaliatory motives, or form part of a collusive or monopolising strategy by the domestic complainants (and sometimes the foreign exporters as well).[11] A slightly larger proportion of

[8] This case was filed in May 1992 against exporters from Argentina, Brazil, China, Colombia, Hong Kong, Pakistan, South Korea and Taiwan. The filing concerned cotton fabrics falling under five different four-digit tariff items (the Mexican tariff classification system has up to eight digits). In the end no measures were taken against any of the eight named countries.

[9] Percentage compiled from various issues of the *IMF Direction of Trade Statistics Yearbook*.

[10] Data in Miranda et al (1998, Table 5) for 1987 to 1997 show that steel, chemicals and plastics ranked first, second and fourth, respectively, among the most frequently targeted industries by antidumping actions world-wide.

[11] See, for example, Messerlin (1990) and Crandall (1995).

steel, chemicals and plastics investigations was against developed countries as opposed to developing countries. The cluster of processed food, textile products and rubber accounted for 16 investigations. These are usually relatively small-scale and unconcentrated industries, and antidumping actions in these industries tend to be aimed at protecting small producers. Most of these investigations were targeted at developing countries. The remaining 15 cases concerned other industries (including machinery, electrical equipment and cement).

[Insert Table 1]

For each case, data on imports have been collated for a period of six years (year 1 to year 6); two years before the year of initiation, the year of initiation itself, and three years after the year of initiation. These import data come from a database called MAGIC.[12] This database contains annual import values and volumes for Mexico for each tariff item (eight digits) and by country of origin, for the period 1990–2000.[13] Because in MAGIC the import time series for Mexico are already expressed in US dollars rather than pesos these series are not further adjusted for inflation. For each case, the total import value and volume were determined for both the named and non-named countries for each of the six years. It should be noted that 30 of the 70 investigations covered two or more eight-digit tariff items. For the value series this is not a problem since these can be added up, but the import volume series should be interpreted with care. A price series was constructed by dividing import value by volume. Caution is therefore due when interpreting these average price series as well. Further, the prices obtained only reflect export prices before duties, and therefore do not fully

[12] Module to Analyze the Growth of International Commerce; a database owned by the United Nations Economic Commission for Latin America and the Caribbean (UN ECLAC).

[13] This coverage of 1990–2000 in the MAGIC database is the reason why the analysis in this study has been limited to the period 1992–1997.

capture the effect of the duty on the actual sales price in the Mexican domestic market. All series are expressed in index form, with year 3 (the year of initiation) as the base year.

A problem inherent in measuring trade effects of antidumping actions based on annual trade data is that the latter correspond to calendar years and not (or only by chance) to the actual period of the investigation. The other papers discussed in Section 2 have the same problem.[14] In this study year 3 (the year of initiation) is assumed to be the year of the investigation, while years 4 to 6 are assumed to be years in which the antidumping measure (if any) is in force. This is only a very rough approximation. The average length of the 70 investigations was 17.5 months.[15] 40 out of the 70 investigations were initiated in the first half of a calendar year, and only for these cases may the approximation be accurate. However, more precise (ie, monthly) import data are not available. At any rate, by taking a sufficiently long time period after the initiation, ie, three years, the trade effect should be properly accounted for.

Some preliminary indications of the trade effects of antidumping can already be obtained by considering average import levels (in index form) from year 1 to year 6 for all 70 cases. Figure 1 shows the average index of import values for both named and non-named countries, and split between cases with affirmative and with negative outcomes.[16] It can be seen that

[14] Only the Staiger and Wolak (1994) model makes certain adjustments to the annual data to capture within-year effects.

[15] This figure is consistent with the data in Miranda et al (1998), which show an average duration of around 500 days for Mexican antidumping investigations in the period 1987–1997. Mexico is well above the global average which is now around 11 months. The 1994 WTO Antidumping Agreement requires investigations to be completed within 12 months, or 18 months in exceptional circumstances.

[16] A few cases where the index value is above 1,000 in one or more years have been excluded for the purpose of calculating the averages in Figures 1 to 5 (such high index values are obtained where imports in the base year are very low). Those cases would

imports from the named countries grew faster than imports from non-named countries in the two years before the investigation (years 1 and 2). This is not surprising, since that growth is likely to be one of the factors that lead to the filing of the complaint in the first place. After the investigation, imports from the named countries decreased—and more so in cases with an affirmative finding—while imports of the non-named countries increased. This seems to suggest that some import diversion from named to non-named countries does indeed occur, although in the third year after the investigation (year 6) these effects seem to dampen.

[Insert Figure 1]

Figure 2 shows the average index of import volumes, with the same breakdowns as in Figure 1. The effect of antidumping investigations on import volumes seems similar to the effect on import values. The impact on the named countries in cases with an affirmative outcome is more significant in volume than in value terms, as could be expected if the antidumping measure also leads to a price increase. As with import values, the effects on volumes seem to dampen after a few years, and in particular import volumes from named countries in cases with a negative outcome pick up again quickly.

[Insert Figure 2]

Figure 3 shows the price effects of antidumping investigations. Overall these price effects seem less marked than the volume effects. All prices increase after year 3, but only for named countries in cases with an affirmative outcome do prices increase above pre-investigation levels.

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otherwise disproportionately affect the average index values. At any rate, Figures 1 to 5 are included for illustrative purposes only. For the econometric analysis presented in Section 4 no observations have been excluded.

However, as discussed above, these price data should be interpreted with care.

[Insert Figure 3]

Figure 4 shows the import effects with a breakdown between industrial and developing countries (for import values and cases with an affirmative outcome only). It can be seen that antidumping measures have a similar negative effect on imports from both named industrial and named developing countries. However, imports from non-named countries seem to increase substantially after antidumping measures against industrial countries, while for cases against developing countries no such effect takes places. This seems to suggest that antidumping actions against developing countries are successful in protecting domestic industries, while actions against industrial countries result in a greater extent of import diversion to non-named countries.

[Insert Figure 4]

Finally, Figure 5 shows the import effects by cluster of industries—ie, the cluster including the steel, chemicals and plastics industries, and the cluster including processed food, textile and rubber—again for import values and cases with an affirmative outcome only (the cluster of 'other industries' is not shown). Imports from named countries fall for both clusters after the antidumping investigation. However, only for steel, chemicals and plastics an apparent import diversion to non-named countries takes place. Imports from non-named countries in the cluster of food, textile and rubber show no increase after the investigation (and indeed decrease slightly). This seems to suggest that antidumping actions in the food, textile and rubber industries are successful in protecting domestic producers, while actions in the steel, chemicals and plastics industries mainly lead to some degree of import diversion to non-named countries. However, it should be noted that Figures 1 to 5 above are only included for illustrative purposes, and no

firm conclusions can be drawn from them. In Section 4 below it is analysed whether antidumping actions indeed have statistically significant effects on trade.

[Insert Figure 5]

4. Econometric model

As explained above, the dataset for the econometric analysis is a pool of 70 antidumping investigations initiated in the period 1992–1997, with six annual observations for each investigation—two years before the year of initiation, the year of initiation itself, and three years after the year of initiation. The objective is to determine the effect of both the initiation and the outcome of the antidumping investigation on the value, volume and price of imports from both named and non-named countries. All estimations are pooled OLS estimations with fixed effects for the time series. The estimated equations are of the following general form:

$$\ln M_{i,t} = \alpha_1 C_i + \alpha_2 \ln M_{i,t-1} + \alpha_3 INITIATE_{i,t} + \alpha_4 DUTY_{i,t} + \alpha_5 \ln RER_{i,t}$$
$$(i = 1,\ldots,70;\ t = 1,\ldots,6)$$

In this equation, the dependent variable, $M_{i,t}$, is the import variable of interest, which in alternative specifications is import value, import volume or import price (in index form). Separate equations are estimated for named and non-named countries, and also for the different clusters of cases as discussed in Section 3—ie, all cases, non-US cases, cases against industrial countries, cases against developing countries, cases in steel, chemicals and plastics, and cases in processed food, textile and rubber. $INITIATE_{i,t}$ is a dummy variable that takes the value of 1 in $t=3$, ie, the year of initiation for each case. This variable tests for the harassment effect of antidumping investigations. $DUTY_{i,t}$ is a dummy variable that takes the value of 1 in $t=4,\ldots,6$ in those cases i where the outcome is affirmative.

This variable tests for the trade diversion and destruction effects of antidumping. In an alternative specification, the results of which are also shown below, $DUTY_{i,t}$ gives the actual level of *ad valorem* duty (in percentage points)for each case *i*. Information on the level of duty is available for 44 out of the 54 cases with an affirmative outcome. These *ad valorem* duties range from 13% to 1,105%, with an unweighted average of 150% and a median of 88%. Finally, $RER_{i,t}$ is the trade-weighted average real exchange rate of the Mexican peso with respect to 111 countries, as reported by the Mexican Central Bank (Banco de México, 2001) on a monthly basis in index form. For this model the Central Bank figures are averaged into an annual index with 1990 as the base year. Thus, $RER_{i,t}$ has the value of 100 for $t=1$ and $i=1,\ldots17$ (ie, year 1 each for the 17 investigations initiated in 1992). An increase in the index value means an appreciation of the peso and *vice versa*. The exchange rate variable is included to control for macro-economic conditions year by year. It turned out to be the most significant among a number of alternative control variables that have been tested, including trade deficit and current account variables, indicators of manufacturing output and year dummies.[17] These other variables are not shown below. All variables used in the model are summarised in Table 2.

[Insert Table 2]

Table 3 shows the results of the estimations of import value effects for all investigations. The four columns show the separate estimations for named and non-named countries, and for the two alternative specifications of the $DUTY_{i,t}$ variable (ie, dummy and level of the duty). The coefficient for the lagged dependent variable is statistically significant at the 1% level in each estimation. Its positive value indicates an upward trend in import values

[17] Prusa (1999), Konings et al (2001) and Brenton (2001) only use year dummies as control variables. The real exchange rate is probably a more accurate control variable, particularly for countries with highly fluctuating trade balances such as Mexico.

over time. The other control variable, ln $RER_{i,t}$, also has a statistically significant coefficient each case—at the 5% level for the named countries and 1% for the non-named countries. Its positive sign indicates that import values increase when the exchange rate appreciates. As to the antidumping effects, it can be seen in Table 3 that the coefficient for the $DUTY_{i,t}$ variable, in both its specifications, is statistically significant for the named countries. It has the expected sign, as it indicates that an affirmative antidumping outcome has a negative effect on imports from the named countries. Thus, there is evidence of trade destruction effects. The $DUTY_{i,t}$ variable has no statistically significant relationship with import values for the non-named countries. This suggests the absence of trade diversion effects. The coefficients for $INITIATE_{i,t}$, the dummy variable for year 3, are not statistically significant, which implies that there is no evidence of a harassment effect.

[Insert Table 3]

Tables 4 and 5 show the results of the estimations for the import volume and import price effects, respectively. The volume results in Table 4 are overall similar to the value results in Table 3. The coefficient for the lagged dependent variable is statistically significant at the 1% level, and positive, in each estimation. The exchange rate control variable also has a statistically significant coefficient each case. The coefficient for the $DUTY_{i,t}$ variable, in both its specifications, is statistically significant and positive for the named countries, but not for the non-named countries. The coefficients for $INITIATE_{i,t}$, the dummy variable for year 3, are insignificant. The estimations of the price effects in Table 5 are generally less robust, as could be expected given the specification of the price variable (see Section 3). Of note is that the coefficient of the $DUTY_{i,t}$ variable specified as dummy is statistically significant at the 1% level for the named countries. Its positive sign indicates that an affirmative finding leads to an increase in the price of imports from named countries (even before duties).

[Insert Tables 4 and 5]

The coefficients for the independent variables that are used in each of Tables 3 to 5 are related, ie, the sum of the coefficients for the import volume and import price estimations is equal to the coefficient for the import value estimation. For example, the coefficient for $DUTYDUM_{i,t}$ in the first column in Table 3 (–1.31) is equal to the sum of the coefficient for $DUTYDUM_{i,t}$ in the first column in Table 4 (–1.66) and that for $DUTYDUM_{i,t}$ in the first column in Table 5 (0.35). This is no coincidence, since the price variable in the data set is obtained by taking the ratio of value and volume (see Section 3). These coefficient values can be interpreted as follows. The $DUTYDUM_{i,t}$ coefficient of –1.31 in Table 3 suggests that an affirmative outcome in an antidumping investigation leads to a structural decrease in import value from the named country by 73%.[18] This structural decrease can be broken down into a volume and price effect. The $DUTYDUM_{i,t}$ coefficient of –1.66 in Table 4 indicates an 81% decrease in import volume, while the coefficient of 0.35 in Table 5 points to an increase in average import price by 42%. Thus, affirmative antidumping actions have the expected trade destruction effect on the named countries are concerned: their prices go up, volumes fall, and overall they lose market share (as measured by value) in the domestic market.

The orders of magnitude of these trade destruction effects are not out of line with other studies. For example, Prusa (1999) estimates that the imposition of a duty reduces import values by around 50% in each of the three subsequent years. This can be split between reductions in import volumes by around 60%–70% each year, and increases in import prices by around 30%–50%. Konings et al (2001) find an overall average reduction of 37% in import value after a duty is imposed. This slightly lower order of magnitude may be explained by the fact that these authors consider a

[18] This is because $e^{-1.31} - 1 = -0.73$, following the Halvorsen–Palmquist method for interpreting dummy variables in semi-logarithmic equations.

longer post-investigation period, ie, six years, at the end of which some of the effects may have dampened. Tables 3 to 5 indicate that antidumping actions do not have the expected trade diversion effect, ie, there is no evidence of imports from the non-named countries being affected by the outcome of investigations. Thus, it seems that domestic producers are the main beneficiaries of the fall in imports from named countries. This result for Mexico is similar to that for the EU as estimated by Lasagni (2000) and Konings et al (2001)—but not to the EU result obtained by Brenton (2001) or the US result obtained by Prusa (1999).

Tables 6 to 10 below show the results of estimations on subsets of investigations, to test whether antidumping actions have any differential impact depending on the exporting country or on the target industry concerned. Table 6 shows the estimations for all cases excluding those involving the USA (49 in total). The reason is that the USA is by far Mexico's principal trading partner. Well-established cross-border supplier relationships and intra-firm trade between the two countries make the destruction of, or the diversion away from, US imports less likely than for other countries. It can be seen that the orders of magnitude of the trade destruction effects on the named countries are slightly higher if the USA is excluded. The value coefficient for the $DUTYDUM_{i,t}$ variable is –1.77 (compared to –1.31 in Table 3), the volume coefficient is –2.24 (–1.66) and the price coefficient is 0.46 (0.35).[19] This indicates that affirmative findings in non-US cases reduce import values from named countries by 83% on average and import volumes by 89%, while they increase import prices by 58%. Hence, imports from the USA are indeed less affected on average by antidumping measures than imports from other countries. Another interesting finding in Table 6 is that import values from the non-named countries also seem to decrease after an affirmative finding—the coefficient for the $DUTYDUM_{i,t}$ variable is –0.40. This can be translated

[19] The value and volume coefficients for the $DUTYDUM_i$ variable are statistically significant at the 1% level; the price coefficient at the 5% level.

into a structural decrease in imports from non-named countries by 49%, and suggests the presence of a reputation effect for non-US cases (the opposite of a trade diversion effect). However, the coefficient is only statistically significant at the 10% level.

[Insert Table 6]

Tables 7 and 8 split all investigations between those against developed countries (including the USA) and against developing countries (30 and 40 cases, respectively). It can be seen that for both clusters of countries the trade destruction effects of affirmative outcomes are significant, but the order of magnitude is greater for the developing countries—the value and volume coefficients for the $DUTYDUM_{i,t}$ variable in Table 8 are larger (in absolute terms) than in Table 7.[20] Thus, antidumping measures against developing countries seem to be somewhat more successful in deterring imports from named countries than measures against developed countries. Also, as Table 8 indicates, there seems to be a reputation effect in cases against developing countries: the non-named countries in these cases also reduce imports after an affirmative outcome (although the coefficient for the $DUTYDUM_{i,t}$ variable for non-named countries is only statistically significant at the 10% level). For the developed countries there is no such effect.

[Insert Tables 7 and 8]

Finally, Tables 9 and 10 show the estimations for two clusters of industries—steel chemicals and plastics in Table 9 (39 cases), and processed food, textile and rubber in Table 10 (16 cases). In contrast with Tables 6 to 8, these tables show the level specification of the $DUTY_{i,t}$ variable rather than the dummy specification. This is for illustrative purposes only, as the

[20] The price coefficient for the $DUTYDUM_{i,t}$ variable in Table 6 is higher than in Table 5, but not statistically significant.

level-specification produced slightly more robust results. The volume and value effects of trade destruction on named countries are slightly stronger for the food, textile and rubber cluster, while the price-increasing effect is stronger for the steel, chemicals and plastics cluster. There seems to be a reputation effect for the food, textile and rubber cluster: the non-named countries in these cases also reduce imports after an affirmative outcome. The coefficient for the $DUTYLEVEL_{i,t}$ variable for non-named countries is statistically significant at the 5% level. This effect is similar to that for cases against developing countries shown above, which can be explained by the fact that most of the investigations involving these industries were against developing countries (see Table 1). For the steel, chemicals and plastics cluster there is no such effect.

[Insert Tables 9 and 10]

5. Conclusion

This paper aims to make a contribution to the empirical literature on antidumping policy, in particular in the 'new' or emerging antidumping users. The study has found evidence that antidumping measures in Mexico have significant trade destruction effects on the named countries—both in import volume and import value terms. Overall, an affirmative outcome in an antidumping investigation tends to cause a structural decrease in import value from the named country (or countries) by 73% on average (which can be broken down into a volume decrease by 81% and a price increase by 42%—although in particular the price data should be interpreted with care). These orders of magnitude are not out of line with other studies on the USA and EU. Trade destruction effects in Mexico are particularly strong for antidumping measures against non-US imports, against developing countries and against the processed food, textile and rubber industries.

The study has not found any evidence of trade diversion, ie, imports from the non-named countries have no statistical relationship with the imposition of antidumping measures. This seems to suggest that domestic producers are the main beneficiaries of the fall in imports from the named countries. This result for Mexico is similar to that for the EU as estimated by Lasagni (2000) and Konings et al (2001)—but not to the EU result obtained by Brenton (2001) or the US result obtained by Prusa (1999). Evidence of a harassment effect has not been found either. The initiation of an antidumping investigation does not have a statistically significant impact on import values, volumes or prices. Only final affirmative decisions have such an impact. There is some evidence of a possible reputation effect of antidumping in Mexico. In particular, antidumping measures against developing countries and against the processed food, textile and rubber industries seem to have a negative effect on imports from non-named countries as well as on imports from the named countries. One reason may be that these non-named countries fear being next to be targeted by an antidumping investigation.

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Table 1: Number of antidumping investigations initiated in the period 1992–1997

Industry cluster Named country	Steel, chemicals and plastics	Processed food, textile and rubber	Other industries	Total	Number of affirmative findings
USA	16	3	2	21	16
Other developed countries	7	2	0	9	7
Developing countries	16	11	13	40	31
Total	39	16	15	70	54

Table 2: Summary of variables used in the model

Variable	Description	Data source
Dependent variables		
$MVALUE_{i,t}$	Value of the imported product(s) in investigation i (i=1,…,70) and period t (t=1,…,6; where t=3 is the year of initiation).	Module to Analyze the Growth of International Commerce (database owned by UN ECLAC) and own database built from several issues of the *Diario Oficial*.
$MVOLUME_{i,t}$	Volume of the imported product(s) in investigation i (i=1,…,70) and period t (t=1,…,6; where t=3 is the year of initiation).	Module to Analyze the Growth of International Commerce (database owned by UN ECLAC) and own database built from several issues of the *Diario Oficial*.
$MPRICE_{i,t}$	Average price (value divided by volume) of the imported product(s) in investigation i (i=1,…,70) and period t (t=1,…,6; where t=3 is the year of initiation).	Module to Analyze the Growth of International Commerce (database owned by UN ECLAC) and own database built from several issues of the *Diario Oficial*.
Explanatory variables		
$INITIATE_{i,t}$	Dummy variable to test 'harassment' effect, taking value of 1 in t=3, ie, the year of initiation for each case.	Own database built from several issues of the *Diario Oficial*.
$DUTYDUM_{i,t}$	Dummy variable that takes the value of 1 in t=4,…,6 in those cases i where the outcome is affirmative. This variable tests for the trade diversion and destruction effects of antidumping.	Own database built from several issues of the *Diario Oficial*.

$DUTYLEVEL_{i,t}$	Actual level of *ad valorem* duty for each case *i* where the outcome is affirmative, for periods in $t=4,\ldots,6$. This variable tests for the trade diversion and destruction effects of antidumping.	Own database built from several issues of the *Diario Oficial*.
$RER_{i,t}$	Trade-weighted average real exchange rate of peso with respect to 111 currencies. Figures are averaged into an annual index with 1990 as the base year—$RER_{i,t}=100$ for $t=1$ and $i=1,\ldots,17$. An increase in the index value means an appreciation of the peso.	Banco de México, *Indicadores Económicos y Financieros* (www.banxico.org.mx).

Table 3: Effect of antidumping on import values—all cases

Dependent variable: $Ln\ MVALUE_{i,t}$	**Named country**	**Named country**	**Non-named countries**	**Non-named countries**
Independent variables				
$Ln\ MVALUE_{i,t-1}$	0.24	0.25	0.34	0.39
	(3.26)***	(2.88)***	(4.46)***	(4.71)***
$INITIATE_{i,t}$	–0.08	0.30	–0.27	–0.15
	(–0.31)	(1.21)	(–1.28)	(–0.79)
$DUTYDUM_{i,t}$	–1.31		–0.13	
	(–5.52)***		(–0.70)	
$DUTYLEVEL_{i,t}$		–0.0034		–0.0010
		(–3.67)***		(–1.30)
$Ln\ RER_{i,t}$	1.17	1.21	2.29	1.81
	(2.27)**	(2.10)**	(5.43)***	(4.07)***
Number of cross-sections used	64	56	67	57
Number of panel observations	297	261	331	281
Adjusted R^2	0.36	0.24	0.20	0.19
F-statistic	78.2	47.1	51.4	41.8

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 4: Effect of antidumping on import volumes—all cases

Dependent variable: $Ln\ MVOLUME_{i,t}$	**Named country**	**Named country**	**Non-named countries**	**Non-named countries**
Independent variables				
$Ln\ MVOLUME_{i,t-1}$	0.22	0.21	0.24	0.36
	(3.25)***	(2.76)***	(3.10)***	(4.44)***
$INITIATE_{i,t}$	–0.25	0.27	–0.20	–0.17
	(–0.83)	(0.89)	(–0.65)	(–0.66)
$DUTYDUM_{i,t}$	–1.66		0.033	
	(–5.96)***		(0.12)	
$DUTYLEVEL_{i,t}$		–0.0038		–0.0002
		(–3.35)***		(–0.23)
$Ln\ RER_{i,t}$	1.55	1.65	2.88	2.42
	(2.56)**	(2.36)**	(4.72)***	(4.06)***
Number of cross-sections used	63	55	67	57
Number of panel observations	296	260	331	281
Adjusted R^2	0.39	0.29	0.22	0.23
F-statistic	86.2	54.9	55.1	48.6

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 5: Effect of antidumping on import prices—all cases

Dependent variable: $Ln\ MPRICE_{i,t}$	**Named country**	**Named country**	**Non-named countries**	**Non-named countries**
Independent variables				
$Ln\ MPRICE_{i,t-1}$	0.11	0.12	–0.043	0.097
	(1.82)*	(1.74)*	(–0.61)	(1.27)
$INITIATE_{i,t}$	0.13	–0.006	–0.09	–0.013
	(0.89)	(–0.04)	(–0.59)	(–0.10)
$DUTYDUM_{i,t}$	0.35		–0.13	
	(2.61)***		(–0.92)	
$DUTYLEVEL_{i,t}$		0.0003		–0.0006
		(0.64)		(–1.09)
$Ln\ RER_{i,t}$	–0.37	–0.42	–0.53	–0.56
	(–1.25)	(–1.23)	(–1.68)*	(–1.81)*
No. of cross-sections used	63	55	67	57
No. of panel observations	296	260	331	281
Adjusted R^2	0.40	0.39	0.34	0.35
F-statistic	88.8	74.3	79.6	70.9

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 6: Effect of antidumping on import values, volumes and prices—all cases except against USA

Dependent variable:	**Import value (log)**		**Import volume (log)**		**Import price (log)**	
Independent variables	**Named country**	**Non-named**	**Named country**	**Non-named**	**Named country**	**Non-named**
Lagged dependent variable (t–1)	0.23	0.35	0.21	0.29	0.12	0.11
	(2.43)**	(3.02)***	(2.48)**	(3.25)***	(1.53)	(1.39)
$INITIATE_{i,t}$	–0.07	–0.24	–0.33	–0.30	0.22	0.003
	(–0.18)	(–1.07)	(–0.74)	(–1.07)	(0.98)	(0.02)
$DUTYDUM_{i,t}$	–1.77	–0.40	–2.24	–0.35	0.46	–0.04
	(–4.91)***	(–1.93)*	(–5.28)***	(–1.35)	(2.16)**	(–0.29)
$Ln\,RER_{i,t}$	1.36	1.92	1.73	2.40	–0.34	–0.40
	(1.76)*	(4.25)***	(1.90)*	(4.21)***	(–0.74)	(–1.20)
No. of cross-sections used	43	46	42	46	42	46
No. of panel observations	192	227	191	227	191	227
Adjusted R^2	0.37	0.15	0.41	0.28	0.40	0.39
F-statistic	52.1	29.3	58.2	46.3	56.9	64.3

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 7: Effect of antidumping on import values, volumes and prices—cases against developed countries

Dependent variable:	**Import value (log)**		**Import volume (log)**		**Import price (log)**	
Independent variables	**Named country**	**Non-named**	**Named country**	**Non-named**	**Named country**	**Non-named**
Lagged dependent variable (t–1)	0.35	0.36	0.30	0.22	0.11	–0.25
	(2.53)**	(2.87)***	(2.82)***	(1.69)*	(1.25)	(–2.28)**
$INITIATE_{i,t}$	–0.20	–0.39	–0.32	–0.21	0.06	–0.14
	(–0.59)	(–0.92)	(–0.82)	(–0.35)	(0.31)	(–0.57)
$DUTYDUM_{i,t}$	–1.21	–0.05	–1.62	0.25	0.40	–0.25
	(–3.64)***	(–0.12)	(–4.48)***	(0.46)	(2.38)**	(–1.15)
$Ln\,RER_{i,t}$	1.90	3.11	2.62	3.87	–0.65	–0.67
	(2.57)**	(3.61)***	(3.29)***	(3.18)***	(–1.78)*	(–1.39)
No. of cross-sections used	30	30	30	30	30	30
No. of panel observations	145	148	145	148	145	148
Adjusted R^2	0.43	0.15	0.51	0.14	0.41	0.30
F-statistic	46.7	20.0	61.8	19.1	44.8	32.2

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 8: Effect of antidumping on import values, volumes and prices—cases against developing countries

Dependent variable:	**Import value (log)**		**Import volume (log)**		**Import price (log)**	
Independent variables	**Named country**	**Non-named**	**Named country**	**Non-named**	**Named country**	**Non-named**
Lagged dependent variable (t–1)	0.19	0.31	0.17	0.27	0.13	0.12
	(2.10)**	(3.91)***	(1.92)*	(3.42)***	(1.41)	(1.34)
$INITIATE_{i,t}$	0.01	–0.17	–0.21	–0.20	0.21	–0.02
	(0.04)	(–1.05)	(–0.47)	(–0.76)	(0.91)	(–0.11)
$DUTYDUM_{i,t}$	–1.45	–0.27	–1.78	–0.21	0.33	–0.05
	(–4.28)***	(–1.80)*	(–4.20)***	(–0.88)	(1.51)	(–0.24)
$Ln\,RER_{i,t}$	0.29	1.58	0.39	1.98	–0.10	–0.33
	(0.40)	(4.86)***	(0.43)	(3.74)***	(–0.22)	(–0.81)
No. of cross-sections used	34	37	33	37	33	37
No. of panel observations	152	183	151	183	151	183
Adjusted R^2	0.29	0.34	0.27	0.40	0.38	0.39
F-statistic	32.8	44.6	30.6	54.4	43.0	52.2

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 9: Effect of antidumping on import values, volumes and prices—cases involving steel, chemical and plastics industries

Dependent variable:	**Import value (log)**		**Import volume (log)**		**Import price (log)**	
Independent variables	**Named country**	**Non-named**	**Named country**	**Non-named**	**Named country**	**Non-named**
Lagged dependent variable (t–1)	0.13	0.34	0.17	0.35	0.09	–0.20
	(1.09)	(2.84)***	(1.67)*	(2.80)***	(0.96)	(–1.80)*
$INITIATE_{i,t}$	–0.16	–0.12	–0.19	0.12	–0.06	–0.13
	(–0.43)	(–0.34)	(–0.43)	(0.26)	(–0.32)	(–0.68)
$DUTYLEVEL_{i,t}$	–0.015	–0.001	–0.019	0.001	0.004	–0.002
	(–3.76)***	(–0.35)	(–4.09)***	(0.16)	(2.05)**	(–1.13)
$Ln\,RER_{i,t}$	1.45	1.76	2.15	2.85	–0.71	–0.71
	(1.83)*	(2.25)**	(2.32)**	(2.82)***	(–1.82)*	(–1.74)*
No. of cross-sections used	29	30	29	30	29	29
No. of panel observations	137	146	137	146	137	141
Adjusted R^2	0.19	0.08	0.35	0.10	0.40	0.25
F-statistic	21.0	15.2	34.9	16.3	40.3	25.9

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Table 10: Effect of antidumping on import values, volumes and prices—cases involving processed food, textile products and rubber

Dependent variable:	**Import value (log)**		**Import volume (log)**		**Import price (log)**	
Independent variables	**Named country**	**Non-named**	**Named country**	**Non-named**	**Named country**	**Non-named**
Lagged dependent variable (t–1)	0.63	0.45	0.44	0.45	0.52	0.20
	(3.67)***	(3.71)***	(2.71)***	(3.28)***	(3.53)***	(1.34)
$INITIATE_{i,t}$	0.74	–0.21	0.69	–0.37	0.06	0.10
	(–0.43)	(–1.11)	(1.22)	(–1.45)	(0.25)	(0.78)
$DUTYLEVEL_{i,t}$	–0.0019	–0.0009	–0.0025	–0.0005	0.0002	–0.0004
	(–1.60)*	(–2.15)**	(–1.98)**	(–0.91)	(0.37)	(–1.59)
$Ln\,RER_{i,t}$	0.48	1.90	0.38	1.74	0.10	0.11
	(0.37)	(4.28)***	(0.28)	(3.00)***	(0.17)	(0.34)
No. of cross-sections used	13	13	13	13	13	13
No. of panel observations	59	65	59	65	59	65
Adjusted R^2	0.43	0.58	0.41	0.57	0.59	0.66
F-statistic	19.7	34.6	18.5	33.7	32.7	47.5

Note: Pooled OLS regression with fixed effects (fixed effect coefficients not illustrated in table). Estimated coefficients are shown with *t*-statistics in parenthesis. *** means coefficient is significantly different from zero at 1% level; ** means significant at 5% level; * means significant at 10% level.

Figure 1: Average index of import values for named and non-named countries and for affirmative and negative outcomes (year 3 = 100)

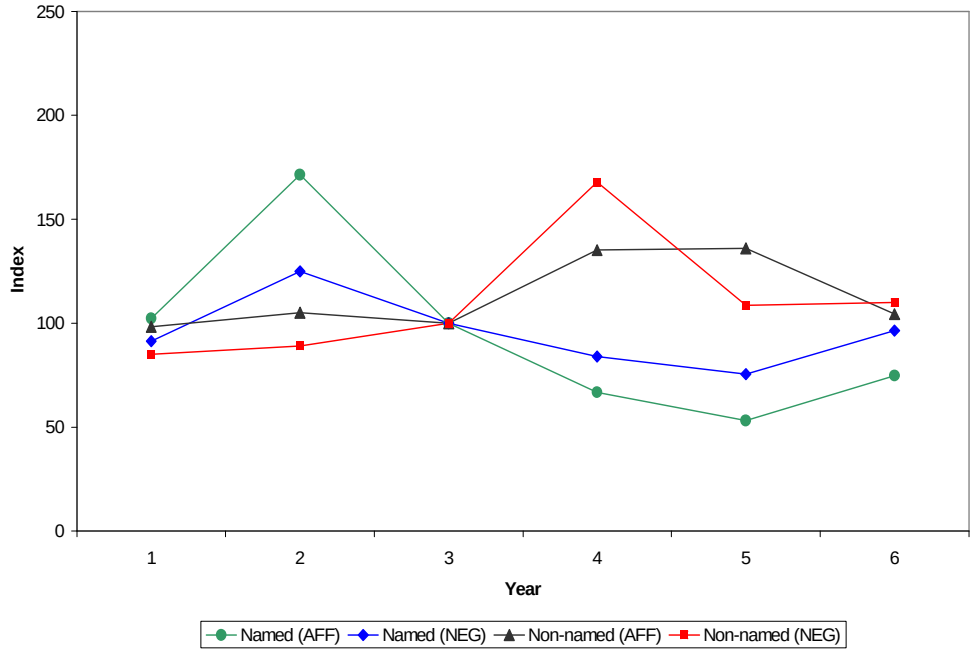

Figure 2: Average index of import volumes for named and non-named countries and for affirmative and negative outcomes (year 3 = 100)

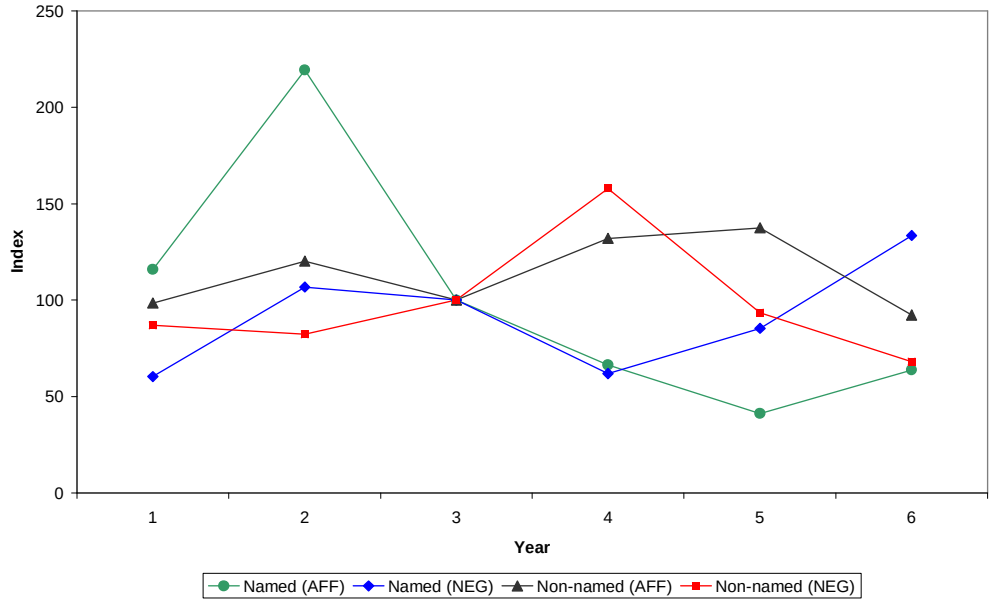

Figure 3: Average index of import prices for named and non-named countries and for affirmative and negative findings (year 3 = 100)

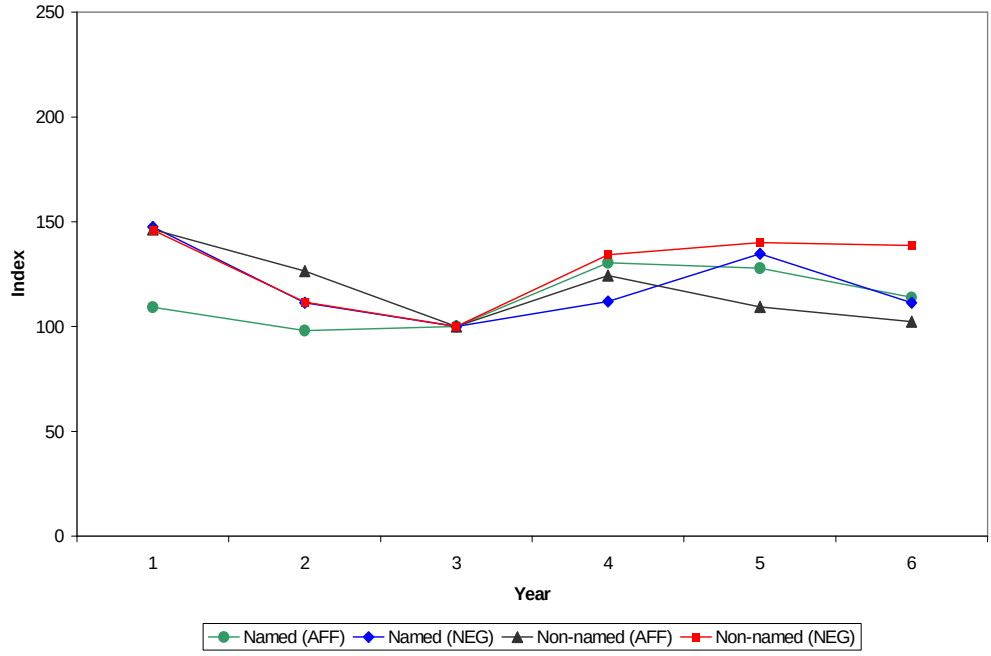

Figure 4: Average index of import values for named and non-named industrial and developing countries; affirmative findings only (year 3 = 100)

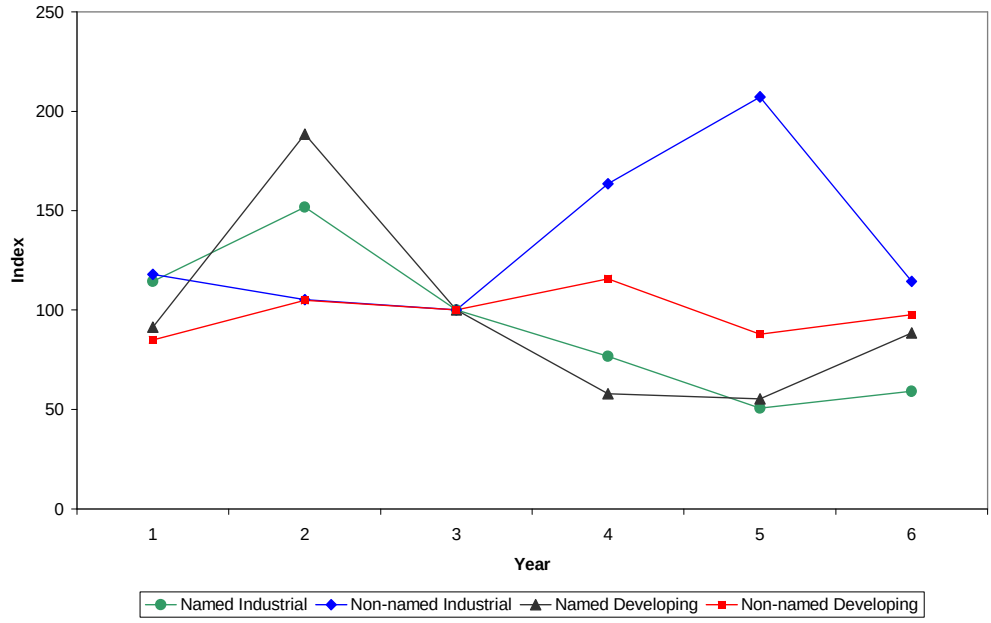

Figure 5: Average index of import values for steel, chemicals and plastics cases, and for food, textile and rubber cases; affirmative findings only (year 3 = 100)