UNIVERSIDADE FEDERAL DO PARANÁ

GUILHERME ZAMBALDE PORTELA CUSTÓDIO

ESSAYS ON INTERNATIONAL TRADE: TARIFF REDUCTIONS AND WELFARE GAINS IN THE AUTOMOBILE INDUSTRY DURING COLLOR/FRANCO MANDATES AND THE EFFECTS OF ANTIDUMPING POLICY ON BRAZILIAN EXPORTS

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Orientador: Prof. Dr. Maurício Vaz Lobo Bittencourt

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Curitiba, 26 de Fevereiro de 2016.

Prof MAURICIO VAZ LOBO BITTENCOURT (UFPR)
(Presidente da Banca Examinadora)

Prof ALEX SANDER SOUZA DO CARMO (UEPG)

Prof ARMANDO VAZ SAMPAIO (UFPR)

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To my family and my girlfriend, Aline.

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ABSTRACT

This work comprises two essays: one of them is dedicated to evaluating the welfare gains Brazilian agents obtained during the Collor/Franco reduction of tariffs for the automobile sector during their mandates, and the other one evaluates the effects Brazilian exports face when they are mentioned or not in an antidumping procedure. The former is justified on the grounds of evaluating the benefits arisen in a brief period of atypical liberalized trade regime, which has been a rare occasion since Brazil opted to industrialize via import substitution. The second one is justified by means of better assessing the effects of this relatively new trade policy, in this specific case, as to the effects of other parties' use of the policy against Brazilian exporters in a period that spans from 1994 to 2015. The first essay found a significant gain for (consumers + producers) from 1991 to 1994/07, considering a fall in tariffs from 1990's level of tariffs (in 2014 BRL 21.442 billion). In addition, it was calculated the gains that could have been generated if tariffs had fallen to zero in that very period(in 2014 BRL 191.556 billion). As for the second essay, it was found a relevant effect on Brazilian exports when the country is mentioned in a petition, both for the cases where the process ended with the application of definitive measures and the cases where there was the application of provisional measures. The former case generated a strong fall in years one and four after the beginning of the process, whereas the latter one generated a strong fall in year one and a strong recovery in year four. In addition, it was found a possible evidence of trade diversion in the situation where Brazil was not mentioned in the process, with Brazilian exports rising. Furthermore, it was also found that the "metals" sector was the most affected sector in the amount of cases initiated, and that its exports are more strongly affected by antidumping processes than other sectors.

Keywords: Welfare analysis. Automobile industry. Antidumping.

RESUMO

Esse trabalho compreende dois ensaios: um deles se dedica a avaliar os ganhos de bem-estar obtidos pelos agentes brasileiros durante a redução de tarifa para o setor automobilístico nos mandatos de Collor/Franco, e o outro avalia os efeitos sentidos pelas exportações brasileiras quando são mencionadas ou não em uma investigação *antidumping*. O primeiro é justificado com base em uma avaliação dos benefícios gerados em um breve período de atípico regime tarifário liberalizante, uma ocasião rara desde que o Brasil optou por industrializar-se via substituição de importações. O segundo ensaio se justifica por uma melhor avaliação acerca dos efeitos gerados pela utilização desse mecanismo de proteção comercial relativamente recente, e nesse caso específico, acerca dos efeitos gerados pelo uso do instrumento *antidumping* por terceiros contra os exportadores brasileiros no período de 1991 a 1994-07. O primeiro ensaio encontrou ganhos significativos para (consumidores + produtores) de 1991 a 1994/07, considerando uma queda nas tarifas a partir do valor em 1990 (em 2014 BRL 21,442 bilhões). No mais, também foi calculado os ganhos que poderiam ter sido gerados caso as tarifas tivesse caído para zero no mesmo período (em 2014 BRL 191,556 bilhões). No que concerne ao segundo ensaio, foi encontrado um efeito relevante sobre as exportações brasileiras quando o país é citado em uma petição, para ambos os casos em que o processo terminou com aplicação de direito definitivo e os casos terminados com aplicação de direito preliminar somente. Aquele gerou uma forte queda nos anos um e quarto após o início do processo, enquanto este gerou uma forte queda no ano um e uma forte recuperação no ano quatro. No mais, foi encontrada uma possível evidência de desvio de comércio na situação em que o Brasil não foi mencionado no processo, com as exportações brasileiras crescendo. Ainda, foi também encontrado que o setor “metais” foi o setor mais afetado em quantidade pelas investigações, e que esse também foi mais afetado pela redução das exportações brasileiras em comparação com outros setores.

Palavras-chave: Análise de bem-estar. Indústria automobilística. Antidumping.

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SUMMARY

1 INTRODUCTION TO BOTH ESSAYS

The essays that comprehend this work will focus on problems arising from barriers to international trade. The first one will try to assess the gains and losses achieved by Brazilian agents on the automobile sector due to a brief period of tariff reductions that started in the beginning of the Fernando Collor de Melo term and lasted until Itamar Franco (Collor substitute after he was impeached). The second essay looks at antidumping policy initiated against Brazil in order to assess how Brazilian exports are affected by its installment. Therefore both essays look at protectionist measures to assess the gains and losses Brazilian agents face. One of them looks at those estimates with Brazil being the perpetrator of the protection, and the other one as Brazil being the victim of trade protection coming from another party.

It is interesting to look at these essays to better understanding the effects of trade policies. The industrialization strategy Brazil followed was through import substitution policy. That meant bigger tariffs and subsidies to partially or totally impede the entry of imports by making Brazilian products more competitive. This choice may have proved useful in the beginning of the process. Actually, there is a literature on infant industry protection that goes back in time, and is mostly tributary of List (CHANG, 2004). The fact of the matter is that Brazil became very protectionist since the industrialization began, and by focusing on the alleged dynamic gains of trade and the importance of developing an industrial sector, the country seemed to ignore evidence on the contrary on both dynamic and static grounds. Many studies have tried to understand how a closed economy may affect the Total Factor Productivity (TFP), but not many covered the static effects in many of the industries protected. The first essay should contribute to shed light on the magnitude of gains and losses that happened in the automobile sector, an important industry of Brazil, thus generating input for a better overview of trade policies output and contributing to a better understanding of the trade-offs involved, which should help policy makers with a better guide to trade policies.

As for the second essay, the instrument of the antidumping policy has become a new established method of protection. It rose mainly as the old forms

of protection were declining in usage, since countries started to negotiate trade agreements and international treaties and rules. At the beginning, the developed countries appeared as the largest users of such a mechanism, but that changed recently, and China and India took the lead. Considering the instrument is still very popular nowadays, it is interesting to understand how it affects Brazil. The study draws its strength on a recent database for antidumping policy in the world, which made it much easier for researchers to address the issues, since before this, any organization of the data had to be collected directly from foreign institutions website, which would need the total understanding of the languages involved.

This study is organized in four chapters. Chapter one is this introduction for both of the essays. Chapter 2 is the essay on the welfare effects of tariff reductions in Brazil during the Collor/Franco mandates; chapter 3 is about the essay on antidumping policy initiated against Brazilian exporters; and the conclusions of this study are in chapter 4.

This study also hopes to bring clarity, in a modest scope, to issues of trade policy, and thus better inform policy-makers.

2 TARIFF REDUCTIONS AND WELFARE GAINS IN THE AUTOMOBILE INDUSTRY DURING COLLOR/FRANCO MANDATES

2.1 INTRODUCTION

International trade is usually assumed an important feature of the process of development (LUCAS, 1988). Some recent successful experiments in growth and development seem to be found on extensive trade, like China, South Korea and other Asian Tigers, for instance. Traditionally, protectionist measures are assumed to reduce the potential for growth in a certain country (BALASSA, 1993). The following table (Table 1) shows how Brazil remains a much-closed economy in comparison with other countries. The standard measure of international trade is generated by the sum of exports and imports over the size of the GDP. The measure is called Trade Opening in the table. It comprises a handful of countries, from developed to underdeveloped ones, as well as relative prosperous economies. The table is organized from the most open to the least open, and it shows Brazil at the bottom of it.

Table 1 - MEASURING THE SIZE OF INTERNATIONAL TRADE

COUNTRY	EXPORTS (%GDP)	IMPORTS (%GDP)	OPENING DEGREE	POPULATION (MILLION INHAB.)
Korea	53.9	48.9	102,8	50.2
Germany	45.6	39.8	85,4	80.6
Chile	32.6	32.9	65,5	17.6
South Africa	31	33.2	64,2	53.1
Mexico	31.7	32.4	64,1	122.3
France	28.3	29.8	58,1	65.9
India	25.2	28.1	53,3	1252.1
Russia	28.4	22.5	50,9	143.5
China	26.4	23.8	50,2	1357.3
Japan	16.2	19	35,2	127.3
Nigeria	18	13	31	173.6
United States	13.5	16.5	30	316.1
Argentina	14.5	14.8	29.3	41.4
Brazil	12.6	15	27.6	200.3
Sudan	9.6	16.1	25.7	37.9

SOURCE: World Bank (own elaboration)

Apart from the growth restrictions a closed economy might face, protectionist measures as import quotas and tariffs also have an impact on consumers welfare, as the imposition of this measures causes the consumer surplus to reduce.

Brazil has been a remarkable case of protectionism over the decades. At first, the discourse was about the necessity of protecting the national industry to generate industrialization (CASTELAR PINHEIRO and BACHA ALMEIDA, 1995). As controversial as it might be the reasoning for accepting protectionist measures, it is a fact that Brazil has become an industrialized country, but as it will be seen in section 2.2, where it is briefly reviewed the historical context of the early 1990s, the costs of protectionism have been more widely considered since Brazilian growth rates started falling down during late 1970s, and persisted in this state until early 1990s.

Due to the Brazilian proficient history with protectionism, it is important to evaluate all the costs and benefits Brazil might have had by engaging in protectionist measures, both when it comes to dynamical analysis of growth and development and when it comes to the welfare effects generated by the instruments of trade policy.

The objective of this study is to investigate the welfare gains in the automobile industry derived from a brief moment of international trade opening during the Collor/Franco period. As it will be seen, tariff rates fell from high levels in late 1980s to much lower levels during the beginning of the decade of 1990. Much of that can probably be attributed to the Collor administration convictions, as well as the historical context of the world and the Brazilian and Latin American economic distress of the period. Furthermore, this study will also estimate the amount of welfare lost because despite all the trade opening of the decade, the industry remained somewhat protected. Therefore, gains were made given the fall of tariffs to a certain point, but more gains could have been made if tariffs had fallen to zero. The analysis comprises both investigations, then.

The automobile industry was chosen for the analysis given its relative importance for the Brazilian industry, as well as a case where Brazil has been notoriously protectionist throughout history. The trade opening of the beginning of the decade of the 1990s may account for some noticeable gains for

consumers. In investigating the size of the gains consumers might have achieved during this period, it is possible to shed light and better account for the trade-offs involved in the utilization of trade policy. If gains were reasonably big, one could have a good argument against the widespread use of tariffs in Brazil.

2.2 A BRIEF DIGRESSION ON THE HISTORICAL BACKGROUND OF EARLY 1990s

To understand the steps taken by the Collor administration in the direction of greater liberalization of the Brazilian international trade, it is important, firstly, to understand the historical context of the world during the period. When Fernando Collor de Melo took office, in 1990, the world had just seen the fall of the Berlin Wall, the last great symbol of communism. It was a time of triumph for capitalism, which created the disseminated feeling of superiority of the free enterprise regime that led to claims such that of the “end of history”, made by Fukuyama (1992), and the 10 points that John Williamson wrote about as being the major consensus of policy prescriptions for emergent, crisis-wrecked countries. This consensus was formulated by Washington-based agencies such as the IMF, the World Bank, and the US Treasury Department, and came to be known as the Washington Consensus (WILLIAMSON, 1990). In those ten points, categories like fiscal responsibility and monetary discipline got the focus of attentions, although two of the categories, the numbers six and seven on the list, are about international trade. One of them urges the countries to liberalize the trade regime, although Williamson recognizes later that there was no consensus about how fast this liberalization program should move (WILLIAMSON, 2004, pg. 3). The other one asserts that countries should liberalize for the entry of foreign capital. Williamson (2004, pg. 3) also notes that those institutions didn’t have in mind the exact framework of capital account liberalization, remaining some difficulties about the magnitude of the opening or the maintenance of some types of capital controls.

The Washington Consensus and the fall of communism led a reorientation in Latin America politics. The decade of the 1980s saw a major stagnation in economic activity throughout the region. Take, for instance, the evolution of the GDP per capita in Latin America during the period. The

slowdown of the region made these economies to lag behind developed countries, with growth rates below the rates seen in more developed nations. This fact aborted a process of convergence to the levels of GDP per capita observed in developed nations. By 1990, the region achieved a relative income of 21% of the GDP per capita of the United States, as opposed to 27% in 1980 (HOPENHAYN and NEUMEYER, 2004, pg 5).

Taking the evolution of total factor productivity (TFP) - a major source of growth according to standard growth theory, one which relates heavily with all kinds of institutional packages countries choose to adopt, including trade policies - in the region during the decade of the 1980s, it is possible to observe, as illuminated by Gomes, Pessôa and Veloso (2003, pg. 405), that the Brazilian TFP showed a continued growth since 1950 until 1976, when it experienced the first sharp decline. This decline lasted until 1992, when the TFP started recovering and showed some robustness until 1998. The data can be seen in the Attached Graphs and Tables section (Attached 1), where it shows a graph for the Brazilian TFP, using two different measures of it, constructed by Gomes, Pessôa and Veloso (2003, pg.405).

Apart from Brazil, the situation in Latin America was not encouraging either. Ferreira, Pessôa and Veloso (2012, pg. 19) analyses a graph where the TFP, categorized by regions of the world, is measured as a percentage of US TFP. Western Europe shows a subtle decay after the second half of the 1980s decade, but stabilized at 90% of US TFP. As for Asian economies, the much celebrated Asian miracle stories can be seen in the graph, as these economies are shown to grow persistently until being able to catch up with Western Europe. As it happened with Brazil, the Latin America region showed a relative regression on the evolution of its TFP during the decade, and still has not managed to recover from its relative decline. Again, much of the success of Asian miracle stories are speculated on a handful of motives, but international trade appears as one of the stories (FERREIRA, PESSÔA and VELOSO, 2012).

One of the motivations for changing gears was, presumably, the disappointing performance of the economy in the 1980s, after the boom experienced in the 1970s. Take this excerpt from Ferreira, Pessôa and Veloso (2012, pg. 28), for instance:

> "The period between 1960 and 1980 was characterized by widespread government intervention and import-substitution industrialization in Latin America. These interventions were associated with competitive barriers of different forms, including restrictions on international trade and targeted investment subsidies."

One could theorize that the bad outcomes of the 1980s were just the natural consequences of a closed, rigid economy, after the exhaustion of the government-induced policies experienced throughout Latin America. The political economy may tell us that bad economic outcomes can be a sign of future counter-tendencies, and that would also help to explain the economic change of course (Deazen and Easterly, 2001).

Actually, there were a great number of political transitions that took place in the region after a decade of stagnation, together with the new economic liberalism ideology, boosted by the disentanglement of the Soviet Union. Brazil, as already mentioned, has witnessed the rise of Fernando Collor de Melo, with a political platform liberal enough to contrast with preceding interventionist policies. His brief administration produced a change of course from the beginning, when he announced that 11 state-run enterprises were to be shut-down, together with 13 government agencies. Until December 1990, the administration had fired 100.000 public employees. At the same time, an ambitious privatization program was elaborated (Schneider, 1992, pg. 5)

The measures taken by the administration that interests this work the most, as it is related to the subject studied, are those that concern Collor's trade opening. Consider, for instance, the tariff rate imposed on the automobile industry, before and after Collor's term. The Graph 1 shows the evolution of the tariff rate for automobiles. The green line corresponds to the *ad valorem* tariff rate levied on automobiles of a capacity of less than six passengers, in percentage. The red line is the average *ad valorem* tariff rate levied in automobiles, trucks and buses, altogether.

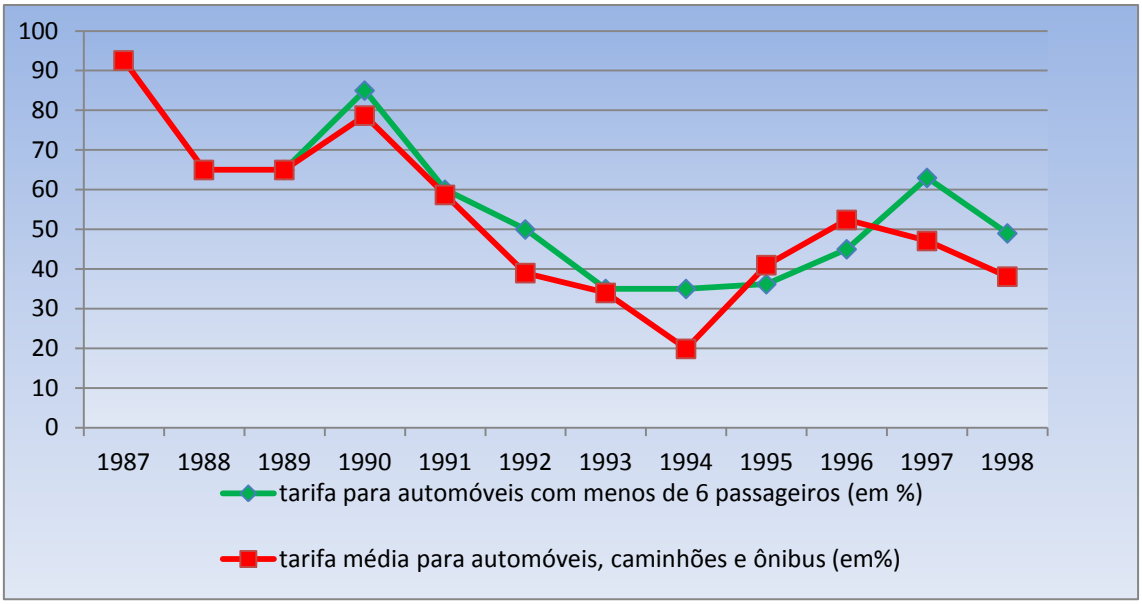

Figure 1 - EVOLUTION OF TARIFF RATES FROM 1987-1998 IN BRAZIL (IN PERCENTAGES)

Source: Data from TRAINS/UNCTAD and the table 1 in Kume, Piani and Souza (2003)

It is possible to see that after Collor took place, in 1990, the average tariff rates fell from the levels of 80% to a much lower 20-35% in 1994, the last year of Itamar Franco's mandate, which entered in office after Collor was impeached. Franco was not an enthusiast of liberal policies as Collor seemed to be. For instance, Franco took some rather controversial measures during his term. The one he is most remembered for consists of subsidizing a then deactivated Volkswagen Fusca production.

Despite Franco's unwillingness to broadly participating in the current international mood, when it comes to international trade, he followed his predecessor by letting tariff rates fall until 20-35%. The Franco's term looks like just a little digression from the overall inclination of the general policies put into action in the 1990s, as Fernando Henrique Cardoso took office in 1995 with a relatively liberal agenda, restoring the first impulses of Collor de Melo. Nonetheless, there were modest rises in the tariff rate since Cardoso, as it can be seen in Graph 1.

The history of liberalization in Brazil was also accompanied by many other Latin America countries. Chile was the first one to switch to more liberal policies, at least since Augusto Pinochet in the 1970s and the influence of the

so-called “Chicago boys”, which was a group of economists trained under the umbrella of the likes of Milton Friedman. Chile was not only the first country in Latin America to experiment with economic liberal reforms, but arguably the first country in the world to try this path. Apart from Chile, the wave of liberalism affected other Latin American countries after the consolidation of the ideology since the 1990s. Argentina had its share of liberal policies in the government of Menem, which started in 1989. México tried the path with president Salinas since 1988. Venezuela changed course in the second term of Carlos Andrés Perez, in 1989. For Peru, it was since Fujimori in 1990 (ANDERSON, 1995, pg. 9-23). All of them experienced an increase in international trade and a reduction in tariffs and quotas (FERRANTI ET AL., 2003).

2.3 THE THEORETICAL FRAMEWORK FOR WELFARE ANALYSIS

The theoretical framework for accounting the gains and losses of international trade comes from a long established partial equilibrium analysis, presented nowadays in international economics textbooks.

Welfare analysis in international trade bears a resemblance with traditional microeconomics welfare analysis. In the latter, an imposition of a tax rate in a certain product will therefore change the practiced market price, with consequences for production and demand. The raise of prices will diminish the supply of the good, whereas it will also reduce the demand for it. One can see the effects better in Graph 2. Given a certain equilibrium market prices, the imposition of a tax makes prices differ for consumers and producers. This difference gap is collected by the government as revenues. As a change in price affects both the consumer willingness to buy, and the producer willingness to produce, there is a change in equilibrium quantity and prices after the tax is levied. The equilibrium market price goes from its competitive equilibrium to a higher price for the consumer, p_c^*, and a lower price for the producer, p_s^*. It is easy to visualize that now the quantity supplied is lower than it would be if there was no tax imposed. The loss generated by the tax is called the deadweight loss, and it is measured by the area of the black triangle. The revenue collected by the government is measured by the square to the left of the black triangle,

formed by the final quantities and the difference between p_c^* and p_s^* (VARIAN, 1992)

Apart from the deadweight loss, one can also evaluate the losses and gains achieved by producers, the government and consumers. Consumers lose the area of the triangle formed to the upper-left of equilibrium market prices minus the area formed by the upper-left white triangle to the left of p_c^*. Part of the loss is due to the deadweight loss of taxation, and the other part is due to some of the revenue government collects. As for producers, they lose the area formed by the lower-left triangle to the left of equilibrium market prices minus the lower-left white triangle at the left of p_s^*. As already noticed, the government collects the white square (VARIAN, 1992)

As for welfare analysis in an open economy, at first one have to introduce the international trade in a given market, and then proceed with an investigation of how an open economy affects quantities and prices.

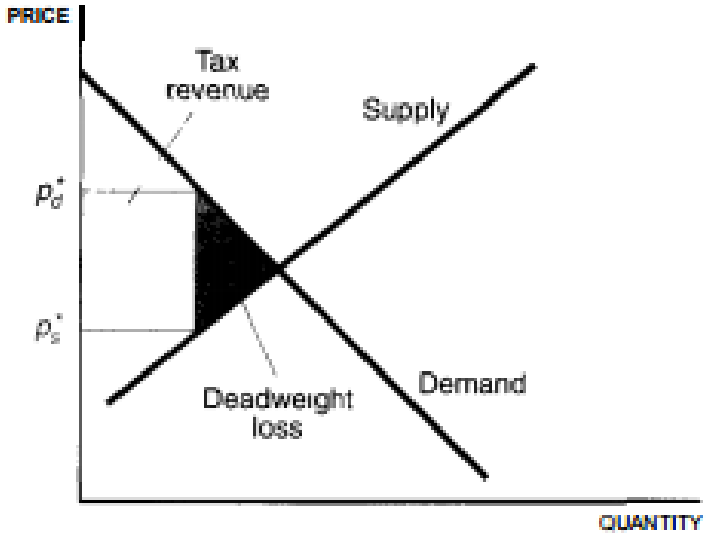

Figure 2 - WELFARE ANALYSIS AND TAXATION

Source: Hal Varian (1992)

Given a supply and demand curves for the domestic market of any given product, and assuming the inexistence of any trade barriers and also a smaller international price (P_w) than in the domestic market, there is a possibility for trade. The lower international price will discourage producers to sell the same

amount they would prefer if there was not international trade. Therefore, at international prices, the producers sell at the quantity S^1 in Graph 3, which is lower than the quantity they would sell if there was no international trade. As for consumers, they will demand a quantity D^1 with international prices, which is higher then what they would demand if there was no international trade (KRUGMAN AND OBTSFELD, 2003)

The possibility for international trade creates a gap between supply and demand for a given international price. In this example, the lower international price will generate a certain quantity of trade, which is given by the imports on the magnitude of $D^1 - S^1$ (KRUGMAN AND OBTSFELD, 2003)

Now assume that there is an imposition of a tariff rate. The imposition of a tariff in a given market open to international trade will cause the following situation: first, the tariff affects the price, from P_W to P_T, which lowers the quantity demanded by consumers, D^2, and raises the quantity supplied by producers, S^2. This movement will cause the trade deficit in this given market to reduce from $D^1 - S^1$ to $D^2 - S^2$. The effects of the tariff rate can also be seen on the foreign market, as it diminishes the price of the good in the foreign market, to P_T^* (KRUGMAN AND OBTSFELD, 2003).

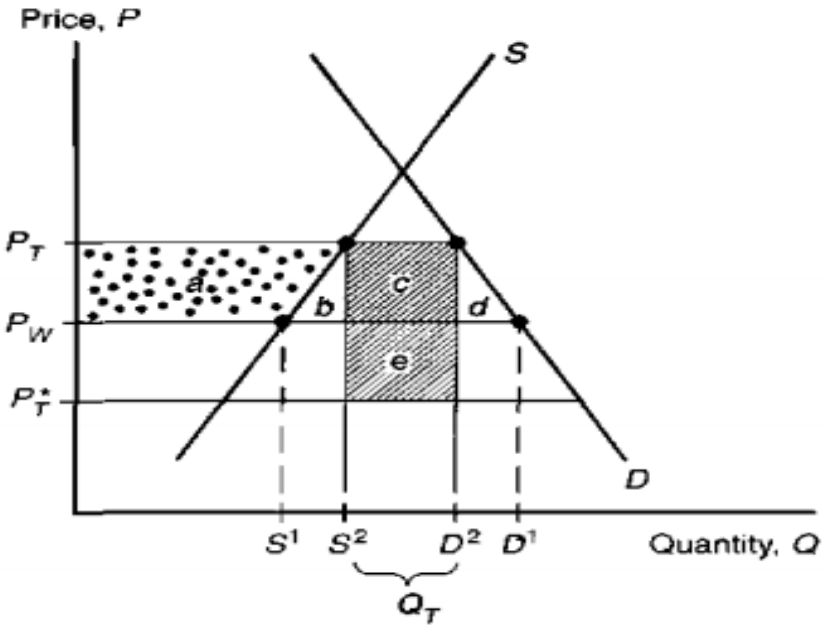

Figure 3 - WELFARE ANALYSIS WITH INTERNATIONAL TRADE

Source: Krugman and Obtsfeld (2003)

The welfare analysis of an imposition of a tariff can be done with the help of the letters in Graph 3. The letter “a” displays the gains achieved by producers. As prices and quantities increase, producers are at a better shape after the tariff is levied. Letters “b” and “d” account for the deadweight loss generated by the imposition of the tariff. Letters “c” and “d” shows what the government collect as revenues. As for the loss in consumer surplus, it can be viewed as the sum of letters “a”, “b”, “c” and “d”. Letter “e” represents the gains originated from the change in the terms of trade (KRUGMAN AND OBTSFELD, 2003).

After identifying the sources of welfare gains and losses by all relevant agents in the economy, one can account for the net welfare effect of a tariff. The tariff net loss can be seen as the following:

$$Net\ Loss = Consumer\ Loss - Producer\ Gain - Government\ Revenue - Change\ in\ the\ terms\ of\ trade$$

$$Net\ Loss = (a + b + c + d) - a - (c + e) = b + d - e$$

If the economy is small enough to affect foreign prices, then the value of the area given by “e” tends to zero, and the imposition of a tariff is clearly costly for the whole of the economy.

The situation described above is true for the Brazilian automobile industry, as it is small enough to affect international prices.

When there is a market operating under imperfect competition, the welfare losses and gains are different. As it is known from microeconomic analysis, the monopolist behaves differently from producers inserted in a competitive market, as it can set the price on this market. The monopolist will choose the price that maximizes his profit, and that price is set by the quantities given at the intersection of the supply and marginal revenue curves. This choice will make the price higher and the quantity supplied lower than in the situation given by perfect competition. (VARIAN, 1992)

It is obvious that under free international trade, there is no way a domestic monopolist can set his price where he would prefer if there was no trade. Therefore, the possibility of trade forces the domestic monopolist to

behave as a price-taker, and this price is the one determined in international markets.

The first graph in Graph 4 shows the situation with free trade. It is possible to assume that the domestic monopolist is trying to pursue the monopolist price, given by P_M. But as the international price is at a lower P_W, it imposes a constraint on the possibility of the domestic monopolist to explore his market power. With free trade, the domestic monopolist is forced to operate at the competitive international price (KRUGMAN AND OBTSFELD, 2003)

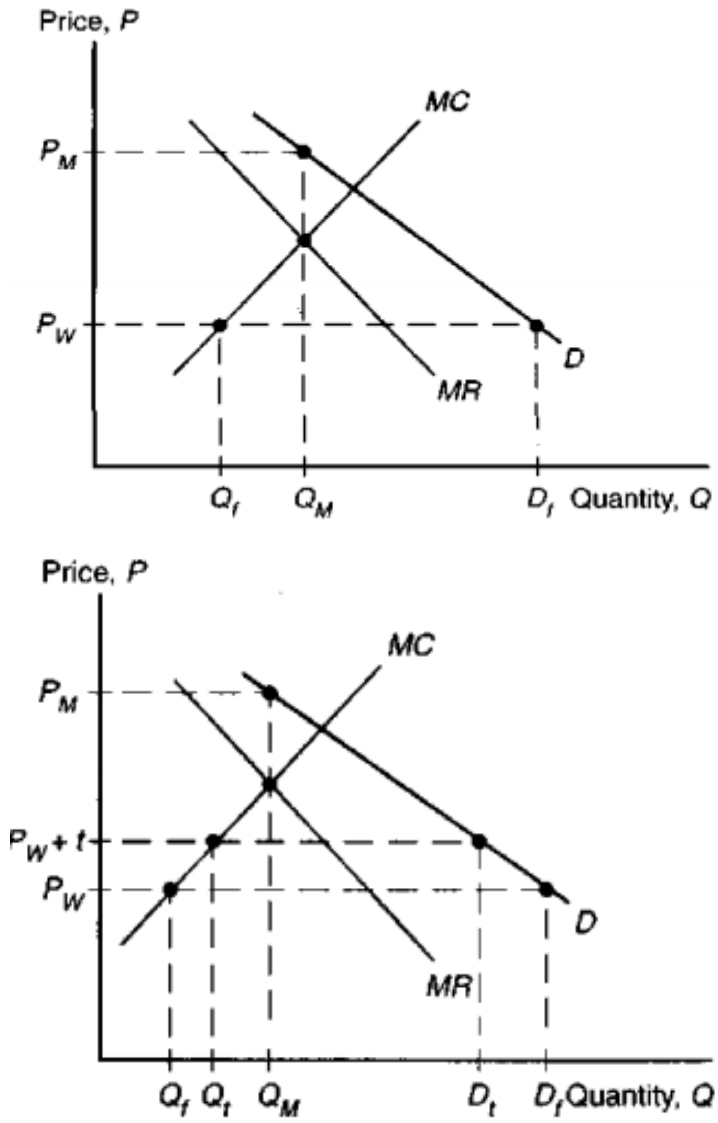

Figure 4 - DOMESTIC MONOPOLIST UNDER FREE TRADE AND UNDER A TARIFF REGIME

Source: Krugman and Obtsfeld (2003)

Now assuming the imposition of a tariff, it will raise the price to $P_W + t$. This raise in prices can give some market power to the monopolist, making his situation better off than under perfect free market competition.

This review will help to lay the ground for the empirical analysis to come further, as it will be needed a model to estimate supply and demand for automobiles, and also the international price and the tariff to establish the results.

2.4 EMPIRICAL LITERATURE REVIEW

The literature concerning partial equilibrium analysis of international trade is vast. The focus of this review will be on the analysis for the Brazilian economy and some of the international main results. It is also important to review the literature concerning the automobile industry worldwide.

It is interesting to start with the paper from Scavarda et al. (2005), because it is focused on the Brazilian economy and on the automobile industry. The objective of this paper was to estimate the loss Brazilian agents suffered from an increase of tariffs for automobiles in the year 2000. The authors collected yearly data ranging from 1990-1998 and the methodology consisted in using the data to sketch the supply and demand curves in order to accomplish the task of doing the comparative statics by introducing the higher tariff (of 35%). They chose the sub-compact segment to do the analysis, as it was about 70% of the market in those years, and they also used the prices of the simpler versions of the models. Scavarda et al. (2005) used price elasticities to obtain the supply and demand curves. The authors found a loss of USD 16.6 million (in 2000 prices) for the Brazilian community as a whole, including consumers, producers and the government.

Another study for the Brazilian automobile industry is the one from De Negri (1998), which aims at identifying the effects of the tariff reduction on prices during the same period this study is interested in and in estimating the income, price, and cross-price elasticities. The study found that the effects were better seen after July-1993, but soon reversed, in 1995, as the tariff regime for automobiles was raised again to standards common before the liberalization

period. As for the elasticities, De Negri (1998) found the following: (i) price elasticity was estimated at between 0.6 and 0.7; (ii) income elasticity was estimated at between 1.1 and 1.5; and (iii) the cross-price elasticity between the demand for the domestic good and the foreign good was estimated to be 0.2.

An older paper, by Baumgarten (1972), is of the interest of this research because of its attempt to estimate some functions for crucial automobiles market variables in Brazil. Several equations were estimated in order to come up with a better adjustment. There were equations trying to estimate the determinants of the inventory acquisitions by the firms. Those equations were better adjusted with the variables “total yearly income” and the price of new cars. As for the demand equation, the ones with the variables “income” and “price” were found to produce a better adjustment. The functional form of a linear equation adjusted better to the data than the one with an exponential form (BAUMGARTEN, (1972).

Hess (1977) wrote a paper concerned about testing some theoretical hypothesis of the consumer demand for automobiles. He found that (i) a constrained utility maximization framework is a correct way to assess the demand for automobiles, as evidenced by the signals of the estimation he did; (ii) the household is better viewed as planning over a multi-period rather than a single-period; (iii) the household is better described by an equation that describes the possibility of substitution between consumption, automobiles, durable goods and housing, instead of just consumption and automobiles; (iv) substitution effects have a larger impact on automobiles demand rather than wealth effects; and (v) the real interest rate and the expected inflation affects the demand for automobiles.

The paper from Feenstra (1988) tries to investigate the effects the Japanese import market for automobiles faced when subject to a quota for passenger automobiles and a tariff rate of 25% for the truck market between 1989 and 1995. The author found an effect of quality improvement in the market for automobiles. The logic of this finding has to do with the fact that firms facing a quota restraint might try to bypass the legislation by changing design and some other features of the cars they produce, thus escaping the quota regime. As for the truck market, no evidence of quality improvement was found. Feenstra (1988) also measured the costs associated with the quota increase.

The annually estimated loss due to the quota is of USD 2.3 billion, being USD 300 million the costs associated with the deadweight loss.

The paper produced by De Melo and Tarr (1990) attempts to calculate the welfare effects that would be generated by the elimination of the quota restraints (QR) on textiles, steel and automobiles. The authors have chosen a general equilibrium model[1] to perform the analysis. This type of model can achieve a better estimate of the costs associated with tariffs and quotas than standard partial equilibrium analysis. This is so because the general equilibrium model accounts for three factors that partial equilibrium analysis is unable to deal with. Those are (i) the inclusion of a balance of trade constraint, expressed in world prices (to remove an upward bias present in partial equilibrium models); (ii) the effects of income transfers to and from the rest of the world is properly accounted; and (iii) economy-wide resource constraints and inter-industry linkages provide a more accurate estimate of welfare and sectoral employment effects (DE MELO AND TARR, 1990). The authors found a significant difference between the losses generated by the non-tariff restrictions and those generated by tariffs. The total loss was estimated to be USD 22 million (1984 dollars). The tariff regime accounted for something between 2% to 4% of the losses generated by the non-tariff restrictions on textiles, steel and automobile industries. This result is in line, according with De Melo and Tarr (1990), with the general idea, common in policy discussions, that non-tariff barriers are usually more onerous to welfare than tariffs. Another way of identifying the size of those losses is in estimating what would be the necessary tariff to generate the same magnitude of loss. The authors estimate that the tariff would have to be of 19.5% to generate the same losses created by non-tariff barriers.

Feenstra (1992) aims to gather some data on how costly is protectionism to the USA. He begins by citing Krugman (1990), which implies that the standard measures of welfare loss due to protectionist measures in the USA are actually very small. Feenstra (1992) argues in the paper that the use of quotas by the USA affects other countries as well, as the USA can affect world prices, being a major player in international trade. The effect is due a deadweight loss for foreign countries. Some studies tried to measure the losses countries face

[1] The specifics of the model used by De Melo and Tarr (1990) may be found in De Melo and Tarr (1988).

by advanced economies trade restrictions. Trella and Whaley (1990), *apud* Feenstra (1992) calculated that developing nations lose about USD 8 billion from the quotas and tariffs in the textile market of advanced economies. In an earlier work, Trella and Whaley (1988), *apud* Feenstra (1992) found that the total loss the USA solely is able to generate is of the magnitude of USD 4 billion, or half of the losses advanced economies generates in the textile sector.

2.5 METHODOLOGY

2.5.1 THE DATA

This study aims to generate a measure of welfare gains and losses, for a diversity of agents (producers, consumers and the government), in the automobile industry. It is difficult to come up with a precise number to represent those gains, although it is reasonable to expect a good number to express the order of magnitude of such gains, as it is common in the literature.

Just shown by the graphs presented in section 3, it is necessary to plot a supply and demand curves for automobiles. In order to sketch those curves, we need to estimate them. In addition, there is the need to obtain some international prices for automobiles and the appropriate tariff rate for the period. The analysis will cover part of the Collor/Itamar period, when the tariff imposed on less than six passenger automobile showed a substantial reduction, as already discussed in section 2.

The collected data was obtained from magazines, newspapers, websites and research organizations databases.

The Brazilian car prices were collected from the Digital Archive (Acervo Virtual) of the Quatro Rodas Magazine, together with complements taken from Folha de São Paulo Newspaper Digital Archive, both available online. The car prices were collected monthly from January 1990 to December 1998. Most of the prices were collected from the Quatro Rodas Magazines, except for some periods where the Magazine did not supply data for the car market. Those gaps were filled by data collected from Folha de São Paulo Newspaper.

The prices researched were those related to the 70% best-selling models in a given year. The yearly data on car sales was used as proxy for the monthly data, as we were interested in the proportion of sales of each model. This data was also available in the website of Revista Quatro Rodas. After accounting for the number of sales, it was proceeded by separating the cars in three categories: (i) popular models; (ii) average models; (iii) and luxury models. There is an inescapable level of arbitrariness in the selection of categories. Additionally, it is hard to compare those categories over the years, as models change, and so does the market. Another potential source for difficulties was the fact that it is hard to differentiate the subtypes inside a model. The data covers all versions of any car model. It is not possible to differentiate between a Volkswagen Gol GL and a Volkswagen Gol GLS, for instance. Given this fact, the solution is to opt for the simplest version. This procedure is common in the literature, and may distort the raw number, but it will not harm the intent of the analysis, which is to get more of a general idea of the costs involved than an exact number, which would be an unrealistic attempt.

To account for “popular” vehicles, it was paid attention to the simplest models of all. For this, it was selected compact cars with a 1.0 engine. Those cars are generally the cheapest available for the consumers. However, it was also important to pay attention to the price practiced to categorize a given model. The compact car with a 1.0 engine was taken as the benchmark to serve as the basis for the popular category, which also included those cars with different features but prices closest to those of the standard for the category. This is the case of the Chevrolet Chevette in the beginning of the series, for instance. Being a sedan, its price was closest to the compact 1.0 models.

In order to categorize the “average” models, it was chosen to include any small pick-up (like Fiat Strada) and average station wagons (like Palio Weekend), with engines superior to 1.0. To decide if sedans would count as luxury or any other category, it was paid attention to prices and its relative closeness to the parameters of the category. The Fiat Siena, for instance, is an example of a sedan included in the average category. It is also common for this category to include medium sized hatchbacks, like Chevrolet Kadett.

The parameter for the “luxury” market is bigger sedans (like Chevrolet Vectra) and bigger pick-ups (like Chevrolet S10) with engines superior to 1.0.

Some hatchbacks may be included in the category given its prices, like Volkswagen Golf in some of the years.

The data was organized in a way that was possible to yield three different prices in a given year, one for each category. To find this price, it was proceeded by calculating a weighted average for the prices collected in all the three categories. The weight was the share of sales of the model in any given category, for a given year. It makes sense to perform this way because if a model is sold more than another is, its price will be more representative of the category.

At this point a series of prices for each category in time was generated, from January-1990 until December-1998. Firstly, it was needed to convert some of the prices, which were in dollars, to current currency. The data for the exchange rate of the period was gathered from the Brazilian Central Bank website. After having the data displayed in the prices of the month it was collected, the series was deflated using the FGV's monthly IPC-M index, and corrected for the monetary regime changes, where zeros were cut in the transition from the *Cruzado Novo* to the *Cruzeiro* and also from the *Cruzeiro* to the *Cruzeiro Real*. The next step was to deflate the series and represent the values in BRL (Brazilian *Reais*) of december-2014. The choice for that year was made as a way to better comprehend the magnitude of the gains and losses involved in the analysis, as it is done for a more recent price level, one which readers are more comfortable do deal with.

The prices are shown in Graph 5 (next page). The lines show the evolution of the automobile market prices for the period considered. It is noticeable the slight decline in prices throughout the whole period, for the three categories. The fall may be related to industry efficiency, a falling cost of production or the reduction in tariff rates (already exposed in Graph 2). As for the major rises and falls throughout the period, one can see it coincides with periods of escalating inflation followed by a monetary reform. This is true for the beginning of the series, when it is possible to see prices falling rightly after the introduction of the *Cruzeiro* (and even before it), and then raising fast before the monetary reform that introduced the *Cruzeiro Real*, which was followed by a similar steep fall after the introduction of the new currency. The same pattern came to repeat right before and after the Real Plan, which introduced the *Real*.

As already explained, all data was carefully deflated, so that it seems improbable that this pattern stems from errors in deflating. There are probably other causes, possibly related to the inflation, to explain the swing in prices, like severe GDP fluctuations or uncertainty given the inflation scenario.

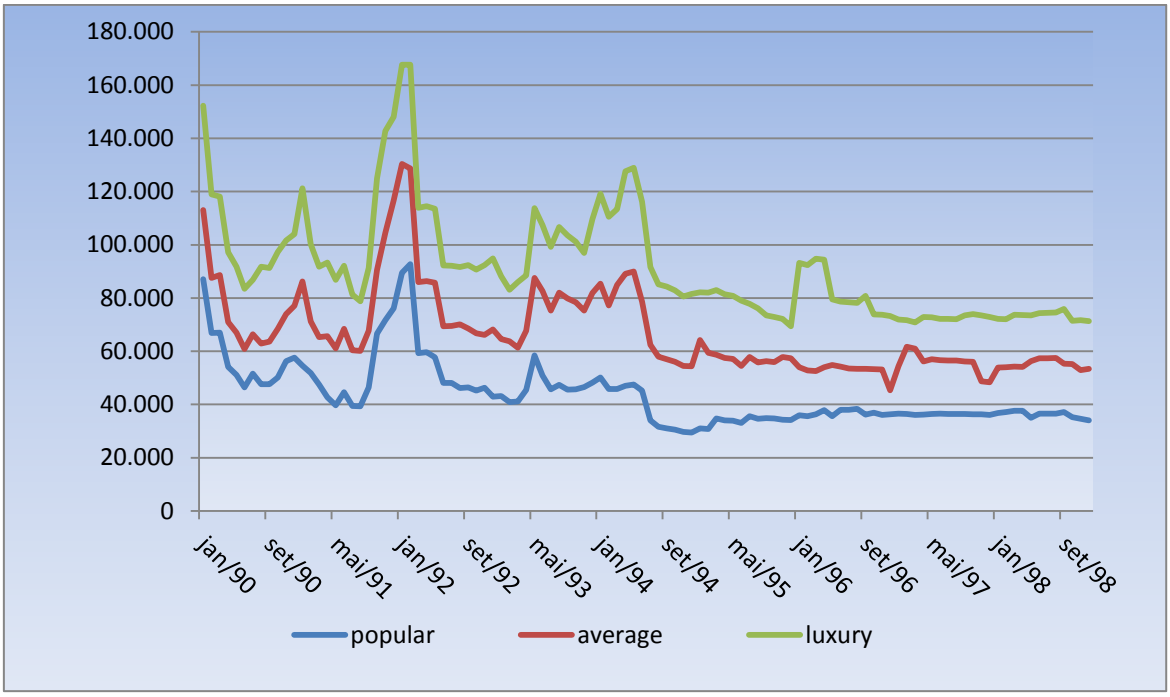

Figure 5 - EVOLUTION OF AUTOMOBILES MARKET PRICES BY CATEGORY (IN 2014 BRL)

SOURCE: Own elaboration using data from Folha de São Paulo and Quatro Rodas Magazine.

As for international prices, which are also needed to perform the analysis, it was used data for the 1990's car market in the United States, for the same period of time data was gathered for the Brazilian market, and in the same three categories: (i) popular; (ii) average; (iii) and luxury. The choice for the United States was made because that country generally has smaller car prices, possibly due to efficiency and fewer taxes. In addition, it is a country that Brazil has a historical and relevant trade link.

Unfortunately, it was not found any Magazine website in the USA with full information, like those of Revista Quatro Rodas and Folha de São Paulo newspaper. Therefore, data came from various sources, including some magazines, websites and studies. The data was gathered annually, because tariffs are also in a yearly basis. The data will not be used in the estimation of

the model, only in the welfare section (except for a foreign car price variable attempted in the regressions, which will be later explained).

One brief digression is necessary in order to better understand the categories of cars and the international comparison problems. According to the American data, it is possible to identify at least four different categories, based solely on the market prices. There are the subcompacts and some hatchbacks, which are the cheapest. There are some coupés, station wagons, small pick-ups and some hatchbacks with a slightly higher price. After those two categories, it should be selected some sedans and SUVs with a noticeable higher price and joint them in another category. In addition, there are some very expensive cars, probably available to a smaller fraction of the population, upper middle class and upper class Americans (BMWs, for instance), with still higher prices.

The first three categories are those found to be more comparable with the Brazilian market, so those are the ones chosen for comparison. The market for upper-luxury vehicles is still weak in Brazil nowadays, and it is even weaker in the period evaluated. It was not possible to identify a noticeable share for this market in Brazil.

The car price for each category is going to be used, invariably, for the estimate of supply and demand.

Other important variable is the quantity supplied. This data was collected in a monthly basis at ANFAVEA website. It is also important to achieve data for the quantity sold in each category. This data was constructed using Quatro Rodas Magazine. At the beginning of each year, the magazine supplies data on the amount of cars sold per model. By classifying those models in one of the three categories, it is possible to generate an estimate for the percentage of sales in each of them. The problem is that these percentages are available at a yearly basis, differently from the monthly total sales data. Nevertheless, considering the share does not seem to change too much throughout those years, it is a decent approximation.

It is also important to collect other variables to help in the estimates of the elasticities of supply and demand. Those are exogenous variables, supply and demand shifters to help to identify those curves.

The Gross Domestic Product (GDP) is one of them, and it is a proxy for income. It was collected at the Ipeadata website, and It is one that fitted well in the demand equation regressions.

The supply-side variable used is the productivity in the transformation industry (PRODUC), collected at Ipeadata. For the model estimated for luxury vehicle it was also used data for the price of energy (ENER), given by the average tariff for 1MW/h.

2.5.2 THE MODELS

2.5.2.1 CRAFTING THE WELFARE MODEL

The model chosen to compute the welfare gains in the Brazilian automobile industry for the Collor-Franco's term is a computable partial equilibrium model based on Hufbauer and Elliot (1994) and Morkre and Tarr (1980), with modifications.

There are three key assumptions:

(i) – The supply schedule for the imported good is flat
(ii) – The supply schedule for the domestic good is upward sloping
(iii) – All markets are perfectly competitive.

Reviewing the effects of a trade barrier, as considered in section 3, it can be assumed that the reduction of a tariff lowers the price of the imports in the domestic market. The decrease in the price, by its own turn, creates a negative shift in domestic markets' demand for that good. The logic is straightforward: the new goods available from abroad at a lower price expand its share at the expense of the domestic production.

The changes in prices and quantities due to trade liberalization result in a gain in consumer surplus with the addition of deadweight gains, a loss in producer surplus, and a mixed effect for government revenue, because the lowering of tariffs affects positively the amount of goods to be taxed from abroad, but also reduces the amount of revenue per unit of product imported.

The analysis will be performed in two steps. The first step consists in estimating the gains achieved when tariffs fell from the 1990's level. The tariff rate for automobiles (as already shown in Graph 1) was at a peak of 85%. If tariffs remained that high no gains would be observed. However, with a shift downwards it is possible to estimate the gains for 1991, 1992, 1993 and 1994 until the Real Plan. Some rather big numbers are expected, since the fall reached its minimum in 1993, with a 34% tariff.

The other step consider taking the analysis further, as to ask what could be achieved by the Brazilian agents if tariffs had fallen to 0%.

Two models are going to be used. One when *P* (the foreign price with 1990 tariff) is below P_E (the equilibrium price in domestic markets), and one when it is above. This simple fact can change some of the equations.

The first model (*P* belowP^E) is defined as follows:

$$Added\ Consumer\ Surplus = Q_D\left(P - P'\right) + \frac{1}{2}\left[\left(P - P'\right)(Q_{D'} - Q_D\right)$$

$$Lost\ Producer\ Surplus = Q_{S'}\left(P - P'\right) + \frac{1}{2}\left[\left(P - P'\right)\left(Q_S - Q_{S'}\right)\right]$$

$$Deadweight\ Gains = \frac{1}{2}\left[\left(Q_S - Q_{S'}\right)\left(P - P'\right)\right] + \frac{1}{2}\left[\left(Q_{D'} - Q_D\right)\left(P - P'\right)\right]$$

$$Added\ Government\ Revenues = -\left[\left(Q_D - Q_S\right)\left(P - P'\right) + \left(Q_{D'} - Q_D\right)\left(P' - P^*\right) + \left(Q_S - Q_{S'}\right)(P - P^*\right)$$

Where *P* is the current foreign price with the 1990's tariff; *P'* is the current foreign price with the current tariff; P^* is the foreign price without tariffs; Q_D is the quantity demanded with price *P*; $Q_{D'}$ is the quantity demanded with price *P'*; Q_S is the quantity supplied with price *P*; and $Q_{S'}$ is the quantity supplied with price *P'*.

The second model (P aboveP^E) is defined as follows:

$$Added\ Consumer\ Surplus = Q_E\left(P^E - P'\right) + \frac{1}{2}\left[\left(Q_{D'} - Q_E\right)\left(P^E - P'\right)\right]$$

$$Lost\ Producer\ Surplus = Q_{S'}\left(P^E - P'\right) - \frac{1}{2}\left[\left(Q_E - Q_S\right)\left(P^E - P'\right)\right]$$

$$Deadweight\ Gains = \frac{1}{2}\left(Q_E - Q_{S'}\right)\left(P^E - P'\right) + \frac{1}{2}\left(Q_{D'} - Q_E\right)\left(P^E - P'\right)$$

$$Added\ Government\ Revenues = \left(Q_{D'} - Q_{S'}\right)\left(P^E - P^*\right)$$

Where P^E is the equilibrium price for the domestic markets, and Q_E is the equilibrium quantity for the domestic market. The other variables are the same as in the model for *P* belowP^E.

2.5.2.2 ESTIMATING SUPPLY AND DEMAND ELASTICITIES

Before using the models described in section 4.2.1, the analysis begins by estimating the supply and demand functions for each category. Despite having data that goes beyond the period at study, it was chosen to keep the data ranging from 1990 to 1994-07, just before the Real Plan. This makes sense because elasticities may change with great frequency throughout time, so it is unwise to expect the same coefficients for a long period, and estimating them for a long period will yield a somewhat distorted estimate. In addition, the period of interest is conveniently distributed as before the Real Plan and after the Real Plan. It is wise to treat this event as a structural break.

The method chosen is the Two Stages Least Squares. This method is responsible to treat endogeneity problems, as they naturally arise from supply and demand equations.

It consists mainly in estimating as a first step, by Ordinary Least Squares, the endogenous variables against all exogenous variables in the system. After this procedure is completed, one needs to estimate the structural form by replacing the endogenous variable in the right side of the equation by the

estimates of the endogenous variable against all exogenous variables, obtained in step 1. This is step 2, and it will give consistent estimates for the coefficients (GUJARATI, 2006).

The models for the “popular” and “average” categories were estimated as follows:

$$LNP = \alpha_1 + \beta_1 PRODUC + \beta_2 LNGDP + u_1 \qquad \textbf{STEP 1}$$

$$LNQ_D = \alpha_1 + \beta_1 LNPhat + \beta_2 LNGDP + u_1 \qquad \textbf{STEP 2}$$
$$LNQ_S = \alpha_1 + \beta_1 LNPhat + \beta_2 PRODUC + u_2$$

As for the “luxury” category, the model is defined as follows:

$$LNP = \alpha_1 + \beta_1 PRODUC + \beta_2 LNGDP + u_1 \qquad \textbf{STEP 1}$$

$$LNQ_D = \alpha_1 + \beta_1 LNPhat + \beta_2 LNGDP + u_1 \qquad \textbf{STEP 2}$$
$$LNQ_S = \alpha_1 + \beta_1 LNPhat + \beta_2 PRODUC + \beta_3 ENER + u_2$$

Where LNQ_D is the natural log of quantities demanded; LNQ_S is the natural log of quantities supplied; *LNP* is the natural log of the price, *LNPhat* is the adjusted estimate for *LNP* in step 1. *LNGDP* is the natural log of gross domestic product, *PRODUC* is the productivity measure, *ENER* is the cost of energy. α_1 is the intercept for both equations; ***βs*** are the coefficients for the explanatory variables, and u_1 and u_2 are the error terms.

2.5.2.3 RESULTS AND DISCUSSION

Once the supply and demand equations have been determined, it is time to run the regressions and find the estimates for the elasticity of supply and demand for each category. An important consideration might be done: the estimation by Two Stages Least Squares does not produce meaningful R-Squared estimations. When they result negative, the software does not report them. If estimations of the predicted value of the endogenous variable are

needed, this might be a problem, but if the aim is to estimate the parameters, a significant one is enough to generate good measures for the elasticities needed (Stata Website, Support Section).

As already noticed, the variables chosen to be the demand and supply shifters are the GDP, for demand, and PRODUC for supply. In addition, it was used a second shifter for supply in the equation for the luxury vehicles, in order to obtain more significant parameters for that equation.

The first model is the one for the “popular” category. The estimates for the demand equation are defined as follows:

Table 2 - ESTIMATES FOR THE DEMAND EQUATION (POPULAR CATEGORY)

Variables	Coef.	Std. Err.	t	P > t	[95% Coef. Interv.]	
LNP	- 2.6830	0.6370	- 4.21	0.000	- 3.9613	-1.4047
LNGDP	1.4382	0.4516	3.18	0.002	0.5320	2.3443
Cons.	21.7820	7.1172	3.06	0,003	7.5002	36.0637

2 Stages Least Squares Regression – Endogenous Variable LNQ

Instrumented Variable: LNP – Instruments: LNGDP PRODUC

N. Obs.	F (2,52)	P > F	R-Squared	Adj. R-Squared
55	10.50	0.0001	-	-

SOURCE: Regressed in Stata12

The endogenous variable *LNQ* is regressed against a constant, *LNP* and *LNGDP*. *LNP* is a proxy for the real *LNP*, regressed against *LNGDP* and *PRODUC*, as explained in 2.5.2.2. All explanatory variables are significant at 0.05 level of significance, and coefficients signals are as expected, with *LNP* being negative and *LNGDP* being positive.

Results are in line with what one would expect from theory, given the fact that the price variable is negative, meaning that consumers will demand less automobiles if prices rise. In addition, the demand shifter, *LNGDP*, is positive, meaning that there will be a bigger demand for vehicle when the total income of a given period rises. The presence of significant parameters gives confidence on the variables being estimated.

The supply equation for the “popular” category is defined as follows:

Table 3 - ESTIMATES FOR TE SUPPLY EQUATION (POPULAR CATEGORY)

Variables	Coef.	Std. Err.	t	P > t	[95% Coef. Interv.]	
LNP	1.1427	0.5950	1.92	0.060	- 0.0513	2.3366
PRODUC	0.0301	0.0049	6.11	0.000	0.0246	0.0400
Cons.	- 5.3780	6.8816	- 0.78	0.438	- 19.1870	8.4309

2 Stages Least Squares Regression – Endogenous Variable LNQ

Instrumented Variable: LNP – Instruments: LNGDP PRODUC

N. Obs.	F (2,52)	P > F	R-Squared	Adj. R-Squared
55	38.71	0.0000	0.5332	0.5152

SOURCE: Regressed in Stata12

LNQ is regressed against *LNP* (already instrumented, as explained in section 2.5.2.2) and *PRODUC*. The coefficients are significant at 0.10 level of significance, except for the constant. Adjusted R-Squared is 0.5332. The signals are as expected, with *LNP* positive and *PRODUC* positive.

The signals mean that an increase in prices drives the supply of automobiles upward, which is in line with microeconomic theory. A bigger price will encourage producers to supply more automobiles. Furthermore, an increase in productivity will likely generate a larger supply of the good.

Table 4 - ESTIMATES FOR THE DEMAND EQUATION (AVERAGE CATEGORY)

Variables	Coef.	Std. Err.	t	P > t	[95% Coef. Interv.]	
LNP	- 3.5667	2.0070	- 1.78	0.081	- 7.5940	0.4606
LNGDP	1.8996	0.9059	2.10	0.041	0.0816	3.7175
Cons.	26.7863	14.9424	1.79	0.079	- 3.1977	56.7703

2 Stages Least Squares Regression – Endogenous Variable LNQ

Instrumented Variable: LNP – Instruments: LNGDP PRODUC

N. Obs.	F (2,52)	P > F	R-Squared	Adj. R-Squared
55	2.20	0.1207	-	-

SOURCE: Regressed in Stata12

Those are the estimates (above) for the demand equation (*LNQ* regressed against *LNGDP* and *LNP,* which was instrumented as noted in 2.5.2.2) of the “average” category. All signals are as expected, with *LNP* being

negative and *LNGDP* being positive. All estimates are significant at 0.10 level of significance.

As noticed for the “popular” category, there is a clear reason why prices should be negatively correlated with the quantity demanded and *LNGDP* should be positively correlated with the quantity demanded in the demand equation. It is possible to notice that the price-elasticity of demand is somewhat bigger for this category, in relation to the “popular” one. An increase in prices discourages more the acquisition of cars in the “average” category. A reason for that could be that a consumer could substitute the consumption of “average” cars for “popular” ones when prices rise. This is possibly not the same for the “popular” category, since possible substitutes might be a motorbike or using public transportation, which are somewhat different in convenience than owning a car.

Table 5 - ESTIMATES FOR THE SUPPLY EQUATION (AVERAGE CATEGORY)

Variables	Coef.	Std. Err.	T	P > t	[95% Coef. Interv.]	
LNP	0.9664	0.6652	1.45	0.152	- 0.3684	2.3011
PRODUC	0.0139	0.0035	3.95	0.000	0.0068	0.0209
Cons.	- 2.6565	7.6327	- 0.35	0.729	- 17.9727	12.6597

2 Stages Least Squares Regression – Endogenous Variable LNQ

Instrumented Variable: LNP – Instruments: LNGDP PRODUC

N. Obs.	F (2,52)	P > F	R-Squared	Adj. R-Squared
55	7.83	0.0011	-	-

SOURCE: Regressed in Stata12

The estimates for the supply equation (above, *LNQ* against *PRODUC* and *LNP,* instrumented as explained in section *2.5.2.2*) are with the expected signals. The coefficient for *PRODUC* is significant at 0.01 level of significance, but the other coefficients fail to be significant at 0.10 level of coefficient.

As for the “popular” category, the estimates are consistent with microeconomic theory, and an increase in prices also affects positively the quantity supplied, in a similar magnitude to the “popular” category (1.1427 for the “popular” category and 0.9664 for the “average” category)

Table 6 - ESTIMATES FOR THE DEMAND EQUATION (LUXURY CATEGORY)

Variables	Coef.	Std. Err.	t	P > t	[95% Coef. Interv.]	
LNP	- 3.9930	2.1245	- 1.88	0.066	- 8.2563	0.2702
LNGDP	1.5626	0.9022	1.73	0.089	- 0.2478	3.3730
Cons.	36.9422	17.4187	2.12	0.039	1.9890	71.8954

2 Stages Least Squares Regression – Endogenous Variable LNQ

Instrumented Variable: LNP – Instruments: LNGDP PRODUC ENER

N. Obs.	F (2,52)	P > F	R-Squared	Adj. R-Squared
55	1.86	0.1665	-	-

SOURCE: Regressed in Stata12

The last estimates are for the demand and supply equations of the "luxury" category. As already mentioned, this result is given by a different supply curve, with the addition of the variable ENER. This is so because estimates appeared more significant with the addition of this variable.

The demand equation is showed above (Table 6). *LNP* was instrumented against *LNGDP*, *PRODUC and ENER*, so that a proxy for *LNP* could be generated. All coefficients are relevant at 0.10 level of significance. In addition, all signals are as expected, with *LNP* appearing as negative and *LNGDP* as positive.

As for the estimates of the demand equation for the "average" category, the price-elasticity of demand is also greater than those of the "popular" category. It is still higher than that of the "average" category, suggesting that the consumption of "luxury" automobiles is much more elastic to prices than the consumption of "popular" automobiles.

The supply equation is displayed below:

Table 7 - ESTIMATES FOR THE SUPPLY EQUATION (LUXURY CATEGORY)

Variables	Coef.	Std. Err.	t	P > t	[95% Coef. Interv.]	
LNP	0.1047	0.4362	0.24	0.811	- 0.7710	0.9805
PRODUC	0.0141	0.0021	6.55	0.000	0.0098	0.0185
ENER	- 0.0025	0.0011	- 2.18	0.034	- 0.0047	- 0.0002
Const.	7.4367	5.1647	1.44	0.156	- 2.9318	17.8052

2 Stages Least Squares Regression – Endogenous Variable LNQ

Instrumented Variable: LNP – Instruments: LNGDP PRODUC ENER

N. Obs.	F (2,52)	P > F	R-Squared	Adj. R-Squared
55	19.44	0.0000	0.5346	0.5073

SOURCE: Regressed in Stata12

The *PRODUC* coefficient is significant at 0.01 level of significance, and the *ENER* one is significant at 0.05 level of significance. The other coefficients were not significant at 0.10 level of significance. Expected signals were as expected, with *PRODUC* being positive, *ENER* negative and *LNP* positive.

2.5.2.4 WELFARE RESULTS

The estimates given by the previous section permit the use of two supply and demand equations, for the three categories.

The supply and demand equations for the “popular” category are as follows:

$$LNQ_D = 21.78 - 2.68\,LNP + 1.44\,GDP$$
$$LNQ_S = -5.37 + 1.14 LNP + 0.03\,PRODUC$$

The supply and demand equations for the “average” category are:

$$LNQ_D = 26.79 - 3.57\,LNP + 1.90\,LNGDP$$
$$LNQ_S = -2.66 + 0.97\,LNP + 0.03\,PRODUC$$

And the supply and demand equations for the “luxury” category are:

$$LNQ_D = 41.13 - 4.55\ LNP + 1.75\ LNGDP$$

$$LNQ_S = 7.68 + 0.50\ LNP + 0.01\ PRODUC + 0.00ENER^2$$

The following table summarizes the data collected and estimated from the use of the equations for the popular category. The description of the data follows:

YEAR: the year considered for the analysis

LNGDP: the value of LNGDP used. It was constructed as the sum of monthly data divided by 12, to get the mean of LNGDP for the year at interest.

PRODUC: the value of productivity used, which was computed like LNGDP.

LNP90: the value of foreign prices at a given year added by the 1990 tariff of 85%.

LNP': the value of foreign prices at a given year added by the "current" tariff, or the tariff of the same year.

LNP*: the value of foreign prices at a given year without tariffs.

All that data was already constructed before any estimate, and they helped with the estimates of the following variables;

Qd90: the quantity demanded at international prices LNP90, which can be found by plugging LNP90 in the demand equation.

Qd': the quantity demanded at international prices LNP', which can be found by plugging LNP' in the demand equation.

Qd*: the quantity demanded at international prices LNP*, which can be found by plugging LNP* in the demand equation.

Qs90: the quantity supplied at international prices LNP90, which can be found by plugging LNP90 in the supply equation.

Qs': the quantity supplied at international prices LNP', which can be found by plugging LNP' in the supply equation.

Qs*: the quantity supplied at international prices LNP*, which can be found by plugging LNP* in the supply equation.

[2] By using the approximate value up to 2 decimals, the value for this parameter is actually zero.

Pe: the equilibrium price in the domestic market.

Qe: the equilibrium quantity in the domestic market.

Table 8 - DATA ARISING FROM THE ESTIMATES FOR THE SUPPLY AND DEMAND EQUATIONS (POPULAR CATEGORY, 1990-1994/07, IN NATURAL LOGS)

YEAR	LNGDP	PRODUC	LNP90	LNP'	LNP*	Qd90	Qd'
1991	11.95	99.83	10.78	10.64	10.17	10.09	10.47
1992	12.03	103.54	10.97	10.76	10.36	9.70	10.27
1993	12.17	112.07	10.97	10.64	10.35	9.91	10.79
1994-07	12.14	114.92	10.96	10.65	10.35	9.89	10.72
YEAR	**Qd***	**Qs90**	**Qs'**	**Qs***	**Pe**	**Qe**	
1991	11.73	9.91	9.75	9.21	10.83	9.97	
1992	11.34	10.24	10.00	9.55	10.83	10.08	
1993	11.57	10.50	10.13	9.79	10.81	10.32	
1994-07	11.52	10.57	10.22	9.88	10.78	10.37	

SOURCE: Own elaboration

With all those estimates, it is possible to perform the welfare analysis described by the models in section 4.2.1. One can easily calculate the values for "Added Consumer Surplus" (ACS), "Lost Producer Surplus" (LPS), "Deadweight Gains" (DG) and "Added Government Revenues" (AGR). The following tables summarize the two types of analysis. The first one displays the situation where gains are calculated in relation to the counterfactual of a continuous 1990 tariff rate, at 85%. Those are the actual gains that happened because Collor/Franco chose to lower tariffs. Those are the following estimates:

Table 9 - ESTIMATES OF WELFARE GAINS ARISING FROM A LOWER TARIFF IN THE CURRENT YEAR RELATIVE TO THE SITUATION WHERE THE 1990 TARIFF IS KEPT (POPULAR CATEGORY, 1990-1994/07, IN BILLION 2014 BRL)

YEAR	ACS	LPS	DG	AGR	TOTAL
1991	2.235	1.629	0.532	2.355	**2.961**
1992	1.080	0.818	0.139	1.272	**1.534**
1993	3.663	2.052	1.089	2.959	**4.570**
1994-07	1.581	0.981	0.365	1.363	**1.963**

SOURCE: Own elaboration

The computation for the total value comes from the equation:

$$TOTAL = ACS - LPS + AGR$$

The following table provides the results for the gains that could have materialized if tariffs had fallen to 0% during the Collor/Itamar term.

Table 10 - ESTIMATES OF WELFARE GAINS ARISING IF TARIFF WAS REDUCED TO ZERO (POPULAR CATEGORY, 1990-1994/07, IN BILLION 2014 BRL)

YEAR	ACS	LPS	DG	AGR	TOTAL
1991	14.990	3.897	9.037	(-) 3.400	**7.693**
1992	10.525	4.848	5.892	(-) 1.272	**4.405**
1993	9.472	3.622	4.074	(-) 2.959	**2.891**
1994-07	5.587	2.404	2.425	(-) 1.363	**1.820**

SOURCE: Own elaboration

The same tables produced for the “popular” categories are featured below for the “average” category:

Table 11 - DATA ARISING FROM THE ESTIMATES FOR THE SUPPLY AND DEMAND EQUATIONS (AVERAGE CATEGORY, 1990-1994/07, IN NATURAL LOGS)

YEAR	GDP	PROD	P90	P’	P*	Qd90	Qd’
1991	11.95	99.83	11.21	11.06	10.59	9.48	10.01
1992	12.03	103.54	11.40	11.19	10.78	8.95	9.70
1993	12.17	112.07	11.39	11.07	10.77	9.25	10.39
1994-07	12.14	114.92	11.39	11.07	10.77	9.19	10.33
YEAR	**Qd***	**Qs90**	**Qs’**	**Qs***	**Pe**	**Qe**	
1991	11.69	9.21	9.07	8.61	11.27	9.27	
1992	11.16	9.43	9.23	8.83	11.29	9.33	
1993	11.46	9.51	9.20	8.91	11.33	9.45	
1994-07	11.41	9.54	9.23	8.94	11.31	9.46	

SOURCE: Own elaboration

Table 12 - ESTIMATES OF WELFARE GAINS ARISING FROM A LOWER TARIFF IN THE CURRENT YEAR RELATIVE TO THE SITUATION WHERE THE 1990 TARIFF IS KEPT (AVERAGE CATEGORY, 1990-1994/07, IN BILLION 2014 BRL)

YEAR	ACS	LPS	DG	AGR	TOTAL
1991	2.182	1.315	0.646	2.610	**3.477**
1992	1.230	0.848	0.280	1.788	**2.17**
1993	5.176	2.175	2.590	4.521	**7.522**
1994-07	2.650	1.178	1.246	2.381	**3.853**

Table 13 - ESTIMATES OF WELFARE GAINS ARISING IF TARIFF WAS REDUCED TO ZERO (AVERAGE CATEGORY, 1990-1994/07, IN BILLION 2014 BRL)

YEAR	ACS	LPS	DG	AGR	TOTAL
1991	20.258	2.944	14.352	(-) 3.879	**13.435**
1992	12.651	3.472	8.374	(-) 1.788	**7.391**
1993	12.720	2.225	6.471	(-) 4.521	**5.974**
1994-07	7.040	1.338	3.620	(-) 2.381	**3.321**

SOURCE: Own elaboration

Table 14 - DATA ARISING FROM THE ESTIMATES FOR THE SUPPLY AND DEMAND EQUATIONS (LUXURY CATEGORY, 1990-1994/07, IN NATURAL LOGS)

YEAR	GDP	PROD	P90	P’	P*	Qd90	Qd’
1991	11.95	99.83	11.43	11.28	10.82	10.42	11.05
1992	12.03	103.54	11.63	11.42	11.01	9.30	10.41
1993	12.17	112.07	11.62	11.29	11.00	9.56	10.88
1994-07	12.14	114.92	12.09	11.78	11.48	7.63	8.88
YEAR	**Qd***	**Qs90**	**Qs’**	**Qs***	**Pe**	**Qe**	
1991	12.89	9.57	9.55	9.51	11.53	9.63	
1992	11.78	9.64	9.62	9.58	11.55	9.63	
1993	12.04	9.72	9.69	9.66	11.58	9.72	
1994-07	10.07	9.80	9.77	9.74	11.56	9.75	

SOURCE: Own elaboration

Table 15 - ESTIMATES OF WELFARE GAINS ARISING FROM A LOWER TARIFF IN THE CURRENT YEAR RELATIVE TO THE SITUATION WHERE THE 1990 TARIFF IS KEPT (LUXURY CATEGORY, 1990-1994/07, IN BILLION 2014 BRL)

YEAR	ACS	LPS	DG	AGR	TOTAL
1991	7.421	2.226	2.285	7.459	**12.654**
1992	3.674	2.275	1.376	6.667	**8.066**
1993	11.266	5.219	5.968	8.931	**14.978**
1994-07	0	0	0	0	**0**

SOURCE: Own elaboration

Table 16 - ESTIMATES OF WELFARE GAINS ARISING IF TARIFF WAS REDUCED TO ZERO (LUXURY CATEGORY, 1990-1994/07, IN BILLION 2014 BRL)

YEAR	ACS	LPS	DG	AGR	TOTAL
1991	80.492	5.019	58.526	(-) 17.140	**58.333**
1992	30.124	5.649	18.025	(-) 6.667	**17.808**
1993	26.891	3.963	14.113	(-) 8.931	**13.997**
1994-07	1.150	0.963	0.187	0	**0.187**

SOURCE: Own elaboration

The total gain achieved in the “popular” category arising from the reduction on tariff rates for the years 1990 to 1994-07 was estimated to be BRL 11.028 billion. As for the “average” category, it was estimated to be of BRL 15.069 billion. The “luxury” category yielded BRL 35.698. The summation of the three categories suggests a total gain of BRL 61.795 billion, in roughly three years and a half.

Considering only the gain achieved by consumers and producers, and leaving the government aside, it was of the magnitude of BRL 3.079 billion for the “popular category”, of the magnitude of BRL 5.722 billion for the “average” category, and BRL 12.641 for the “luxury” category. The summation of the three categories yields a total amount of BRL 21.442 billion.

As for the total gains that could be achieved if tariffs had been completely removed during the period of 1990 to 1994-07, they would be of BRL 16.809 billion for the “popular” category. For the “average” category, it was estimated to be on the magnitude of BRL 30.121 billion. And for the luxury category the

estimate is about BRL 90.325 billion. The summation of the three categories would be of BRL 137.255 billion

Considering solely the total amount of gains that could be achieved by consumers and producers, they would be of BRL 25.803 billion for the “popular” category, and BRL 42.690 billion for the “average” category. The “luxury” category could yield BRL 123.063 billion. The summation of the three categories could generate BRL 191.556 billion in consumer and producer surplus.

Apart from describing the welfare gains, it is also important to calculate the size of the gains relative to the total market for the category in a given year. Using the data already collected for prices and quantities in each category, it is possible to generate such data.

The following table summarizes it:

Table 17 – THE SIZE OF TOTAL GAINS RELATIVE TO THE MARKET SIZE IN A GIVEN YEAR

YEAR	CATEGORY	TOTAL GAINS / MARKET SIZE FOR ACTUAL TARIFF FALL (FROM 85% IN 1990)	TOTAL GAINS / MARKET SIZE FOR TARIFF FALLING TO ZERO
1991	**POPULAR**	0.2312	0.6007
1992	**POPULAR**	0.0963	0.2766
1993	**POPULAR**	0.2461	0.1557
1994-07	**POPULAR**	0.1530	0.1418
1991	**AVERAGE**	0.2892	1.1176
1992	**AVERAGE**	0.1832	0.6198
1993	**AVERAGE**	0.4268	0.3389
1994-07	**AVERAGE**	0.5974	0.4779
1991	**LUXURY**	0.6284	2.8969
1992	**LUXURY**	0.3794	0.8378
1993	**LUXURY**	0.6232	0.5824
1994-07	**LUXURY**	0	(~) 0

SOURCE: Own elaboration with data from Revista Quatro Rodas, Folha de São Paulo Newspaper and ANFAVEA.

The table shows how gains can be significant. The range for the popular category, in the actual situation, when tariffs fell from a high point of 85% in 1990, is in the order of magnitude from 0.0963 of the market size in 1992, to 0.2461 in 1993. In addition to those observed gains, a total of 0.6007 total gains/market size could be obtained if tariffs had fallen to zero in 1991 for the popular category.

As for the average category, the total gains/market size achieved is as high as 0.4268 in 1993 and 0.4268 in 1994-07. If tariffs had fallen to zero, total gains/market size could be as high as 1.1176 in 1991, when tariffs were still very high, even though it already started falling from 85%.

In the luxury category, where prices were very high in the first three years analyzed, total gains/market size were ranging from 0.3794 to 0.6232. If tariffs had fallen to zero, in 1991 it could be achieved and impressive amount of gains relative to the market size, of 2.8969. As prices and tariffs fell later on, gains became more modest, but still as high as 0.8378 in 1992.

To conclude this section, it is important to notice the relevance of the gains that were obtained from the tariff reductions, and also notice the amount that could be generated by a further reduction in tariffs. Leaving aside the question of whether there could be any dynamical gains to compensate for the protection of the automobile sector, it is true that a significant amount of static welfare gains could be obtained from a reduction of tariffs. Authorities have yet to promote a more significant discussion about the gains and losses from trade protection. After the mandates of Fernando Collor de Melo and Itamar Franco, the country seemed to return, even though not completely, to higher levels of protectionism. The agenda of nowadays stronger political parties does not seem to include such topic with the relevance it should have, which suggests that the possibility of another round of trade liberalization seems to be far ahead in the future.

3 THE EFFECTS OF ANTIDUMPING POLICY ON BRAZILIAN EXPORTS

3.1 INTRODUCTION

Before the investigation proposition, it is important to delimitate, firstly, the concept of antidumping. The World Trade Organization (WTO) website states that a given enterprise is practicing dumping when it exports at lower prices than those it is practicing at the home country. Despite all the controversies that exist around the concept, the WTO do not make any judgment call on whether a given measure is fair or not, being this call a responsibility of national governments, which may accept or not the claims of protection against dumping. If the government accepts the petition, it has to report to the WTO if it is a signatory of the Antidumping Agreement, which is part of the General Agreement on Tariffs and Trade (GATT) negotiated during the Uruguay Round. The petitioner country has to prove, then, the existence of such practice.

Still accordingly to the WTO website, the organism permits that governments act against the practice of dumping when there is a reasonable material loss caused to the domestic industry. The governments have to calculate the size of the dumping (how low is export prices compared with prices practiced in the domestic market of the exporter), and present the losses generated or, at least, threatening to generate, by such low prices. Specifically, there are diverse ways of calculating if a given product was dumped or not. The agreement proposes three methods to calculate the normal value: (i) the main method is based on the value practiced by the exporter in its domestic market; (ii) a second one is the value the exporter is practicing in a third country; and (iii) is a method based on the combination of the costs of production, other costs and profit margins of the exporter.

The WTO is very cautious with the petitions: a detailed investigation has to be conducted according to specific set of rules. These procedures include how the cases might be initiated, how investigations might be conducted, and also the conditions that guarantee the participation of all of the parts involved in the process, so that they have the opportunity to offer evidences in favor of their causes. The measures might expire 5 years after the imposition of it, unless a

new investigation could argue that the suspension of the duty may generate losses for the domestic industry.

The WTO also stipulates that the investigations have to be terminated immediately in cases where the authorities find the dumping margins to be insignificant. Another condition is that investigations should terminate if the volume of imports is irrelevant (if imports of those products are less than 3% of total imports of the country). The Agreement also signals that the members should inform the Comitee of Antidumping Practices about the preliminary and final dispositions. When the imbroglio persists, members can use the dispute resolution procedures of the WTO.

Vasconcelos and Firme (2011, pg. 166) points to the origin of the mechanism definition as being given by Viner (1923), according to whom "[…] dumping would be the practice of lower prices than those of similar products, or of a third country, by the exporting firm". It is easily verifiable that this definition is in line with that given by the WTO nowadays. Vasconcelos and Firme (2011, pg.166) also credit Ethier (1998) as responsible for the incorporation of the cost of production in the concept.

The antidumping use is actually relatively new. According to Trebilcock and Howse (2002, apud, Vasconcelos and Firme, 2011, pg. 166) there has been a growing usage of this mechanism in the recent decades, even though more traditional users are diminishing its use (like USA, Australia, New Zealand, Canada and the European Union). Despite of the developing nation's unwillingness to keep using the instrument, their diminished usage has been compensated by a dramatic increase of the instrument utilization by developing nations (ZANARDI, 2004, apud VASCONCELOS AND FIRME, 2011, pg.166). The Attached 2, from Yilmaz (2007), shows that this spectacular increase of the mechanism usage by emergent markets happened after the establishment of the WTO. India deserves the spotlight, as it was responsible for 15% of all investigations initiated in the period of 1995-2006, in contrast with its participation of just 1% in the investigations initiated in the period of 1990-1994. Other relevant examples, still accordingly to the table presented by Yilmaz (2007) and featured in the Attached 3, are Peru, Thailand, South Korea and South Africa.

As for the Brazilian contribution on the antidumping world, it was collected some data that spans from 2002 until 2010. Table 1 displays the cases opened by Brazil during those years. Miranda (2003) collected data for the period 1987-2000, and found 140 investigations opened in the period. Taking the average, it was 10 investigations/year in the period 1987-2000 and 20,66 investigations/year in the period 2002-2010, i.e. more than the double.

Table 18 - NUMBER OF CASES OPENED IN THE PERIOD 2002-2010

YEAR	CASES OPENED
2002	16
2003	17
2004	13
2005	13
2006	23
2007	18
2008	28
2009	18
2010	40
TOTAL	186

SOURCE: DECOM 2010 report – SECEX/MDIC

As for the result of the investigations of the period, we found the following, given by Table 18:

Table 19 - NUMBER OF CASES OPENED BY END RESULT IN THE PERIOD 2002-2010

TYPE OF DUTY	CASES BY ITS END RESULT	PERCENTAGE PER END RESULT
Definitive Antidumping Measures	107	57,52
Preliminary Measure Only	24	12,90
Price Agreement	5	2,69
Without the Application of Any Measure	50	26,88

SOURCE: DECOM 2010 report – SECEX/MDIC

When it comes to the countries we targeted those measures, it is possible to visualize that in the following table (Table 19). China appears as the largest aim of Brazilian measures. A rapid look at the data coming from other

countries (Global Antidumping Database) also displays China as the leader. This seems logical, as China became a very important economy in the awakening of the century. In addition, being an industrialized economy still competing with low wages, its costs are generally very low, and it understandably hurt other countries industrial competitors. The USA appears in the second place, with 22 cases opened, less than half of China's 55. Following those countries, India is considered a big player in world antidumping, and then neighboring Argentina.

Table 20 - NUMBER OF CASES THAT ENDED WITH DEFINITIVE MEASURES FOR EACH COUNTRY IN THE PERIOD 2002-2011

TARGET COUNTRIES	INVESTIGATIONS OPENED
China	41
USA	15
India	8
Argentina	5
Mexico	4
Russia	4
Thailand	4
Bangladesh	3
Romania	3
France	3
Indonesia	3
Germany	2
South Africa	2
Others	20
TOTAL	117

SOURCE: DECOM 2010 report – SECEX/MDIC

The main objective of this study is to understand the impact of antidumping measures on Brazilian exports. Two main mechanisms concern the study: (i) the direct effect of the antidumping measure filed against Brazil (assumed to be negative); and (ii) the effect generated by trade diversion, i.e, the increase of Brazilian exports due to petitions filed against third countries. The period of investigation (considering the date cases initiated) will be from 1997-2010 for situation (i), for all countries the data is available, and from 2005-2010 for situation (ii), for three important trade partners of Brazil.

3.2 LITERATURE REVIEW

The majority of the world literature on antidumping is concentrated in the United States and the European Union, thus most of the reviewed literature will reflect this fact. A few studies will come from Latin America and Brazil, as the one from Miranda (2003), which will be reviewed more extensively as it is one of the main works to support this investigation.

Miranda (2003)'s work starts by noticing an increase in the utilization of the antidumping throughout the world, which has become a common way of commercial protection during the last 20 years. What has not called for much attention historically turned out to be one of the most polemical themes of the Uruguay Round. Curiously, states Miranda (2003), the great defender of liberalized trade regimes, the United States, is the country which uses the mechanism the most (at least until 2000):

> "Do it like I say, not what I do. That seems to be an adequate description of the USA and the EU on the efficacy of government's involvement in the markets – at least when it comes to antidumping" (PRUSA, apud MIRANDA, 2003, pg 1)

Miranda (2003) also register two effects of antidumping policy: (i) the raise on prices of listed products; and (ii) the increase in imports coming from non-cited countries, which then become the new suppliers of the products that were the aim of the measures. This is called trade diversion.

A table in Araújo Jr., Macario and Steinfatt (2001, pg. 556-558), cited in Miranda (2003) presents the main agents of antidumping in the continent: the USA, Canada, Brazil, Argentina and Mexico.

Analysing it more separately, still according to Miranda (2003) Brazil has been the aim of 97 cases opened by Argentina, Canada, Mexico and the United States in the period 1989-2000. In 50% of the cases, the petitioner country was Argentina, followed by the United States with 25% of the cases, and then Mexico with 16% and Canada with 9%. As for the participation of Brazil, in percentage terms, in the cases opened by those countries, it has the following concentration: of the 212 cases opened by Argentina in the period of 1989-2000, in 23% of those cases Brazil was cited. Mexico has opened 191 cases,

and the Brazilian participation was of only 8%. As for the United States and Canada, Brazil was cited in only 4% of the cases opened by those two countries.

Miranda (2003) also discriminated antidumping measures by sector in Brazil, and created a table with data for the period 1989-2001. It is possible to observe in the table that the most affected sector was the “metals” sector, with 47 investigations opened of a total of 88, which concentrates most of American and Argentine complaints. The second most affected sector was “machinery, appliances and electrical equipment" with 13 investigations. Argentina is the country with the highest number of opened cases against Brazil, as already noted above, and the one with the greatest dispersion of complaints by sector. Of the 12 sectors listed in the table, Argentina made claims in 9 of them.

Another interesting table contained in Miranda's (2003) work examines the countries claims based on the end result of each one. The possibilities are: price agreement; the application of the definitive measure; the application of temporary measures; and without the application of any measure. Most of the investigations terminated with the application of definitive measures. This was the case of 40 investigations of a total of 88. The minority of cases ends with price agreement or without the application of any measure.

First, in an attempt to visualize the data in a more descriptive fashion, Miranda (2003) found that Brazilian exports tend to fall rightly after the imposition of the measure, which seems to confirm the intuition behind the study. Then the work goes on to estimate an econometric model, which is the basis for this work (see section 3.2.3). In the model, it was considered only cases where definitive antidumping duties were applied and those without the application of definitive antidumping measures. The aim was to quantify the effect of antidumping measures on US imports during the period, separated by those two kinds of possible ends. The results obtained from the data indicate that, regardless of any kind of antidumping measure, there is a reduction on imports. The coefficients for the dummies which identify the investigation outcomes are negative in both cases, for the four years analyzed. When definitive antidumping duties are applied, there is a reduction of over 30% even in the year of the beginning of the investigation, indicating that the decline in imports may be associated to the uncertainty generated by the investigation and

the possibility of any provisional duties. In the first year, the results point to further restrictive effects, a decrease of approximately 74% over the levels registered before the investigation was initiated. In the following year (2nd one) there is a slight recovery of the imported value, but still lower than the value of the year before the opening of proceedings. Finally, in the third year there is a reduction of 68%. In cases where antidumping duties are not applied it is also visible a reduction in the value of imports overall. However, except for the first year, the decrease is not as dramatic as compared to cases where the definitive antidumping duty was taken into place, what was expected. Estimates of the coefficients related to the antidumping procedure using the values of imports from non-mentioned countries were negative, different than expected. Compared to the case of the cited countries, it is noted that the reduction was smaller, and the estimated coefficients were mostly non-significant.

Piani (1998) studies the experience of Brazil and Argentina in the administration of its antidumping regimes. Brazil only implemented the first legislation enacting the agreements on Article VI of the GATT and the interpretation and application of Articles VI, XVI and XXII of the General Agreement in 1987 (PIANI, 1998). Once the traditional protection instruments such as tariffs and quotas began to reduce in size and scope since the trade opening of the Collor government, there was an increased use of antidumping measures in Brazil. Piani (1998, pg. 1) said, about the increased use of post trade liberalization antidumping duty: "Given the huge tariff and non-tariff protection prevalent, the use of these measures was unnecessary" and "In the first year the implementation of the tariff reform schedule opened 10 investigations. In the following year it was 11, and 28 in 1993," adds Piani (1998, pg. 2). There was a drop in the amount of investigations in the period after 1995. It is possible that this result is explained by some disappointment about the results obtained with the measure. Moreover, this greater moderation can be explained by the stabilization plan (Real Plan), the use of alternative resources, such as the inclusion of products in the Mercosur temporary exception regimes, and, after that, the use of safeguards (PIANI, 1998).

In a table compiled by Piani (1998, page 3) it can be seen the Brazilian position in relation to other countries and regions that used the antidumping in 1996. It can also be seen that Brazil appears as a major user of the dispositive

considering the relative brevity of the country's entry in the circle of antidumping users. The country appears in 1996 with 17 cases started. Regions with a longest tradition in the use of those measures, such as Australia, Canada, the USA and the EU appear, respectively, with 37, 53, 128 and 61 cases started in 1996.

Piani (1998) also notes that most antidumping measures in 1996 were applied on the chemical and related industries: 28% of the total. The chemical industry is a classic case of structural dumping, based on international price discrimination. The big producers have a very high scale of production, and sales in the domestic market do not exhaust this possibility, especially given the existence of some contracts that allow companies to fix the domestic price above marginal cost. This does not occur in foreign markets, and ultimately justify the request for antidumping measures.

Another possible justification for increasing the use of antidumping duties provided by Piani (1998) is the fact that the concept is not clearly defined, and gives room to interpretations. "A well written petition has a great potential to result in a compensatory measure" (PIANI 1998, page 9). Another important point worth noticing is the existence of technical and administrative weakness of the government bodies responsible for the administration of antidumping measures, exacerbated by the constant institutional changes of the whole area that takes care of foreign trade. Several changes were introduced in the country since the early 90s.

On the Argentine experience with antidumping, Piani (1998) points out that only in 1992 Argentina joined the Antidumping Agreement. Of the total of 135 complaints to the agency in charge of antidumping legislation in Argentina, fifty resulted in the opening of investigations. Similar to Brazil, most cases coincided with the period of greatest economic opening between 1991 and 1993. Brazil was the most frequent target of Argentina's complaints. The range of products has been diversified, including chemicals, bicycles tires, indigo tissues and, the most important one, steel products.

Brenton (2001) analyzes the impact of antidumping policies in the European Union (EU), distinguishing between the impact on cited countries, non-cited in the rest of the world and non-cited within the EU. It is used data for the period 1989-1994.

Brenton (2001) notes that wherever the measures were applied, the average requirement exceeded 25%. This suggests that antidumping measures may have a very high impact on trade. Brenton (2001) finds no significant drop in intra EU trade in the period before the beginning of the investigation. Following an increase in the previous year of the investigation beginning, there is a large decline in the value of imports of the countries cited in the petition. The fall in the volume of imports is even more noticeable in the next period. In the next years, the volume of trade remains at that low level.

According to the study of Brenton (2001), to the extent that imports from the countries mentioned decline, there is an increase in the value of imports from countries not cited in the rest of the world, while the figure for countries not mentioned intra-EU grows too little. This suggests that trade diversion act mainly to increase exports to countries outside the EU. With respect to countries that do not receive the definitive measure, the fall in import volume remains low until two years after the start of the investigation. However, the volume returns to grow in the third year.

After performing the analysis that accounts for the changes in the volume of imports, Brenton (2001) then investigates the behavior of prices. The import price of the countries subject to measures increases substantially for the year in the beginning of the investigation, while the price of imports from non-cited countries outside the European Union and non-cited countries within the European Union remains stabilized. Before the start of the investigation, the prices of cited countries' products were declining, suggesting that this is the reason for the investigation.

Brenton (2001) then produces an econometric model based on Prusa (1997) to adequately quantifying the magnitude of effects. The result confirms the expected existence of trade diversion.

Prusa (1999) also begins, as many other authors reviewed, by noting that developing countries are becoming major users of the antidumping procedure. The discovery of antidumping by developing countries can change the behavior of developed countries on the subject, forcing them to review it. It may be that the gains generated by the international trade opening during the various rounds of GATT/WTO will be reversed by the widespread use of antidumping measures.

> "Apparently, the United States and the European Community may ultimately pursue the reform of antidumping, because other countries also understood the size of the system failures, how easy it is to use it, and perhaps most importantly, how easy it is to use it inappropriately" (PRUSA, 1999, pg. 2)

Prusa (1999) also demonstrates a level of suspicion concerning the main objectives of antidumping. Realizing that in a large percentage of cases, during different decades, most countries that used the antidumping procedure applied the law against other countries that are also common law enforcers, he speculates:

> "[...] Countries adopt anti-dumping not only to protect themselves from unfair imports, but also to defend themselves from abuse of exporters in the use of the law around the world. From this perspective, the antidumping is part of a strategy of the type eye for an eye and tooth for a tooth. In this case, many antidumping actions are not motivated by the desire to make markets more competitive, but by the desire to stop other countries usage of the law. In other words, by increasing the cost of exporting the government also increases the cost for others to use the law. "(PRUSA, 1999, pg. 8)

In the hope that you can protect the sector that competes with imports and escape from retaliation, politicians adopt antidumping. So the world market situation begins to resemble the prisoners' dilemma:

> "Each country cannot resist the temptation to protect industries that compete with imports. However, if all countries also use the anti-dumping legislation, each country will be worse off than it would be under free trade. Following this interpretation, all countries would be better off if they all agree to stop using the law" (PRUSA, 1999, page 8).

Estimating a model that inspired Miranda (2003), Prusa (1999) also uses the US as the country chosen for the same reasons of Miranda (2003), namely: (i) The size and importance of the US in the use of antidumping measures; and (ii), the increased availability of data. The results point to the existence of a significant impact on the cases that end with the application of permanent and temporary measures. In either case, the imported values from listed countries fell 50-70% in the first three years of protection. Even in cases where the antidumping duty is denied, it was found a reduction of 15-20%.

Staiger and Wolak (1994) studied the cases where the mere possibility of an obligation may restrict trade. Three separate events were defined: the investigation effect, the suspension effect, and the withdrawal effect. The investigation effect occurs when starting an antidumping investigation. The suspension effect occurs when an investigation is suspended for the promise made by foreign firms that they will stop dumping. And the withdrawal effect occurs when a petition is simply removed after a final determination. Data were used on all US investigations during 1980-1985 for manufactured products.

Some explanations were given by Dale (1980) *apud* Staiger and Wolak (1994) about how the effects happen. As for the investigation effect, in cases where the final determinations of injury and dumping is positive, and the preliminary LTFV[3] determinations are also positive, the obligations are imposed retroactively from the beginning of the preliminary determination. Therefore, when exporters have the expectation that the law will soon be applied, they try to raise prices, which ultimately have an immediate effect on the imports' volume. Symmetrically, the expectation that the definitive measure will not be granted may have the effect of increase imports again. Another plausible explanation for the existence of the investigation effect is the law requirement to punish not only the exporter but also the importer. Thus, the expectation of the importer with regard to future punishment leads him to import less. Similarly to what happens with the exporter, the importer also resumes activity when the expectation of punishment is negative.

About the suspension effect, it is an alternative to the application of antidumping measures, aiming to stop the dumping. The effect turns out to be of higher prices and reduced trade volume. As for the withdrawal effect, it is the effect on import volumes and prices due to the withdrawal of the petition. *A priori* one would expect that the withdrawal of the petition would generate a return of prices and trade volume before the beginning of the investigation, which actually occurs in some cases (STAIGER AND WOLAK, 1994).

Vandenbussche et.al. (1999) also notes that the reduction of tariffs and voluntary export restraints, negotiated on the multilateral rounds of the World

[3] Less than fair value

Trade Organization (WTO), made room for the increased use of non-traditional protectionist instruments such as the antidumping, which offset in part the diminished use of traditional instruments. "An important distinction between traditional and new forms of trade protection is that the latter usually tends to be more selective and less transparent" (Ethier and Fischer, 1990 *apud* VANDENBUSSCHE et.al.1999, pg.1)

The work of Vandenbussche et al. (1999) aimed to measure - and then contrast with the results of other studies made with US data - the effects of antidumping measures on import flows. It was found evidence that trade diversion in the European Union is small compared to the US. They used data for the period 1985-1990. A total of 48 countries have been targets of European antidumping investigations. About 70% were from low cost countries. On this finding, Bhagwati (1989) *apud* Vandenbussche et.al. (1999, page 6) says:

> "One potential explanation for this phenomenon (the concentration of measures against low cost countries) is that developing countries and economies without free markets are less competitive and more monopolized than a European economy. This makes these countries more inclined to violate the condition of dumping which stipulates that export prices cannot be lower than the prices in the countries of origin."

The results obtained by Vandenbussche et.al. (1999) do not indicate trade diversion in imports from the countries cited to non-cited. The imports growth from non-cited countries was statistically insignificant. As for the fall in imported values from cited countries, there was a 67% reduction in cases where there was an application of the measure, and 53% in cases where there was a price agreement. As the statistics measured the reduction of imports in a period of five years, on average it appears approximately 10% in reduction of imports when price agreements were made, and 13% in cases where there was the imposition of duties.

Vandenbussche et.al. (1999) discusses the results and speculates that one of the reasons why trade diversion is lower in the EU than in the US is the lower level of duty to be paid, imposing a limit on the potential benefits of antidumping protection for non-cited importers. Another possible explanation could be the great extent of uncertainties and information asymmetries around the EU decision process. Economic policy studies comparisons, led by Finger et

al. (1982); and Baldwin and Steagall (1994), demonstrated that antidumping decisions in the US are technical in nature, while the antidumping decisions in the European Union, according Tharakan and Waelbroeck (1994), are more subject to political influence. (VANDENBUSSCHE et.al. 1999).

Vandenbussche et.al. (1999, p 17) also considers a hypothesis related to the nature of the competition, as suggested by some theoretical models (Staiger and Wolak, 1992; Veugelers and Vandenbussche, 1999; and Vandenbussche and Wauthy, 1999). The effects of trade diversion in highly concentrated markets can go in different directions. In highly concentrated sectors it can be expected that entry barriers and oligopolistic reactions are going to be important. In this case, trade diversion of countries cited for non-cited are expected. Moreover, in highly concentrated sectors, one can also expect that trade deviations are less important, as the product demand elasticity tends to be low. Therefore, a price increase due to an obligation or price agreement will have little effect on the quantity sold. As an experiment, Vandenbussche et.al. (1999) tests whether the market structure matters in explaining the trade diversion. The results show large negative effects on imports of cited countries. In more robust regressions these results are much smaller.

About the decisions of the International Trade Commission, Moore (1992) notes that since the 1980s researchers of the trade policy area have begun to pay more attention to political factors and their influence on the final result. Most formal modeling focused attention on how interest groups and politicians seeking votes interact with protectionism. The balance in general moves to a level and/or a type of protection that maximizes the political support received by the politician. Some alternative arguments consider other matters that do not involve strict rent-seeking. Concerns about low-income workers, frustrations over alleged unfair international trade and the fear of economic competitiveness loss are also factors that allegedly alter the balance and make it sub-optimal. Still according to Moore (1992), both arguments are relevant to explain the political motivations involved in the process, however, its application in explaining the results of trade policies remains unclear, since politicians do not implement trade policies every day, and that decisions of international politics in the advanced world are constrained both by international conventions

and by national legislation. This makes it less susceptible to political trade policy decision.

Moore's work (1992) aimed to investigate how the decisions of the International Trade Commission are immune to external influences. This was evaluated by analyzing the individual commissioners' vote on antidumping petitions from 1980 to 1986. Statistical analysis involved two hypotheses: (i) the null hypothesis that the commissioners voted in accordance with a strict interpretation of American law; (ii) the alternative hypothesis that the commissioners used inconsistent criteria with the law. This is indicative of the influence of lobbyists and other political and economic variables. To test the null hypothesis, the author only used data on matters strictly related to material conditions where the legislation suggests action, like general economic turmoil, damage to workers and financial difficulties. As for the alternative hypothesis, it was used a second type of criteria that focused on measures that are out of a "good" interpretation by the law.

The results of Moore's work (1992) point to a greater explanatory power when the political variables are included in the model. Regarding the null hypothesis, only two variables proved to be relevant in explaining the decisions of the commissioners: the coefficient for production changes in narrowly defined industry; and the change rate in the volume of imports under dumping. In the case of the alternative hypothesis, the significant coefficients showed the expected signals. The same two relevant variables in the null hypothesis remained relevant, and political variables were very relevant, which indicates a large presence of lobbies. Most notably, a dummy controlling for the Senate commerce subcommittee obtained a coefficient greater than any other dummy variable. It was also found that an increase of imports from all sources have important explanatory power. Other results suggest the view that the antidumping procedure is used as a wage maintenance program for low-wage workers. The results also show that industries with low levels of profit/sales ratio are more successful in getting affirmative property damage decisions. There was evidence that industries with small workforce are favored in the process: the level of employment coefficient in the industries listed in the 4-digit SIC is negative and significant, which provides little evidence in favor of group pressure models. Complaints of underdeveloped countries on the treatment

received by the US law were significant in the model. The coefficient for Japan, the OECD countries and the "Asian tigers" were not significant. A dummy indicating whether the vote of the commissioner is in the final or preliminary stage was significant. Apparently, the commissioners use a stricter rule in the final stage.

The work by Vasconcelos and Firme (2011) analyzes the effectiveness of the Brazilian antidumping instrument in terms of the influence of macroeconomic factors in the number of opened antidumping investigations and the effects of macroeconomic variables and size of the petitioner industry on the likelihood of the application of antidumping measures.

Vasconcelos and Firme (2011) estimated that 267 cases were opened in Brazil between 1988 and 2007. Of the total, 19 investigations were underway in 2007 and 248 investigations were closed in the period. Of all closed investigations, 55% of them obtained as a result the application of antidumping duty, and 41% did not suffer the application of the law. Only 4% of the cases ended with price agreement. This distribution of the results shows no large difference in relation to the distribution of cases in the world experience, which stood at 56% of antidumping duty applications in the period 1981-2001, according Vasconcelos and Firme (2011). Regarding the concentration of cases by sector, it was found that 72.3% of cases were found in just three sectors, namely: (i) 28% in "common metals and their works"; (ii) 26.2% in the "products of chemical and allied industries" section; and (iii) 18.1% in "plastic and rubber and their works" section.

To verify the hypothesis that macroeconomic factors such as the exchange rate, the level of domestic activity and external activity influence the number of antidumping investigations in the Brazilian economy for the period 1991-2007, Vasconcelos and Firme (2011) employed the following model:

$$NIt = f\ (TCT\ TCT\text{-}1,\ Y\ t,\ Y\ t\text{-}1,\ Yt\text{-}2,\ Yt\text{-}3\ Y\ *\ t,\ y\ *\ t\text{-}1,\ t\text{-}2\ *\ Y\ Y\ *\ T\text{-}3)$$

Where NI is the number of cases opened and closed from dumping investigations in period t, t = 1 (1991T1) ... t = 68 (2007T4); CT is the real effective exchange rate index, Y is the national production index and Y* is the index of production for foreign economies. Not all variables used in the equation

were statistically significant for both contemporary effects as to the lagged effects. Therefore, for the period analyzed, it could not be confirmed that for the Brazilian economy macroeconomic variables such as exchange and internal and external income influence the number of antidumping investigation openings.

3.3 METHODOLOGY

3.3.1 THE DATA

The data needed for the work had to be gathered from antidumping petitions all over the world. Generally, some government agency related to the Ministry of Foreign Affairs is responsible for keeping track of the petitions.

Antidumping researchers created the Global Antidumping Database, a website responsible for categorizing the agencies websites throughout the world.

It was chosen to gather data since 1994 for matters of practical purpose. There are plenty of cases since 1994, enough to justify a research. In addition, it coincides with the implementation of the Real Plan, when the Brazilian economy experienced a much more stable period. Apart from that, it avoids some time consuming enterprise: from 1997 onwards, the nomenclature changed, and it is needed to use a conversion table in order to follow the data backwards. In addition, there are not many data covered back in the 1980s.

The data for the first model of interest was gathered for four years after the beginning of the petition, so that it can be visualized the course of exports after that moment, and 3 years backwards, to capture the stance of exports before the petition was initiated. Since this was the chosen method, it was mainly looked for petitions that started in 1997 at minimum (so that 3 years back it ends up in 1994), up to petitions that started in 2011 (since four years ahead would be 2015, the last data available). A period of 15 years, then. As for the second model, data was collected from 2002 to 2015, with petitions initiated between 2005 and 2010.

One complication stemmed from the codes. There is a standardized procedure, called the Harmonized System, which consists of 2 to 6-numbered codes that help identifying the products. Although countries do share the first 6 numbers given by the Harmonized System, there is no consensus further from that. Brazil, for instance, uses an 8-numbered code, which is standardized for the Mercosur. Nevertheless, for countries outside the Mercosur there is no unified system. Finding a table available to convert the codes proved hard, and thus the second-best option came to be adopting the 6-numbered standardized codes for the countries outside of Mercosur, combined with a strategy that made possible to narrow more from that point. It was used data only when there was the possibility of identifying the product. That could be done in three ways: (i) when the codes for the country which initiated the petition indicated a sole product in the Mercosur code, so it could be possible to unequivocally identify the product; (ii) when the summation of the codes for the country which initiated the petition, in the furthest level, is equivalent to their 6-code, so it could be used the 6 code for Brazil also; and (iii) when the product description could easily be identified in the Mercosur system (a situation more common for pharmaceuticals and chemicals in general).

The Global Antidumping Database covers most of the petitions initiated against other countries. Still, there are some missing information (a few of them), which appears in the excel spreadsheets as “MI”. If the information missing was important to the research, it was opted to not include them. The spreadsheet is organized in the following manner: first, it tells which country is suffering the measures. It then gives a code, which can be used to search for the products’ codes. After that, the name of the product is given, followed by information about the initial date of the process, and further information as the process develops, as if there was a provisional measure, a definitive one, what were the dates of the imposition of measures, the *ad valorem* tariff imposed, and so on. Letters convey information about the status of the process. If an “A” appears in any of those situations, it means that the application of the procedure was accepted. It can be accepted for the application of provisional measures and/or definitive ones. An “N” means non-accepted. “W” means withdrawn, and “P” means price agreement.

A note was taken of every case in which there were any of these situations, apart from the “MI” ones. Different products can be mentioned in each petition, so it was chosen to separate them in the exercise where the interest is in the cases where Brazil was cited, so that more data could be gathered. As for the evaluation of trade diversion (the possibility of Brazil exporting to countries which mentioned another partner), it was chosen to keep them together in each petition, since there are plenty of those cases.

It is important to explain in little more detail how the process works, and why our data is organized the way it is. Initially, a country may file in the WTO a petition against another country, arguing that it is practicing dumping in their market. Rightly after that, the investigations start, and it does not extend much for the first result to come, conceding or not, based on initial evidence, a temporary duty on the exporter. This decision generally happens between the year 0 and the year 1, so it is expected that exports will fall at this moment. After the initial decision, the WTO does a more meticulous investigation and decides, generally between year 3 and year 4, if a final duty, generally lasting for about five years, will be conceded. The final duty, if conceded, may affect the exports negatively, and if not conceded, may permit the exports to rise again to previous levels. Our data covers exports from year 0 to year 4, so that all relevant period is covered in our analysis. Other possible scenarios involve the withdrawal, by the petitioner country, at any moment, of the complaint. Also, the parties involved may solve the problem with a price agreement, and investigations then close.

One of the models will try to capture how much trade is lost due to petitions initiated against Brazil. In that case, the following countries initiated a petition against Brazil: Argentina, the United States, the European Union (all members treated together), Chile, Colombia, Mexico, India, Peru, Paraguay, Korea and South Africa. The amount correspondent to each other is disproportionately distributed, as Argentina is by far the biggest complainer, with 57 petitions being held against Brazil. Of those, 38 finished with the application of final measures, whereas the remaining 19 finished with the application of provisional measures. A not so close second place is held by the United States, with 17 cases opened against Brazil in the period considered, being 8 which finished with the application of definitive measures, and 9 with the application of

provisional measures. The remainder of the countries account for just a few petitions held against Brazil. The ones that ended with the application of definitive measures had the following participants: the European Union (2), Chile (1), Colombia (1), India (2), Mexico (2), Peru (1) and Paraguay (1). As for the cases that ended with the application of provisional measures, we had Chile (2), Colombia (1), Korea (1), Peru (1) and South Africa (1).

The other model will try to look at cases initiated by Argentina, the United States and the European Union, three important trade partners, in the period of 2002 to 2015, where Brazil was not cited. The amount of cases with available information that ended with provisional measures was dismal, thus it was chosen to stick with cases ended with definitive measures only.

As soon as all the data coming from the Global Antidumping Database was captured, the next step was to go to Alice Web, a website kept by the Brazilian Ministry of Development, Industry and Commerce[4], which contains detailed information, in a monthly basis, of Brazilian exports and imports. There it can be accessed historical data discriminated by the sectors contemplated in the Harmonized System. It was opted to gather data not in a round-year fashion. Given the possibility of monthly data, the option was to construct the year as starting in the month where the petition was initiated. Take for instance a petition initiated at 05/04/2003. It was proceeded by calling the period 04/2003 – 03/2005 the year 0. If the petition initiated after day 15, the year 0 was constructed as starting from the next month. Therefore, in the case of 17/07/2006, it started counting at 08/2006. This approach is a good improvement in relation to the works done in a year-round basis. It generates the possibility of a better understanding on when the effects actually happened.

Data on exports for the country (all sectors) which mentioned Brazil, at any point, was also gathered. In the model, this data will work as an explanatory variable that may account for some of the fluctuations on the exports that has nothing to do with the dumping *per se*. Since macroeconomists generally regard exports as a function of external income and the exchange rate ($X = f(Y^*, \epsilon)$), this statistics can summarize both. With that in hands, it was proceeded by the construction of a data that captured the variation of exports in a given year.

[4] Ministério do Desenvolvimento, Indústria e Comércio

3.3.2 THE EVOLUTION OF BRAZILIAN EXPORTS

Before the model is estimated, it is interesting to check the data first. The Graph 6 shows the evolution of Brazilian exports, for cases where the country was cited and which finished with the application of definitive measures. One can notice that exports starts falling in year 0, when the process is initiated. Generally, the provisional measures start at year 0 or 1, which may account for the observed fall in those years, together with the discouragement generated by the sole fact of the investigation procedure. As the provisional measures start to fade away, or the industries get used with the duty imposed, there is a strong recovery in year 2, to levels previously observed, just before another deep fall in years 3 and 4, when the definitive measure is imposed. The imposition of the measure brings exports back to its lowest level.

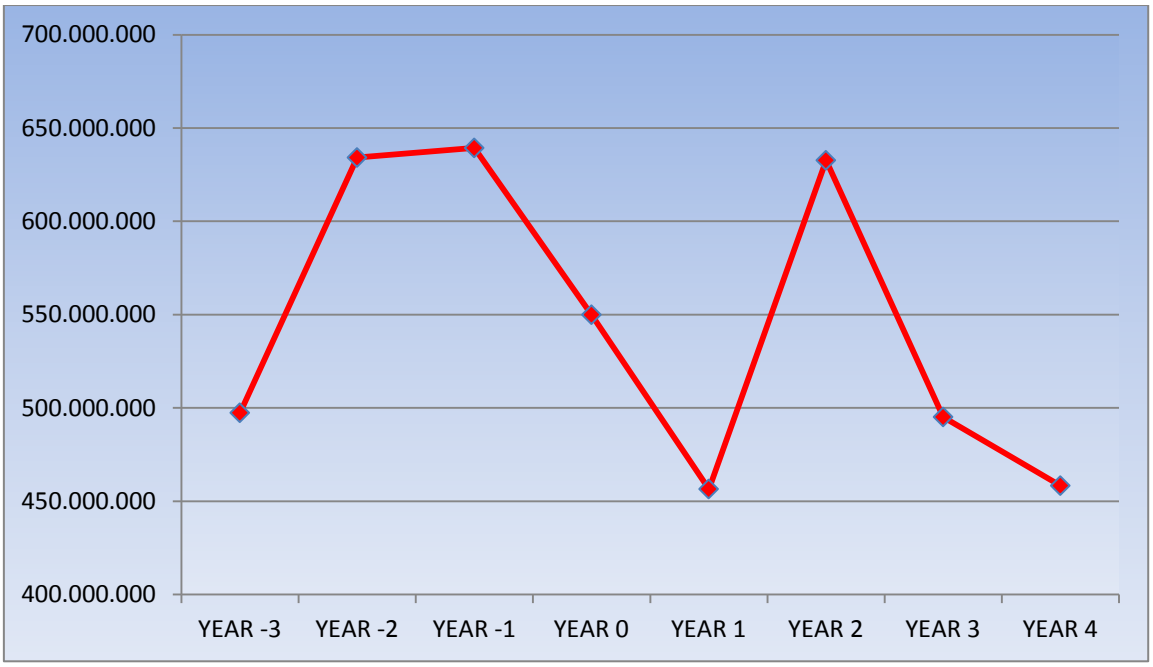

Figure 6 - EVOLUTION OF BRAZILIAN EXPORTS WHEN BRAZIL IS CITED (DEFINITIVE MEASURES, 1994 TO 2015, IN USD)

SOURCE: Global Antidumping Database and AliceWeb. Own elaboration.

One could also visualize the evolution of Brazilian exports when the country was cited in a process where there was not the application of definitive

measures. This is the case of provisional measures only, price agreements, and withdrawn petitions. The graph 7 shows this situation. It is clear that the exports' trajectory is different from the former situation, when there was the application of definitive measures. In this case, there is also a rigorous fall just after the beginning of the investigation and/or the imposition of the temporary measure. Nevertheless, differently from Graph 6, the recovery follows rightly after the fall, with a slight increase from year 1 to year 3, and a sharp increase in year 4, when the rejection of the application of final measures is crystallized.

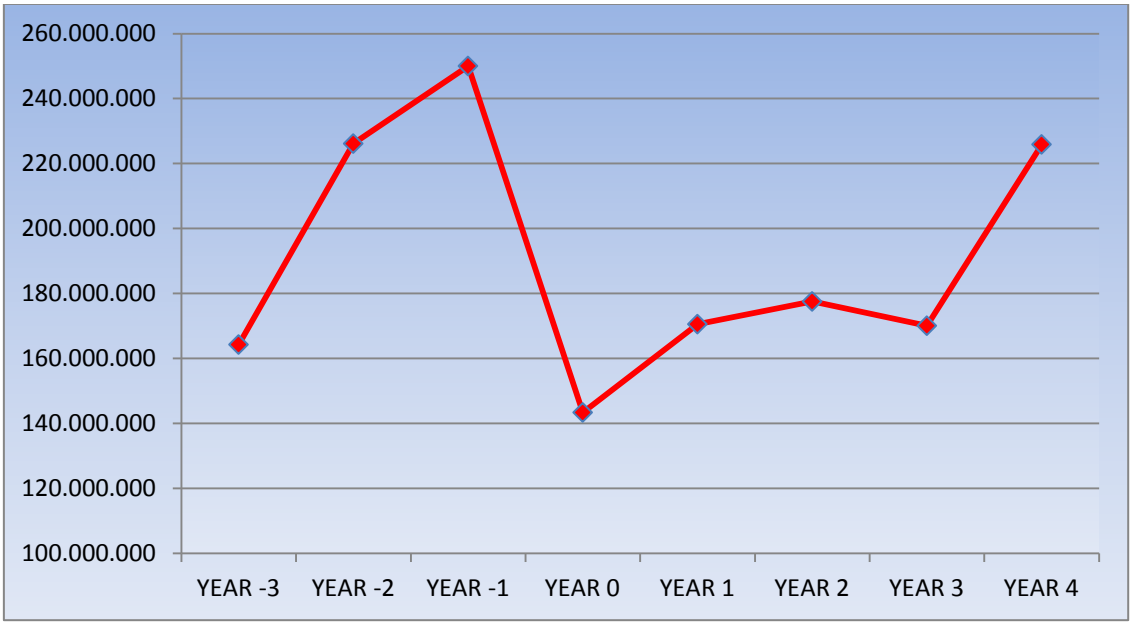

Figure 7 - EVOLUTION OF BRAZILIAN EXPORTS WHEN BRAZIL IS CITED (PROVISIONAL MEASURES, PRICE AGREEMENTS AND WITHDRAWN PETITIONS, 1994 to 2015, IN USD)

SOURCE: Global Antidumping Database and AliceWeb. Own elaboration.

It is also interesting to verify which the most affected sectors of the Brazilian economy were. This is done by means of separating the cases by its 2-digit Harmonized System sector classification. The graph 8 shows the number of cases which ended in definitive measures by its sector classification in the Harmonized System. One can clearly see the disproportionately presence of petitions against the sector of "Metals" (72 to 73), with 32 cases opened in the period considered, more than the rest of cases combined. In a distant second place, it is seen 6 cases in the sector "Plastic/Rubbers" (39 to 40). Four cases were opened in the sectors "Chemicals and Allied Industries" (28 to 38) and

"Machinery/Electrical" (84 to 85). In addition, there were 3 cases initiated in the sector "Textiles" (50 to 63), two cases in the sectors "Animal and Animal Products" (01 to 05) and "Foodstuffs" (16 to 24). One case happened in 3 sectors: "Mineral Products" (25 to 27), "Wood and Wood Products" (44 to 49) and "Stone/Glass" (68 to 71). In 6 of the Harmonized System sectors there was no case initiated against Brazilian exports, being those: "Vegetable Products", "Raw Hides, Skins, Leathers and Furs", "Footwear/Headgear", "Transportation", "Miscellaneous" and "Services".

The concentration of petitions in the "Metals" sector indicates that, as far as *antidumping* policies are concerned, this is the sector that most bother the foreign producer. It cannot be seen the same impetus against Brazilian exports in agricultural and food products, other important commodities Brazil export. This may be due to a historical protection against that market in the EU and USA via traditional trade protection. Alternatively, it may be due to less competitive prices.

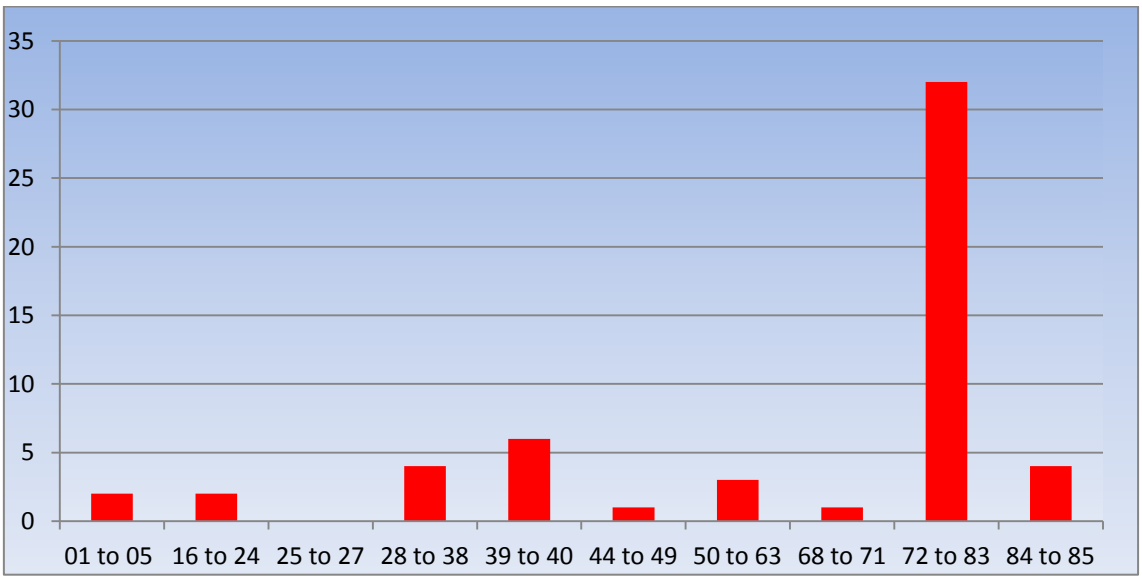

Figure 8 - NUMBER OF CASES THAT ENDED IN DEFINITIVE MEASURES BY ITS SECTOR IN THE HARMONIZED SYSTEM (1997 TO 2010)

SOURCE: Global Antidumping Database

The same exercise can be made for the cases which ended in the application of provisional measures. The Graph 9 shows the distribution of cases in this situation. As it happened for the definitive measures, the situation

is similar for provisional measures, with the “Metals” (72 to 83) sector being responsible for the biggest amount of cases initiated against Brazil, with 13 cases. The “Machinery/Electrical” (84 to 85) sector was responsible for 6 cases. Five cases were initiated against the “Wood and Wood Products” (44 to 49), which had none in cases with definitive measures. The remaining cases were: three in the “Textiles” (50 to 63), two in “Animal and Animal Products” (01 to 05), two in “Miscellaneous” (90 to 97), and 1 case in each the “Plastics/Rubber” (39 to 40) and “Transportation” (86 to 89). The sectors “Vegetable Products”, “Foodstuff”, “Mineral Products”, “Chemical and Allied Industries”, “Raw Hides, Skins, Leathers and Furs”, “Footwear/Headgear”, “Stone/Glass” and “Services” had no cases.

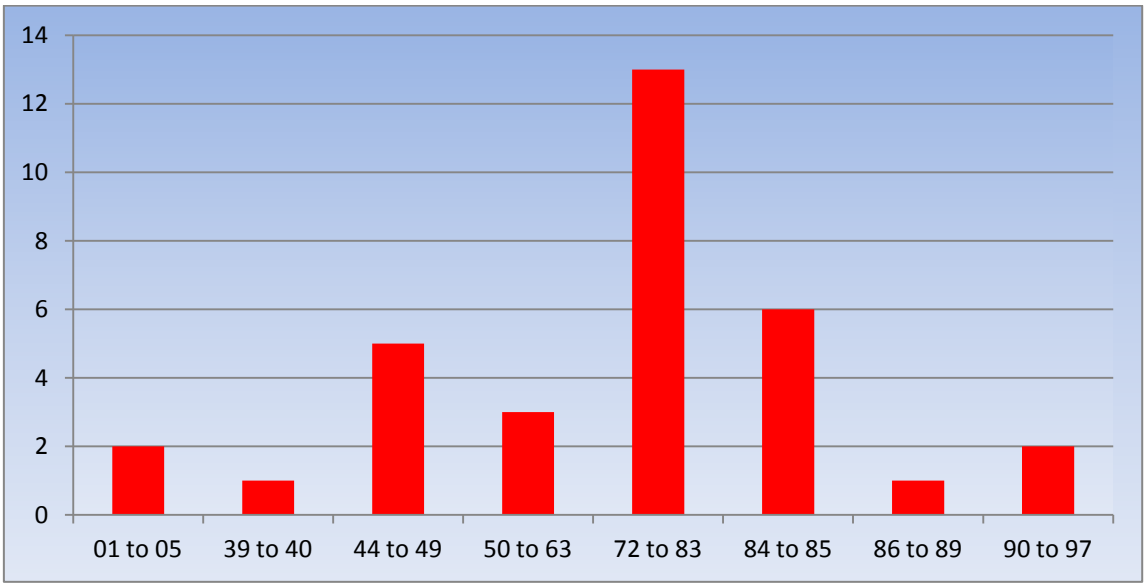

Figure 9 - NUMBER OF CASES THAT ENDED IN PROVISIONAL MEASURES BY ITS SECTOR IN THE HARMONIZED SYSTEM (1997 TO 2010)

SOURCE: Global Antidumping Database

After looking at the data covering the definitive and provisional measures for cases initiated against Brazil, now it is time to look at the cases where Brazil was not cited. The Graph 10 shows the evolution of Brazilian exports for cases where Brazil was not cited in the period studied, for definitive measures. It is clearly a different graph from the one in which Brazil was cited. There is no rough shift downwards when the process is initiated. If anything, there is a small slope upwards, which may suggest the existence of trade diversion.

As for the composition of petitions initiated by Argentina, the United States and the European Union against third parties in the period comprised by 2005 to 2010, it is possible to see, in Graph 11, that a somewhat similar pattern is found: most of the petitions were filed against products listed as “Metals” (72 to 83), with 24 observations in the period. The second most targeted products are in the sector “Machinery/Electrical” (84 to 85), with 17 observations. With 8 observations came the sector “Chemicals and Allied Industries” (28 to 38). “Transportation” (86 to 89) had 5 complaints. “Plastic/Rubbers” (39 to 40) and “Wood and Wood Products” (44 to 49) had 4 cases each. With 3 cases initiated, “Textiles” (50 to 63), “Stone/Glass” (68 to 71) and “Miscellaneous” (90 to 97). Also, there were 3 sectors with only one case registered in the period: “Foodstuffs” (16-24), “Raw Hides, Skins, Leathers and Furs” (41 to 43) and “Footwear/Headgear” (64 to 67). Four sectors had no cases, being they “Animal and Animal Products”, “Vegetable Products”, “Mineral Products” and “Services”.

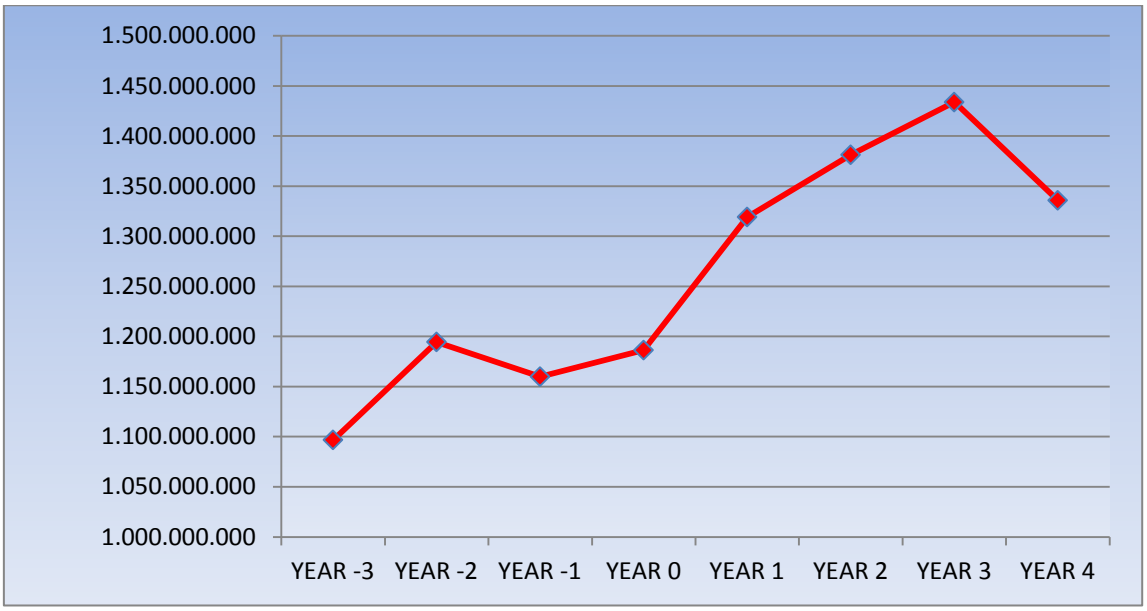

Figure 10 - EVOLUTION OF BRAZILIAN EXPORTS WHEN BRAZIL IS NOT CITED (DEFINITIVE MEASURES, IN USD)

SOURCE: Global Antidumping Database and AliceWeb. Own elaboration.

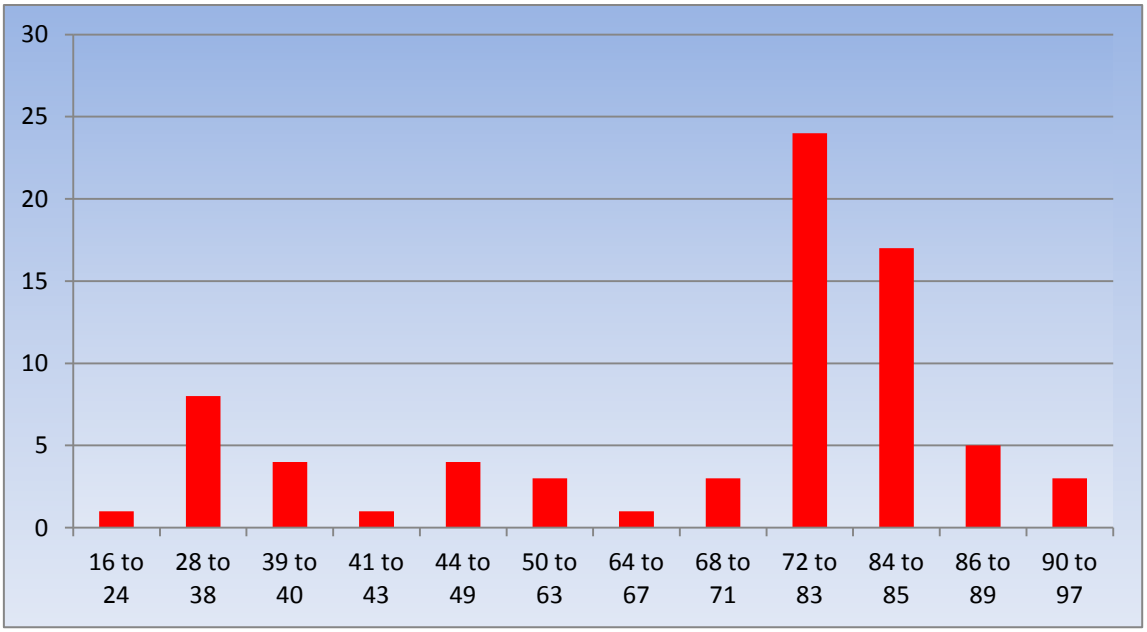

Figure 11 - NUMBER OF CASES THAT ENDED WITH DEFINITIVE MEASURES BY ITS SECTOR IN THE HARMONIZED SYSTEM WHEN BRAZIL WAS NOT CITED (2005 TO 2010)

SOURCE: Global Antidumping Database

The display of these data can give an overview on the problem at study, but it is still needed to run a regression with additional information to get a better picture of the situation. The addition of the variation of total exports to the complainer might help explain the fraction of the data that moves in tandem with total exports, and not because of antidumping petitions.

3.3.3 - THE MODELS

To estimate the impact of antidumping measures on Brazilian exports, when the country is cited or not cited, it is going to be used an equation inspired by Miranda (2003), which is by its turn inspired by Prusa (1999). The equation for the first model - which aims at capturing the effects of antidumping processes initiated against Brazilian exporters divided by two types of possible outcomes, i.e. the application of some kind of definitive measure; and the application of any kind of temporary measure or the decision to not apply any kind of measures - is as follows:

$$LEXP_{i_t} = \beta_1 LEXP_{i_{t-1}} + \beta_2\, DAD_{it_0} + \beta_3\, DAD_{it_1} + \beta_4\, DAD_{it_2} + \beta_5\, DAD_{it_3} + \beta_6\, DAD_{it_4} + \beta_7\, PAD_{it_0} + \beta_8\, PAD_{it_1} + \beta_9\, PAD_{it_2} + \beta_{10}\, PAD_{it_3} + \beta_{11} PAD_{it_4} + \beta_{12} VAR\_EXP\_CNT_{it} + u_{it} \quad \textbf{(MODEL 1)}$$

Where *LEXP* is the log of exports in the case *i* at the year *t*; $LEXP_{i_{t-1}}$ is the log of exports in the last period. *DADs* are the dummy variables for the definitive antidumping measure, also in the case *i* at the year *t; PADs* are the dummy variables for temporary antidumping measures for the case *i* at the year t; and *VAR_EXP_CNT* is the variation of total exports from year *t – 1* to *t*. Most coefficients for dummies are expected to be negative, at least for the definitive case, whereas the provisional cases may have more periods of an upward move in exports. The other variables are expected to be positive.

Given the appearance of too many cases against the “Metals” sector in the situation where the exports receive a definitive antidumping measure, it is also interesting to apply another model in order to see if the sector is more affected than the rest. It goes as follows:

$$LEXP_{i_t} = \beta_1 LEXP_{i_{t-1}} + \beta_2\, MET_{it_0} + \beta_3\, MET_{it_1} + \beta_4\, MET_{it_2} + \beta_5\, MET_{it_3} + \beta_6\, MET_{it_4} + \beta_7\, OTH_{it_0} + \beta_8\, OTH_{it_1} + \beta_9\, OTH_{it_2} + \beta_{10}\, OTH_{it_3} + \beta_{11} OTH_{it_4} + \beta_{12} VAR\_EXP\_CNT_{it} + u_{it} \quad \textbf{(MODEL 2)}$$

Where *METs* are the dummy variables to capture the effects in the “Metals” sector, and *OTHs* are the dummy variables for the other sectors. Other variables are the same as the last model. If the “Metals” sector is more affected than the others, this will show up as a bigger negative coefficient.

Last but not least, the third model will try to capture evidence of trade diversion, i.e., the cases which ended with the application of definitive measures where Brazil was not cited in the process. The model is like that:

$$LEXP_{i_t} = \beta_1 LEXP_{i_{t-1}} + \beta_2\, DAD_{it_0} + \beta_3\, DAD_{it_1} + \beta_4\, DAD_{it_2} + \beta_5\, DAD_{it_3} + \beta_6\, DAD_{it_4} + \beta_7\, VAR\_EXP\_CNT_{it} + u_{it} \quad \textbf{(MODEL 3)}$$

Where there are no dummy variables for preliminary measures. Coefficients are expected to be mainly positive, although some dummies can show up being slightly negative.

The method to be applied is the Ordinary Least Squares.

3.3.4 RESULTS AND DISCUSSIONS

The coefficient signals for model 1 (below) are roughly as expected. The variable *lexp1* is significant in all levels of significance and displays the expected sign, which is positive. The variable *dad1* is significant at 0.10 level of significance and also shows the expected sign, which is negative. The variable *dad2* and *dad3* do not appear significant at 0.10 level of significance, and the variable dad4 appear significant at 0.10 level of significance. As for the dummies that capture the effects of provisional measures, *pad1*, *pad2* and *pad3* did not showed significance at 0.10 level of significance, despite *pad1* being close to that. The only significant coefficient was *pad4*, which was significant at 0.05 level of significance and showed the expected signal. The variable var_exp_cnt appeared with the right signals and a relevant coefficient at any level of significance.

The adjusted R-Squared of the regression was 0.6508. The model confirmed the idea behind the more crude analysis in section 3.3.2, with all the expected signals.

The model shows that exports falls about 51% of its value in the first year, after the process started, relative to year 0, for those exports which was subject to definitive measures, with a significant coefficient. In addition, it is possible to say, with good confidence, that exports also contracts about 41% in the fourth year, relative to the third year, when generally the definitive measure is imposed. As for the cases that ended with provisional measures, it is possible to see that, unlike the situation for the definitive antidumping measures, exports tend to recover in the fourth year, relative to the third year, about 42% of its value, generally when the final measure had already been denied. It is also possible to see that exports are influenced by its past level, and also that

exports subject to investigation are positively related to the total export for the country in question.

Table 21 - ESTIMATES FOR MODEL 1 (DEPENDENT VARIABLE: LEXP, REGRESSION BOOTSTRAPPED 1000 REPS)

Variables	Coef.	Boot. Std. Err.	z	P > z	[95% conf. interval]	
LEXP(-1)	0.8941	0.0511	17.48	0.000	0.7939	0.9944
DAD1	- 0.5136	0.2714	- 1.89	0.058	- 1.0455	0.0184
DAD2	0.1347	0.2092	0.64	0.520	- 0.2755	0.5450
DAD3	- 0.2161	0.2037	- 1.06	0.289	- 0.6153	0.1832
DAD4	- 0.4114	0.2320	- 1.77	0.076	- 0.8662	0.0434
PAD1	- 0.4077	0.2699	- 1.51	0.131	- 0.9366	0.1213
PAD2	0.0863	0.1493	0.58	0.563	- 0.2064	0.3790
PAD3	- 0.2525	0.2421	- 1.04	0.297	- 0.7270	0.2221
PAD4	0.4222	0.1811	2.33	0.020	0.0671	0.7773
VAR_EXP_CNT	0.8488	0.1981	4.28	0.000	0.4605	1.2371
Const.	1.3084	0.7636	1.71	0.087	- 0.1881	2.8050

Observations	R-Squared	Adjusted R-Squared
450	0.6585	0.6508

SOURCE: Regressed on Stata12

As for model 2 (below), although estimates shows the somewhat expected coefficients for the variables, with most of the dummies being negative and showing the effects of the antidumping petitions, only the variables lexp1, met1 and var_exp_cnt appeared significant at the 0.05 level of significance. This and the coefficients may suggest that the “metal” sector suffers more than the other sectors, especially in crucial years, as the first one after the petition was installed, and the fourth one, when the application of the definitive measure was applied. The adjusted R-Square for this model was 0.6345.

It is possible to see that exports from the metals sector are disproportionately affected in year 1, relative to year 0, with reductions on exports on the order of magnitude of 82%. Comparing with the reductions seen in the first regression, of 51% for the cases that ended with definitive antidumping measures, it is clear that the “Metal” sector is disproportionately affected.

Table 22 - ESTIMATES FOR MODEL 2 (DEPENDENT VARIABLE: LEXP, REGRESSION BOOTSTRAPPED 1000 REPS)

Variables	Coef.	Boot. Std. Err.	z	P > z	[95% conf. interval]	
LEXP(-1)	0.8868	0.0772	11.48	0.000	0.7354	1.0382
MET1	- 0.8193	0.4118	- 1.99	0.047	- 1.6265	- 0.0122
MET2	- 0.0077	0.3230	- 0.02	0.981	- 0.6408	0.6254
MET3	- 0.0968	0.2985	- 0.32	0.746	- 0.6818	0.4883
MET4	- 0.3933	0.2580	- 1.52	0.127	- 0.8990	0.1124
OTH1	- 0.0086	0.1589	- 0.05	0.957	- 0.3200	0.3027
OTH2	0.2523	0.2472	1.02	0.307	- 0.2322	0.7368
OTH3	- 0.1550	0.2889	- 0.54	0.591	- 0.7212	0.4111
OTH4	- 0.2810	0.3970	- 0.71	0.479	- 1.0590	0.4970
VAR_EXP_CNT	0.6325	0.2280	2.77	0.006	0.1857	1.0794
Const.	1.4018	1.1465	1.22	0.221	- 0.8453	3.6489

Observations	R-Squared	Adjusted R-Squared
280	0.6476	0.6345

SOURCE: Regressed on Stata12

The last model attempts to capture the existence of trade diversion. The value for the omitted variable *dad4* is captured by the constant term. The coefficients for variables *lexp1*, *dad1* and *dad2* are all significant at 0.05 level of significance. It is possible to have a good level of confidence, then, that in years one and two after the beginning of the investigations, the Brazilian exports for the countries which started a petition against other parties appeared to grow in a significant fashion, suggesting the existence of trade diversion. The other variables did not appear significant at 0.10 level of significance, which makes the estimation of these parameters less trustworthy. The adjusted R-Squared for model three was 0.8173.

If anything, it is possible to suspect the possibility of trade diversion in years 1 and 2, since at year 1, relative to year 0, exports for countries cited in petitions grew 43%, and for year 3, relative to year 2, it grew about 47%. This suggests that Brazil might have benefited from those measures, at least in years after the imposition of the provisional measure.

Table 23 - ESTIMATES FOR MODEL 3 (DEPENDENT VARIABLE: LEXP, REGRESSION BOOTSTRAPPED 1000 REPS)

Variables	Coef.	Boot. Std. Err.	z	P > z	[95% conf. interval]	
LEXP(-1)	0.9661	0.0341	28.31	0.000	0.8993	1.0331
DAD0	0.2827	0.2112	1.34	0.181	- 0.1312	0.6966
DAD1	0.4300	0.2185	1.97	0.049	0.0019	0.8583
DAD2	0.4666	0.2190	2.13	0.033	0.0373	0.8958
DAD3	0.2085	0.2249	0.93	0.354	- 0.2322	0.6493
DAD4	(omitted)					
VAR_EXP_CNT	0.0551	0.3183	0.17	0.863	- 0.5689	0.6790
Const.	0.1482	0.6078	0.24	0.807	- 1.0430	1.3395

Observations	R-Squared	Adjusted R-Squared
370	0.8203	0.8173

SOURCE: Regressed on Stata12

To end our discussion, it is important to note that results seem to be in accordance with the empirical evidence generated by the literature, at least for the first model, when it is clear that exports are negatively affected by the application of provisional measures, both in the cases that ended with definitive measures and those that ended with just this first provisional measures. In addition, it is also agreed in the literature that exports fall again after the application of definitive measures, but recover for those situations where there is no definitive measures.

Apart from that, the evidence for trade diversion is generally inconclusive in the literature. This study suggests that Brazil may have benefited at least in the two intermediaries years studied. The fact that countries may be affected, on the one hand, by the application of antidumping measures against them, but that they can also benefit from situations when they are not cited in the process, can suggest that the use of the antidumping mechanism is not effective, and thus countries should discuss more about the implications of the widespread use of such instrument.

4 CONCLUSIONS

This dissertation generated results for the two essays considered. Those two essays contemplated a welfare analysis for the Brazilian automobile industry during the Collor/Franco term, from January/1991 to July/1994 and an analysis of the impact of antidumping policies on Brazilian exports.

As already discussed, the Brazilian international trade is a vast topic, with still much room for research. At the introduction of the welfare essay, a table showed how Brazil remains a much-closed economy in international comparisons. As noted in the introduction to the dissertation, there is an historical explanation of why the country chose to close the economy, which is related to the chosen method of industrialization by import substitution. Having established so many industries in a successful industrialization process, the justifications for special protection lose its basis as time passes. The theory that assumes the necessity of protection for the infant industry does not contemplate well grown industries, such as the automobile industry. Nonetheless, the sector remains protected in the 21st century.

As seen in section 2.2, there are times when many variables conflate in a vector pointing toward liberalization. During the Collor and Franco years, the observed tariff rate for the import of automobiles fell from a high point of 85% in 1990. This fall generated welfare gains for the conjunction of agents involved in the process. The sum of consumers and producers welfare gains amounted to BRL 21.442 billion from January/1991 to July/1994, and including the government, the total amount is up to BRL 61.795 billion. In addition, it was calculated how much agents could have gained if the tariffs had fallen to zero, instead of stabilizing halfway. The total welfare gain estimated for consumer and producers would have been of BRL 191.556 billion and of BRL 137.255 billion (the latter if the government is considered altogether). The government revenue raised in the first estimates because the reduction of tariffs made possible for Brazilians to start importing various automobiles, hence creating an opportunity for the State to collect revenue. In the estimates for the situation when tariffs fall to zero, the revenue collected by the government actually falls, since the zero tariff rate generates no revenue.

In addition to the discussions about the welfare gains in the period, this study also compared the total gains with the size of the market for automobiles in Brazil. The magnitudes of welfare gains appeared to be large in comparison to the size of the automobile market in the period, rendering an argument for reducing the amount of protection the industry still have in the country.

As for the second essay, it is important to understand how the use of antidumping policies by foreign parties may affect the Brazilian exports in the mentioned sectors. As noted in the introduction to the essay, the reduction on the use of traditional trade instruments gave rise to new forms of protection, being the antidumping measure an important new one. The Brazilian participation in the antidumping world as a petitioner more than doubled in the measure of antidumping/year in the period of 2002-2010 in relation to that of 1987-2000, proving that Brazil is growing on its usage as most of the emerging markets.

The country has also been the target of many complaints since the rise of this trade policy. The study attempted to capture how those complaints affected Brazilian exports. Three models attempted to capture these effects. The first one showed the effects of antidumping policy on Brazilian exports for the cases that ended with the application of definitive measures and provisional ones. The application of definitive measures unequivocally depresses the exports in the first and fourth year after the process was initiated. In the first one, the exports are under the effect of the investigation effect and/or the application of the provisional measures; and in the fourth year, the exports depress again after the application of the definitive measure. In the interim, on years two and three, exports appear to first grow and then start to fall. As for the cases that ended without the application of definitive measures, the results suggest the existence of an initial fall, with the application of the provisional measure. Between years two and three it appears to swing just like the case of the application of definitive measures, but then it unequivocally rises at year four, since there is no application of definitive measures.

In addition to those estimates, the study also tested the effects on the “metals” sector, for cases that ended in definitive measures. This sector received the overwhelming majority of complaints. The estimates suggest that this sector suffers a bigger fall in exports than other sectors. And finally yet

importantly, the third model estimated tried to capture evidence of trade diversion for cases initiated against third parties. The estimates suggest a possible existence of trade diversion, especially in years two and three after the case was initiated, when there is a considerable rise on Brazilian exports.

This study hopes to contribute to a better formulation of trade policy by showing evidence of big gains in welfare for Brazilian agents when the country opted to divert from traditional protectionist policies. In addition, an understanding of the effects of antidumping policy may help policymakers worldwide to better understand its effects, which is important given the rise of the mechanism utilization.

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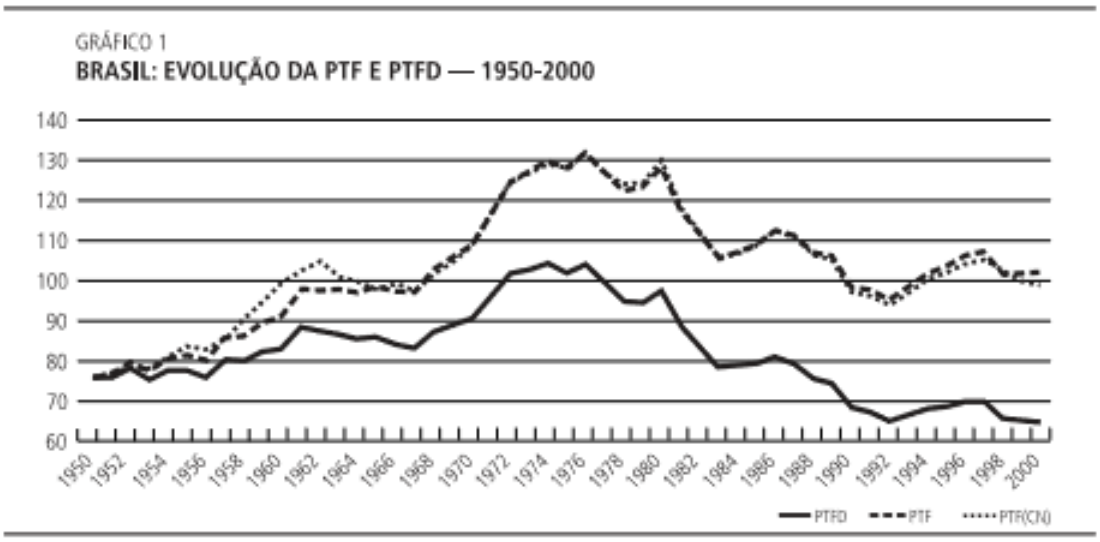
ATTACHED GRAPHS AND TABLES

ATTACHED 1 – EVOLUTION OF BRAZILIAN TFP



Source: Gomes, Pessôa and Velloso (2003, pg. 405)

ATTACHED 2 – PETITIONS INITIATED BY IMPORT COUNTRIES

Table 1: Initiations By Importing Country 1995-2006

Importing Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Totals	%
India	6	21	13	28	64	41	79	81	46	21	28	29	457	15
United States	14	22	15	36	47	47	75	35	37	26	12	7	373	12
European Communities	33	25	41	22	65	32	28	20	7	30	25	34	362	12
Argentina	27	22	14	8	23	45	26	14	1	12	12	15	219	7
South Africa	16	33	23	41	16	21	6	4	8	6	23	3	200	7
Australia	5	17	42	13	24	15	23	16	8	9	7	10	189	6
Canada	11	5	14	8	18	21	25	5	15	11	1	8	142	5
Brazil	5	18	11	18	16	11	17	8	4	8	6	12	134	4
China, P.R.	0	0	0	0	0	6	14	30	22	27	24	10	133	4
Turkey	0	0	4	1	8	7	15	18	11	25	12	8	109	4
Mexico	4	4	6	12	12	6	5	10	14	6	7	6	92	3
Korea, Rep. of	4	13	15	3	6	2	4	9	18	3	4	7	88	3
Indonesia	0	11	5	8	8	3	4	4	12	5	0	5	65	2
Peru	2	8	2	3	8	1	8	13	4	7	4	3	63	2
Egypt	0	0	7	14	5	1	7	3	1	0	12	8	58	2
New Zealand	10	4	5	1	4	9	1	2	5	5	0	1	47	2

SOURCE: Yilmaz (2007)