EXTENSIVE and INTENSIVE MARGINS of U.S. AUTO INDUSTRY TRADE

Kemal TÜRKCAN[*] and Yushi YOSHIDA[†]

September 2010

ABSRACT

Recent empirical research in international trade emphasized the important role of product variety for understanding overall patterns of trade. The objective of this paper is to investigate how the extensive and intensive margins of trade contribute the variation in intra-industry (IIT) of the US auto-industry for the period 1996 to 2008, using detailed bilateral US trade statistics with over 200 countries. In the second part of the paper, we formally investigate two hypotheses with regard to determinants of IIT in the US auto-industry. The first is that an expansion of exports to new industries, measured as extensive margin increases IIT of the US for auto-parts industry and decreases IIT of the US for motor vehicle industry, and the second is that an increase in intensity of exports in existing industries, measured as intensive margin does not affect IIT of the US motor vehicle industry and auto-parts industry. Results suggest that the effect of extensive margins on the motor vehicle industry seems to be negatively correlated with the IIT, whereas it is positively correlated with the IIT. On contrary to our hypothesis, intensive margins are found to have positive effects on the IIT for both industries.

Key words: Export variety; Export margins; Intra-industry trade; the US auto-industry
JEL classification: F-14, F-15.

[*]Kemal Türkcan, Akdeniz University, Department of Economics, Dumlupinar Bulvari Kampus, 07058, Antalya, Turkey; Tel: (242)-3106427; Fax: 242-2274454; Email: kturkcan@akdeniz.edu.tr.
[†] Yushi Yoshida, Kyushu Sangyo University, Faculty of Economics, 2-3-1 Matsukadai, Higashi-ku, Fukuoka, 813-8503 Japan; Tel: 81-92-6735220; Email: yushi@ip.kyusan-u.ac.jp.

1. Introduction

The global automobile industry has been undergoing significant structural transformation in recent years.[1] First, automakers in the US and Europe, such as General Motors (GM), Ford, Toyota, Honda, Volkswagen, Audi, and Daimler Chrysler have outsourced an increasing proportion of automotive production to developing countries and emerging economies in order to reduce production costs through FDI. By outsourcing, automakers buy parts from outside suppliers rather than producing them within their own organization. Hence, reduced vertical integration allows auto manufacturers to buy parts from the best suppliers, a situation that typically results in lower unit costs. Another reason for reduction in the number of parts produced within the boundaries of the company is an attempt to benefit from economies of scale.

Second, most of the giant automotive manufacturers have also recently merged with or acquired other companies with the intention of gaining access to markets where they did not previously have a significant presence, or to avoid bankruptcy as the world automobile market contracted during the financial crisis in 2009. The merger between the Renault Corporation and Nissan Motors, and the acquisitions of Land Rover and Jaguar by India's Tata Motors are just two examples. In further moves of this nature, Chrysler has now formed an alliance with Fiat, with the Italian firm taking an initial 20% stake in the US carmaker, while GM initially offered to sell 55% of its European subsidiaries Opel and Vauxhall to Magna International in 2009. Volkswagen AG and Porsche AG have agreed in principle to the creation of an integrated car manufacturing group.

Finally, another trend is the increasing use of entire sub-assemblies ('modules') rather than individual components. For instance, rather than supplying only the fuel tank for a given

[1] For a more complete analysis of trends in the auto industry, see Sadler (1999), Diehl (2001), Corswant and Fredriksson (2002), Lall et al. (2004), and Cooney and Yacobucci (2005).

model, a tier 1 supplier may now supply the entire fuel supply system,[2] and manufacturers have also started to require their tier 1 suppliers to provide modular components (standard) that can be used on several vehicle models worldwide. By using modules or preassembled units for several vehicle models, automakers are able to cut production costs and reduce their in-house parts operations.

These global trends that have shaped and are still shaping the US auto-industry over the last two decades also have a major impact on the international pattern of the US auto-industry trade.[3] Recent empirical findings suggest that IIT in the US auto-industry trade has been increasing and dominated by vertical IIT.[3] Restructuring and change that have characterized the auto-industry in the past two decades is one of the most important factors behind this rapid expansion of intra-industry in the US auto-industry.

Empirical studies on intra-industry trade abound the literature.[4] Our approach is distinguished from previous analyses of intra-industry trade that focus on the determinants of intra-industry trade by estimating a Grubel-Lloyd-type index on the GDP of countries and the difference in GDP per capita along with other explanatory variables, as in Greenaway et al. (1994, 1995). There is, however, another important development in the empirical trade literature. Based on the concept developed in Feenstra (1994), Hummels and Klenow (2005) proposed a measure to capture the diversity of products a country exports. According to Hummels and Klenow, an increase in export value could be the result of three factors: extensive margin, intensive margin, and higher quality goods.[5] Extensive margin is an increase in the number of firms or products, wheras the intensive margin is a rise in the value

[2] The auto industry has organized itself into several tiers. Tier 1 sells directly to automakers or original equipment manufacturers (OEM), which assemble the final product. Tier 2 supply parts to tier 1, and those that sell parts to tier 2 are known as tier 3, etc. moving down the value chain. The term "tier" describes products rather than an entire firm, so that some firms may be tier 1 on one product and tier 2 on another.
[3] See Montout et al. (2001), Montout et al. (2002), and Jones et al. (2002).
[4] Some of these studies on IIT include Balassa (1986), Balassa and Bauwens (1987) Helpman (1987), Bergstrand (1983, 1990), Hummels and Levinsohn (1995), Tharakan and Kerstens (1995), Greenaway et al. (1994, 1995), Torstensson (1996), Byun and Lee (2005), and Thorpe and Zhang (2005).
[5] See also Broda and Weinstein (2006) and Feenstra and Kee (2004).

of trade by existing firms or products. The effects of extensive margins and intensive margins on the intra-industry trade are very different. From a empirical point of view, the answer is needed for determining the extent and sign of effects of export margins on the intra-industry trade. In an attempt toward an answer, following Yoshida (2008), we introduced the extensive margin and intensive margin as alternative determinants of intra-industry trade. Two different literatures of empirical investigation of international trade are thus merged in this paper. As there has been no previous study which has investigated the impact of export margins on the intra-industry trade of the US auto-industry, this paper seeks to fill the void.

Several empirical studies have analyzed the determinants of IIT in motor vehicle and auto-parts industry (Becuwe and Mathieu, 1992; Montout et al., 2001, 2002; Ito and Umemoto, 2004; Umemoto, 2005; Lefilleur, 2008; Leitao et al., 2009, Turkcan and Ates, 2008; Türkcan, 2010). However, none of these papers explicitly investigated the impact of export margins on the intra-industry trade of the US auto-industry. This paper seeks to fill the void.

The US auto-industry is selected for several reasons. First of all, the US is one of the biggest players in auto-industry along with Japan and Germany and the US is the largest single national market in auto-industry. Second, the auto-industry is one of the most important manufacturing sectors in the US economy. The auto-industry represents around 10.8 % of the total gross output of US manufacturing in 2003. Furthermore, the US auto-industry has considerable share on the US trade statistics. The share of the industry in the US total exports and exports amounted to almost 9 and 10 % in 2003, respectively.[69] Finally, there has been a major structural change in the US auto-industry brought about by several developments over the past 20 years, which may have an impact on the patterns of the US auto-industry trade.

[6] For a more detailed picture of the US auto-industry, see Cooney and Yacobucci (2005).

Therefore, given its crucial importance in the global auto-industry and in the US economy, the US auto-industry has become an appropriate case to study the determinants of IIT.

The objective of the present paper is to examine the current trade patterns of the US auto-industry trade with its over 200 trading partner during the period 1996-2008, particularly by focusing on intra-industry trade and export margins of trade. In particular, using finely disaggregated trade data, the most refined possible, this paper first calculate the Grubel-Lloyd intra-industry index and the Hummels-Klenow export margins for three auto-industry subgroups (auto-industry products, motor vehicle products, and auto-parts). Subsequently, we will investigate the influence of various country-specific factors and export margins to explain the evolution and structure of the IIT in the US auto-industry. Findings from the present study, therefore, provides a new insight into the impact of export margins on the intra-industry trade.

The remainder of this paper is organized as follows. The next section introduces the basic concepts of the Grubel-Lloyd intra-industry index and the Hummels-Klenow export margins. Section 3 provides a brief explanation of the developments in the US auto-industry and presents a discussion of the estimated IIT indices and export margins. Empirical model, testable hypotheses, and estimation methodology are discussed in Section 4. The regression results of the empirical model are given in Section 5. The final section draws some concluding remarks.

2. The Measurement of Intra-Industry Trade and Export Variety

In this paper, we empirically examine the bilateral trade development between the USA and its trading partners during the period 1996-2008, particularly by focusing on intra-industry trade and export margins of trade. In this section, we describe these two key concepts and the indices used in the empirical section of this paper.

2.1 Methodology of Measuring Intra-Industry Trade

Intra-industry trade, as is well documented, constitutes a large portion of international trade. IIT is defined as the simultaneous export and import of products which belong to the same statistical product category. Various ways of calculating intra-industry trade have been proposed in the empirical literature, including the Balassa Index, the Grubel-Lloyd (G-L) index, the Aquino index. The most widely used method for computing the IIT is developed by Grubel and Lloyd (1971). However, beside aggregation bias, the traditional G-L index has one major problem often cited in the empirical literature. The unadjusted G-L index is negatively correlated with a large overall trade imbalance. With national trade balances, the level of IIT in a country will be clearly underestimated. To avoid this problem, Grubel and Lloyd (1975) proposed another method to adjust the index by using the relative size of exports and imports of a particular good within an industry as weights.

Given the problems of unadjusted G-L index, this paper computes the extent of intra-industry trade between the US and its trading partner by employing the adjusted G-L index, defined as:

$$IIT_{jkt} = \frac{\sum_{i=1}^{n}(X_{ijkt} + M_{ijkt}) - \sum_{i=1}^{n}| X_{ijkt} - M_{ijkt} |}{\sum_{i=1}^{n}(X_{ijkt} + M_{ijkt})} \tag{1}$$

where X_{ijkt} and M_{ijkt} are the US exports and imports of product i of industry j with country k at time t. Hence, IIT_{jkt} computes the export and import flows with country k in industry j, adjusted or weighted according to the relative share of the trade flows in the i products included in industry j. The G-L index is equal to one if all trade is IIT and is equal to zero if all trade is inter-industry trade.

The first step to compute the G-L index is to select auto-industry products (motor vehicle products and auto-parts) in the bilateral trade data. Bilateral trade flows used in this

paper is classified at the 6-digit level of Harmonized Tariff Schedule (HTS), which are used to construct the G-L index for each trading partner. In this study, 115 items are considered as automotive products from the six-digit level of HS. In addition, the automotive products are classified into two subgroups: motor vehicle products and auto-parts. In the end, 17 items are considered as motor vehicle products and 98 items are selected as auto parts from the 6-digit product level of HTS.[7]

Once the auto-industry products have been selected for our study, the G-L index between the US and its trading partner k is calculated using the equation (1) at a 6-digit product level of HTS items, and thereafter summed over all 6-digit level compromising a particular industry.

2.2 Hummels-Klenow Indices for Export Margins

There is, however, another important development in the empirical trade literature. Based on the concept developed in Feenstra (1994), Hummels and Klenow (2005) proposed a measure to capture the diversity of products a country exports. They decomposed the share of a country's exports into extensive margin and intensive margin[8]. Extensive margin measures the degree of variety the number of different types of products, while intensive margin measures the degree of export intensity for a given product.

Following Hummels and Klenow (2005), we construct export margin indices for the US exports for the intensive margin and the extensive margin. In order to construct these indices, reference economy m needs to be defined. For the case of Feenstra (1994), the reference economy is the same economy as in the previous period, and the world economy is chosen for cross-country analysis in Hummels and Klenow (2005). Our reference economy m

[7] Following Klier et al. (2006), we employ the list provided by the Office of Aerospace and Automotive Industries' Automotive Team, part of the U.S. Department of Commerce's International Trade Administration in order to select the motor vehicle products and auto parts from the trade data. That team's definition of motor vehicle products and auto parts can be found at http//www.ita.doc.gov/td/auto.html.

[8] See also Broda and Weinstein (2006) and Feenstra and Kee (2004).

is the US as a nation. We denote the value of export product i of industry j from the US to country k as X_{ijkt}, as in the Grubel-Lloyd index.

The extensive margin between the US and its trading partner k in year t is:

$$EM_{jkt} = \frac{\sum_{i \in I_{kt}} X_{mijkt}}{\sum_{i \in I} X_{mijkt}}; \tag{2}$$

where I_{kt} is the set of observable categories in which the US has positive exports to country k in year t; i.e., $X_{ijkt} > 0$. I is the set of all product categories. Extensive margin is the ratio of the US exports for the set of products in which the US has positive exports to the US total national exports. EM_{jkt} is positive and can be above 0 and below 1.

The bilateral intensive margin measures exports from the US to the importer k relative to total exports to the importer in those products in which the US exports to the importer in a given a year. The intensive margin is defined as

$$IM_{jkt} = \frac{\sum_{i \in I_{kt}} X_{ijkt}}{\sum_{i \in I_{kt}} X_{mijkt}}. \tag{3}$$

IM_{jkt} is also between 0 and 1. Notice that the numerator of EM_{jkt} is equal to the denominator of the IM_{jkt}.

As defined by Hummels and Klenow (2005), the overall share of the US exports to country k in a given year t in US total auto exports can be obtained by the product of extensive margin and intensive margin:

$$OT_{jkt} = EM_{jkt} * IM_{jkt} = \frac{\sum_{i \in I_{kt}} X_{ijkt}}{\sum_{i \in I} X_{mijkt}} \tag{4}$$

3. Developments in the US Auto-Industry Trade

In this section we provide an overview of trade between the US and its over 200 trading partners over the last two decades. We further examine trade between the US and its trading partners by investigating the intra-industry measure and export margins.

3.1 Overview of International Trade of the US with World

Global trends that have shaped and are still affecting the US auto-industry over the last two decades also have major impact on the pattern of the US auto-industry trade. Figure 1 presents auto-industry trade with world for the period of 1996-2008. The nominal value of both auto-industry exports and imports almost doubled between 1996 and 2008 (Figure 1). The auto-industry trade deficit has grown from about $ 52 billion in 1996 to $ 100 billion in 2008, despite high level of inward investment by foreign based manufacturers to built vehicles at transplant assembly facilities.[9] As seen in Figure 2, during the last two decades the US was a large net importer of motor vehicle products. Both nominal values of motor vehicle exports and imports have increased since 1996. However, the increase in imports was less pronounced especially in recent years, which reduce the motor vehicle deficit in the US. In addition, the growth of the auto-industry deficit was mainly due to rise in the auto-parts imports relative to auto-parts exports in recent years (See Figure 3).

The trading partners' share in the US auto exports are shown in Table 4. The geographical composition of the US auto exports reveals several important empirical facts. First, it can be easily seen that a significant portion of the US auto-industry trade, motor vehicles trade and auto-parts trade occurred with NAFTA members, namely Canada and Mexico due to operations of the Big Three in those two countries. Table 4 shows that Canada's share in the US auto exports are the highest with 43 %, whereas Mexico's share is the secon with 15 % in 2008. However, Canada, a very important trading partner of the US

[9] However, due to downturn in auto-industry in 2008 and 2009, some assembly plants planned by foreign firms put into hold. For example, Toyota Motor delayed the start of production at its plant in Blue Springs, Mississippi. Toyota will build the assembly plant but won't install equipment.

has been losing its position to Mexico in recent years, as seen Table 4, especially in auto-parts. In 2008, the US major export destinations in the auto-industry outside the NAFTA area were Germany (8%), Saudi Arabia (3%), United Arab Emirates (2.2%), Japan (1.8%), the United Kingdom (1.8%), and China (1.5%).

When motor vehicle products trade examined, it can be seen that exports from the US to NAFTA accounted for around 46 % of total motor vehicle imports. In this category, top five export destinations were Canada (38), Germany (14%), Mexico (8%), Saudi Arabia (5%), and United Arab Emirates (4%) in 2008 as seen in Table 4. In export composition of the US in auto-parts, two countries, Canada and Mexico were the main receivers of US auto-parts exports in 2008. During 2008, Canada received approximately 48 % and Mexico received 24 % of the US auto-parts exports (See Table 4). Canada and Mexico play a dominant role in US auto-parts exports because final assembly plants in these countries are major markets for original equipment parts made in the US. These exported parts are used for production of vehicles destined for return to the US market. In the case of auto-parts exports, other important trade partners of the US besides the NAFTA countries were Germany (2.9 %), Japan (2.6%), the United Kingdom (1.7%), and China (1.5%) .

3.2 Intra-Industry Trade between the US and World

Using the approach outlined in the previous section, Table 5 presents measures of IIT for each product groupings between the US and its trading partners for the period 1996 and 2008. At the more aggregated level, results are also presented in Figure 4 through 9 by regional integration and income groups using the categorization drawn up by the World Bank.[10]

Three points are worth noting. First, the US auto-industry exhibits a substantial level of inter-industry trade with around 95 % share of total trade according to the G-L index.[11]

[10] Table 2 lists core/periphery categorizations of countries used in the analysis.

[11] Similarly, Ando (2006) provided empirical evidence that auto-industry trade in East Asia is mainly one-way trade due to import substituting policies in these developing countries, although vertical IIT became important for auto-parts in recent years. On the other hand, Montout et al. (2002) demonstrated the importance of IIT in

Second, IIT is higher in auto-parts trade compare with motor vehicle trade (See Figure 5 and 6). Figure 6 suggests that the share of intra-industry trade increased from around 6 % in 1996 to 8 % in 2008. This might be due to rising importance of vertical international production sharing in the US auto-parts industry (See Turkcan and Ates, 2008). Finally, the results reported in Figure 7 indicate that IIT in auto-industry tends to be high among countries at similar stage of development. IIT for the high income countries was 9 % of their total trade in 2008, compared with 1 % of the low income countries. On other hand, the US increasingly carries more IIT in auto-parts with countries that are different in terms of incomes in recent years.

The nature and dynamics of IIT in the US auto-industry, motor vehicle products and auto-parts is further studied for each trading partner over the same period. Overall, two important findings emerge from the calculations of IIT in the US auto-industry. Our first finding is that there are wide variations of IIT indices across partner countries (see Table 5). As shown in Table 5, in 2008, it is found that Canada has the highest values of IIT in auto-industry, 61 %, followed by Mexico, Honduras, India, Brazil, the United Kingdom, and Germany. On the other hand, Table 5 reveals that highest measure of IIT in motor vehicle products is for again Canada (58 % in 2008). Mexico, Germany, Finland, Belgium, and the United Kingdom are other important partner countries with a high degree of IIT in motor vehicle products. With regards to IIT in auto-parts in 2008, Canada again has the highest degree of IIT (64 %), but there are other partner countries with rather high degrees of IIT, such as the United Kingdom, Mexico, Austria, Honduras, France, and Poland. The high IIT in

---

NAFTA's auto-parts trade, which represents approximately 70 % of total trade in the 1990s. Jones et al. (2002) also found that the degree of IIT between the USA and Mexico in auto-industry as a whole appears to exhibit substantial level of IIT (61 % in 1999). This result might be due to the fact that in auto-industry production sharing is more constrained than some other sectors such as electronic sector. Lall et al. (2004) state that while auto-industry has separable stages of production and parts with different scale, skill and technological needs whose production can be located in different countries, many components are heavy and bulky thus making their processing suitable for relocation in closer areas rather than in distant areas.

each product groupings with NAFTA countries can be explained by the regional integration and by geographic proximity. Mexico has had a rapid increase in IIT since 1996 due to strengthened trade links with the US after the implementation of NAFTA in 1994. The elimination of trade barriers and low labor costs has led to maquiloradas which are located close to the US border and mainly does assembly and re-export of products. Foreign direct investment by the global auto manufacturers might also contributed to an increase in IIT between the US and members of NAFTA. This result indicates the significance of regional integration on the intensity of IIT in the US auto-industry trade. These findings are in line with Montout et al. (2002)'s results.

3.3 Extensive Margins and Intensive margins of the US Auto-Industry

Following Yoshida (2008), we constructed extensive and intensive margins of the US auto-industry for the sample period using the equations (2) and (3). We begin by providing summary statistics about the extensive margins for each economic integration and income groups in Figure 10 through 15. There are a number of interesting results. First of all, the extensive margin of the US auto-industry with the world has increased during the sample period for each product groupings (See Figure 10 through 12). This suggests that countries still have plenty of room to expand their extensive margins. In contrast, the US and NAFTA have experienced almost no gains in each product groupings. One possible explanation is that the US and NAFTA have already established nearly all export relationships and thus had little room for gain. In addition, the European Union (EU) experience the largest gains in the extensive margin.

In Figure 13 through 15, we graph the evaluation of the extensive margins for four different income groups. As seen, the extensive margins in each product groupings tends to be high among countries that are similar in terms of income. In constrast, low income groups' extensive margins are substantially lower than the other income groups. Results further

indicate that upper-middle income countries has considerably increased its export relationships with the US during the sample period, especially in auto-parts, reflecting trade as a result of back-and-fort transactions in vertically fragmented production process.

Changes in the intensive margin during the sample period for each economic integration are graphed in Figure 16 through 18. An inspection of the Figure 16 through 18 reveals that the level of the intensive margins stay stable during the sample period. From the figure, it is also seen that the intensive margin is relatively more important for NAFTA than other economic regions. Moreover, the level of intensive margins in auto-parts is higher compare with motor vehicle products. Finally, countries with higher GDP do export higher quantities per product category (See Figure 19 through 21).

It is noteworthy that the comparison of these figures with the extensive margins imples that selling the same products more intensively has been less important in the US auto-exports. In other words, the extensive margin is important for exporting success and should play an important role in explaining the US auto-industry export growth. Therefore, our results clarify that the extensive margin has a large impact on the US auto-industry exports, while the intesive margin has little or no impact on exports.[12]

4. Empirical Model, the Determinants of Intra-Industry Trade, and Estimation

4.1 Empirical Model

Using annual data from 1996-2008, the following estimating equation is proposed to explain the determinants of IIT in bilateral auto-industry trade between the US and its over 200 hundred trading partners:

$$y_{jkt} = \alpha_k + \mu_t + \beta_1 GDP\_USA_t + \beta_2 GDP\_PARTNER_{kt} + \beta_3 DGDPPC_{kt} + \beta_4 EM_{kt} + \beta_5 IM_{kt} + \beta_6 DIST_k + \varepsilon_{kt} \quad (5)$$

[12] Our results confirm the findings Kehoe and Ruhl (2009) who find the majority of the growth in the US exports is due to the extensive margin rather than the intensive margin. In contrast, Besedes and Prusa (2007) document small changes in the US extensive margin and imply that the intensive margin is the dominant force in the growth of export.

where y_{jkt} stands for IIT for each of the product groupings (total auto-industry, motor vehicle products, and auto-parts) between the US and its trading partner country k at time t, GDP_USA_t represents the GDP of the US at time t, $GDP\_PARTNER_{kt}$ denotes the GDP of the US trading partner k at time t, and $DGDPPC_{kt}$ indicates the absolute difference in GDP and per capita GDP of the US and its trading partner k at time t, respectively. $DIST_k$ is the geographic distance between the US's capital and its trading partner's capital. As additional determinants of IIT, the model includes the extensive margin and intensive margin as explanatory variables represented as EM_{kt} and IM_{kt}, respectively. Furthermore, α_k is the country effect, $k = 1.....,K$, μ_t is the time effect, $t = 1.....,T$, and finally ε_{kt} is the white noise disturbance term distributed randomly and independently.

In analyzing the determinants of IIT, many earlier studies apply either a linear function or log-linear function by ordinary least squares to the IIT index. However, OLS estimation of a linear or log-linear function may predict values of IIT that lie outside the theoretically feasible range since the Grubel-Lloyd IIT index vary between 0 and 1. One way to handle this problem is to transform the original data so that the error term follows a normal distribution. The logistic transformation is widely used as a solution to this problem, for example, in Hummels and Levinsohn (1995).

However, when the original data contain a zero value, the transformed value is undefined because the logistic transformation takes the logarithmic form[13]. To get around this problem of undefined value, we suggest using the Box-Cox transformation in place of the log part of the logistic transformation. We call the following transformation (7) the Box-Cox Logistic transformation and denote it with BCL:

[13] Researchers may inattentively handle these zero values as missing values. However, this will, in turn, lead to biased estimates by censoring the lowest values of the original variable.

$$BCL(y_{kt}) = \frac{\left(\frac{y_{kt}}{1-y_{kt}}\right)^{\lambda} - 1}{\lambda} \qquad \lambda \in (0,1]. \tag{6}$$

As a result, the Box-Cox transformation of the dependent variables has been used to analyze the determinants of IIT in the US auto-industry. Further, the extensive margin, EM_{kt}, and intensive margin, IM_{kt}, are Box-Cox transformed. The parameter λ for Box-Cox is set equal to 0.1.

4.2 The determinants of Intra-Industry Trade

Since Grubel and Lloyd's (1975) influential study, numerous empirical studies have examined the determinants of IIT using country-specific and industry-specific factors. Our approach is distinguished from previous analyses of intra-industry trade that focus on the determinants of intra-industry trade by estimating a Grubel-Lloyd-type index on the GDP of countries and the difference in GDP per capita along with other explanatory variables, as in Greenaway et al. (1994, 1995). We introduced the extensive margin and intensive margin as alternative determinants of intra-industry trade. Two different literatures of empirical investigation of international trade are thus merged in this paper. The following hypotheses are considered to investigate the determinants of IIT in the US auto-industry.[14]

4.2.1 The Traditional Determinants of Intra-Industry Trade

Helpman and Krugman (1985) argue that the share of IIT in manufactured goods tends to increase as the size of exporting and importing countries increases due to the presence of economies of scale. In addition, the larger markets are also likely to have greater demand for foreign differentiated goods and the potential for IIT becomes high. As a result, we predict that the shares of IIT between any two countries are expected to be positively related to the market size of the exporting and importing countries. The GDP levels of the US and each of

[14] The definitions and sources of the dependent and explanatory variables are explained in Appendix.

its trading partners k (expressed in constant 2000 US dollars), denoted as GDP_USA_t and $GDP\_PARTNER_{kt}$, respectively, are used to test this hypothesis.

Linder (1961) states that the countries with the most similar demand patterns for differentiated goods will tend to be those with similar per capita incomes. As a result, a greater difference in per capita income would imply a greater disparity in the demand structure of countries, which would be reflected in lower relative levels of IIT and horizontal IIT. Helpman and Krugman (1985) also suggest a negative relationship in the IIT model. Alternatively, the model developed by Falvey and Kierzkowski (1987) indicates that the IIT in vertically differentiated goods occurs because of factor endowment differences across countries. In this model, it is assumed that high quality products will be produced in the advanced countries, relatively capital-abundant country, and low quality products will be made in less developed countries, relatively labor-abundant country. Therefore, the model predicts that a greater divergence in the capital-labor endowment of the two countries, proxied by the difference in per capita incomes, yields a higher volume of IIT in vertically differentiated goods. The absolute value of the difference in per capita GDP (in constant 2000 US dollar) between the US and its trading partner k ($DGDPPC_{kt}$) is used to test this hypothesis.

The US bilateral trade with NAFTA countries is important in examining the determinants of the US IIT in auto-industry. NAFTA nations are geographically closer to the US than the European and Asian countries. In the literature, such as in Krugman (1980) and Balassa (1986), it has been found that the share of intra-industry trade is negatively correlated with geographical distance. Distance will increase the transaction costs including insurance and transportation costs. As a consequence, the share of IIT, is expected to be negatively related to the geographical distance variable, $DIST_k$.

4.2.2 Extensive margin and intensive margin on the Intra-Industry Trade

The Grubel-Lloyd (GL) index in this study is restricted within the auto-industry. The GL index is likely to be large if the US has a relatively high degree of overlap of exports and imports across products within the auto-industry. On the other hand, the extensive margin of the US exports is higher if the US exports the most of products to a partner country and the intensive margin of the US exports is higher if the export value in each product is larger. At first glance, there seems to be no relationship between intra-industry trade and export margins because export margin only consider exporting country whereas intra-industry trade concerns of both exporting and importing countries. Therefore, it is difficult to conclude how export margins affect intra-industry trade unless we resort to some theoretical frameworks which impose some restrictions on the industry structures of countries.

We start from the theoretical model of Helpman (1987) which provides the determination of intra-industry index under a two-country, two-sector (homogenous and differentiated products), two-factor, Heckscher-Ohlin-type world economy. From this standard monopolistic competition model, we can develop a testable hypothesis for the effect of intensive margin on intra-industry trade. In Helpman (1987), the Grubel Lloyd index can be shown to be the ratio of value of intra-industry trade, V_{i-i}, to value of total trade

$$IIT_{kt} = \frac{V_{i-i}}{V} = \frac{2sp_x n^* x}{2s^* p_x nx} = \frac{sn^*}{s^* n} \tag{7}$$

where s is the share of the home country in world spending, n is the number of differentiated product varieties, x is the quantity of each variety, and p_x is the price of each variety. The asterisk indicates a foreign country.

It is very important to keep in mind that the home country is assumed to be the net exporter of the differentiated product industry in equation (7).[15] Since the model is symmetric, we can re-interpret variables in equation (7) as of net exporter without asterisk and of net importer with asterisk.

It is straightforward to see that an increase in variety, n, lowers intra-industry trade, given *ceteris paribus,* for a net exporter country. A larger n for the net exporter country leads to less overlap of trade flows in differentiated products. Therefore, this simple model provides the hypothesis that an increase in extensive margin, EM_{kt}, decreases intra-industry trade if a country is net exporter of the industry. However, it is important to note that the opposite holds if a country is net importer of the industry. This distinction of net exporter from net importer has important relevance to our study because the US is net exporter of the motor vehicle industry and net importer, in general, of auto-parts industry.

What about for the case of the intensive margin? We also have a straightforward hypothesis. Intensive margin in equation (7) is indicated by $x \cdot p_x$ because all firms are symmetric in the sense of possessing the same technology. By noting $x \cdot p_x$ appears in both numerator and denominator, an increase in intensive margin, IM_{kt}, does not affect the degree of intra-industry trade.

We formally investigated two hypotheses with regard to determinants of the US IIT in the auto-industry. The first is that an expansion of exports to new industries, measured as extensive margin in equation (2), increases intra-industry trade of the US for auto-parts industry and decreases intra-industry trade of the US for motor vehicle industry. The second is that an increase in intensity of exports in existing industries, measured as intensive margin in

[15] In Helpman (1987) the analysis is focused on the subset of factor price equalization in which a home country is endowed with relatively abundant capital.

equation (3), does not affect intra-industry trade of the US motor vehicle industry and auto-parts industry.

4.3 Estimation

In estimating the determinants of IIT in the auto-industry between the US and its over 200 trading partners, a number of estimation techniques are applied to equation (5) in order to ensure the robustness of the results. The results for each of the product groupings (total auto-industry products, motor vehicle products, and auto-parts) of IIT index using these estimators are reported in Table 6 -8.

First, equation (5) is estimated with the pooled ordinary least squares (OLS) with a White heteroscedasticity correction. However, it has been shown that pooled OLS can lead to biased results because it ignores unobserved cross-country heterogeneity. For example, there are good reasons to believe that unobserved individual factors such as legal, cultural, and institutional factors are difficult to observe, and they most likely affect bilateral trade flows between any pair of countries.

Using a panel data approach allows us to account for such effects. The most commonly employed panel models, which monitor the existence of such effects are the fixed effects model (FE) and the random effects model (RE). The FE model is particularly appropriate in the presence of cross-country heterogeneity because it allows for unobserved factors that explain the bilateral trade flows between two countries, and leads to unbiased and efficient results.

However, a shortcoming of the FE is that it is not able to compute coefficients for time-invariant variables such as distance or the regional integration dummy because those variables are dropped within transformation. In order to tackle this problem most researchers advocate the implementation of the RE model, since it allows parameter estimation of time-invariant regressors within the panel data framework. However, as noted by Egger and

Pfaffermayr (2004), the RE estimates are inconsistent when regressors are correlated with the error term. As evident in the third columns of Table 4-6, the resulting Hausman test statistics in all cases strongly indicate that the fixed effects model should be preferred over the RE model, suggesting that there is no way to obtain consistent GLS estimates for both time-variant variables and distance. [16]

In order to overcome the bias of the RE model, theoretical econometric and empirical studies recommend the use of the Hausman-Taylor procedure (HT) for panel data with time-invariant variables and correlated unit effects (See Hausman and Taylor 1981; Egger and Pfaffermayr 2004). Hausman and Taylor (1981) suggest an instrumental variable approach to estimate the coefficients of time-invariant variables by generalized least squares (GLS) to deal with the endogenity of some of regressors.[17]

In order to obtain efficient and consistent estimates for all parameters in (5), the HT approach consists of four steps. In brief, the first step of the HT approach is to obtain within estimator of β but they may not be efficient. Note that this procedure, however, eliminates the time-variant variables from the model. The second step is to form the within group residuals from the within regression at the first step, and then regress them on the time-variant variables using a set of time-varying exogenous variables and time-variant exogenous variables as instruments. This provides a consistent estimator of time-invariant variables.

In the third step, using residuals from both overall and within estimates, the components of variance of the dependent variable are estimated. The estimated variance components are then used to form the weight for feasible generalized least squares (GLS) by forming the estimate of θ. In the final step, the estimate of θ is used to perform a GLS

[16] As suggested by the tests for heteroscedasticity (the likelihood ratio test (LR) and serial correlation (the Wooldridge test) reported in Table 6-8, pooled OLS, the FE model, and the HT model are conducted using the Newey-West method which generates robust standard errors in the presence of autocorrelation within panels, and heteroscedasticity across panels. In addition, the RE model is estimated using the feasible generalized least squares (FGLS) method in order to account for heteroscedasticity and autocorrelation.

[17] For a detailed explanation of the estimation strategy, see Greene (2003).

transformation on each of the variables at step 2. After transforming the variables by θ, the HT estimates of the coefficients of the model are then obtained by performing an instrumental regression on the GLS-transformed model using deviations of time-varying variables from their means as instruments.

The advantage of the HT approach is that it allows us to estimate the coefficients of time-invariant variables using instruments from inside the model. However, it is quite difficult to find appropriate internal instruments to estimate all model coefficients because the individual effects are unobserved. Following Egger and Pfaffermayr (2004), the explanatory variables are divided into two groups: the doubly exogenous (i.e. uncorrelated with the unobserved effects) and the singly exogenous ones (correlated with the unobserved effects). Hausman and Taylor (1981) suggest using economic intuition to decide which group a variable belongs to. In our case, it is appropriate to assume the distance as doubly exogenous, and the remaining ones as singly exogenous variables. The doubly exogenous variable is then used to instrument for the singly exogenous variables such as GDP. The validity of the choice of instruments can be tested by performing a Hansen test of over-identifying restrictions, which is distributed as chi-squared. As shown in Table 6-8, the Hansen test for over-identifying restrictions does not reject the null hypothesis that our choice of instruments are valid for all three product groupings of the IIT index. Hence, in the remainder of the analysis discussion of the results for both concepts of vertical IIT will focus on those obtained using the HT method.

5. Empirical Results

In estimating the determinants of IIT in the auto-industry between the US and its over 200 trading partners, we estimate equation (5) with four alternative estimation methods for the period 1996 to 2008. The regression results for each of the product groupings are reported in Tables 6 through 8. Following the discussion made in the previous section about the

efficiency of the HT method over other estimation methods, in the remainder of the analysis only the results from the HT method are discussed.

Overall, the regression results from the HT method reported in last columns of Tables 6 through 8 generally consistent with the hypotheses specified in the previous sections with the exception of the intensive margin, IM_{kt}. In addition, the estimated coefficients are qualitatively the same for total auto-industry, motor vehicle products and auto parts.

For the goal of the study, we will focus only on the results for motor vehicle products and auto parts. As indicated in subsection 4.2.2, the hypotheses for extensive margins are opposite between motor vehicle industry and auto-parts industry. In Table 7 and 8 we present estimation results for motor vehicle industry and auto-parts industry respectively. Regarding the effect of extensive margins, we find correct signs in both industries although the coefficient is not statistically significant for motor vehicle industry. This result is quite interesting that the position on net surplus of industry trade affects the signs of extensive margins.

On contrary to our hypothesis, intensive margins are found to have positive effects on the IIT for both industries. This is not surprising because the model in Helpman (1987) have strong restrictions which contradict international trade in the real world. First, all existing firms, each firm producing distinctive variety, participate in exports and the value of each variety export is equal. Alternatively, Melitz (2003) introduces the model in which firms are allowed to be heterogeneous and some firms do not export. Considering these effects may explain the positive effects of intensive margins, but the theoretical development regarding export margins and intra-industry trade is not yet developed in the literature.

The estimated coefficients for other explanatory variables are generally positive and in line with the theory described in the section 4.2.1. First, as expected, the market size variables (GDP_USA_t and $GDP\_PARTNER_{kt}$) turns out to have a positive and significant association

with IIT in motor vehicle products over the sample period, as predicted by the theory, with the exception of GDP_USA_t on IIT in auto-parts. In contrast, differences in GDP per capita ($DGDPPC_{kt}$) are shown to have negative and significant effect on IIT in both motor vehicle products and auto-parts, consistent with the predictions of Helpman and Krugman's (1985) model where it is used as proxy for factor endowment differences. Furthermore, our results indicate that the geographical distance ($DIST_k$) shows a negative and significant relationship with IIT in both product groups, as expected.

6. Conclusions

This study analyzes the current trade patterns of the US auto-industry trade with its over 200 trading partner during the period 1996-2008, a period during in which there were several important developments that reshaped the structure of auto-industry, particularly by focusing on intra-industry trade and export margins of trade. This study carries out a study on the US auto-industry IIT that represents improvements over previous studies as follows. First, the evoluation of the IIT and exports margins in the US auto-industry, motor vehicle industry, and auto-parts industry is carefully examined with the applications of the Grubel-Lloyd IIT index and Hummels-Klenow indices for export margins. Second, the development of IIT in the US auto-industry is analyzed by introducing the extensive margin and intensive margin as alternative determinants of IIT along with other traditional explanatory variables. In particular, we mounted two hypothesis: (1) that an expansion of exports to new industries, measured as extensive margin increases intra-industry trade of the US for auto-parts industry and decreases intra-industry trade of the US for motor vehicle industry, and (2) that an increase in intensity of exports in existing industries, measured as intensive margin does not affect intra-industry trade of the US motor vehicle industry and auto-parts industry.

The results show that the US auto-industry trade is mainly inter-industry trade with around 95 % share of total trade in 2008. However, the shares of intra-industry trade have

exhibited increased importance over the period. Another important finding is that IIT tends to be high among countries that are similar in terms of economic development and factor endowments. In contrast, the US increasingly carries more IIT in auto-parts with countries that are different in terms of incomes in recent years. These facts lead to conclusion that the international fragmentation has become an essential part of the US auto-industry.

Regarding export margins, we observed that the extensive margin of the US auto-industry with the world has increased during the sample period for each product groupings. In contrast, the level of the intensive margins stay stable during the sample period. Therefore, our results clarify that the extensive margin has a large impact on the US auto-industry exports, while the intesive margin has little or no impact on exports, in line with findings of Kehoe and Ruhl (2009).

Using the Hausman-Taylor method, the effect of extensive margins on the motor vehicle industry seems to be negatively correlated with the IIT, whereas it is positively correlated with the IIT, consistent with our hypotheses although the coefficient is not statistically significant for motor vehicle industry. On contrary to our hypothesis, intensive margins are found to have positive effects on the IIT for both industries.

Although our approach provides a new insight into the impact of export margins on the IIT, there remain some caveats. First, the definition of reference economy used in the calculations of the Hummels and Klenow index due to the data constraint, the US economy, might lead to a overstate of the level of extensive margins and intensive margins. More importantly, theoretiacally the relationship between export margins and intra-industry trade is not well established in this study yet. Thus, it may be wortwhile to investigate the relationship between export margins and IIT by employing better trade data and theoretical model in the future study.

REFERENCES

Ando, M. (2006). "Fragmentation and Vertical Intra-Industry Trade in East Asia", *North American Journal of Economics and Finance*, 17, 257-281.

Balassa, B. 1986. "The Determinants of Intra-Industry Specialization in the United States Trade", *Oxford Economic Papers*, 38, 220-233.

Balassa, B. and L. Bauwens. 1987. "Intra-Industry Specialization in a Multi-Country and Multi-Industry Framework", *The Economic Journal*, 97 (388), 923-939.

Becuwe, S. and C. Mathieu. 1992. "The Determinants of Intra-Industry Trade: The Case of the Automobile Industry", *Weltwirtschaftliches Archiv*, 128 (1), 34-51.

Bergstrand, J. H. 1983. "Measurement and Determinants of Intra-Industry International Trade", pp.201-253 in P.K.M. Tharakan (eds.), Intra-Industry Trade: Empirical and Methodological Aspects., New York, NY: Elsevier Science Publishing Company.

Bergstrand, J. H. 1990. "The Heckscher-Ohlin-Samuelson Model, the Linder Hypothesis, and the Determinants of Bilateral Intra-industry Trade", *Economic Journal*, 100(403), 1216–1229.

Besedes, Tibor and Thomas J. Prusa. 2007. "The Role of Extensive and Intensive Margins and Export Growth", National Bureau of Economic Research Working Paper, No. 13628, November.

Broda, Christian and David E. Weinstein. 2006. "Globalization and the Gains from Variety", *Quarterly Journal of Economics*, 541-85.

Byun, J. J. and S. H. Lee. 2005. "Horizontal and Vertical Intra-Industry Trade: New Evidence from Korea,1991-1999" *Global Economy Journal*, 5 (1), Article 3, 1-29.

Cooney, S. and B. D. Yacobucci. 2005. "US Automotive Industry: Policy Overview and Recent History," www.ncseonline.org/NLE/CRSreports/05apr/RL32883.pdf. Accessed 15 September 2008.

Corswant, F. v. and P. Fredriksson. 2002. "Sourcing Trends in the Car Industry", *International Journal of Operations and Production Management*, 22 (7), 741-758.

Diehl, M. 2001. "International Trade in Intermediate Inputs: The Case of Automobile Industry", Kiel Working Paper, No.1027.

Egger, P. and M. Pfaffermayr. 2004. "Distance, Trade, and FDI: a Hausman-Taylor SUR Approach", *Journal of Applied Econometrics*, 19, 227-46

Falvey, R. E. and H. Kierzkowski. 1987. "Product Quality, Intra-industry Trade and Imperfect Competition" pp.143-161 in H. Kierzkowski (eds.), Protection and Competition in International Trade, New York, NY: Basil Blackwell.

Feenstra, Robert C. 1994. "New Product Varieties and the Measurement of International Prices", *American Economic Review*, 84(1), 157-77.

Feenstra, Robert and Hiau Looi Kee. 2004. "On the Measurement of Product Variety in Trade," *American Economic Review Papers and Proceedings*, 94(2), 145-49.

Greene W. H. 2003. Econometric Analysis, 3rd ed. Prentice-Hall, Inc, New Jersey.

Greenway, D., R. Hine, and C. Milner. 1994. "Country-specific Factors and Pattern or Horizontal and Vertical Intra-Industry Trade in the UK", *Weltwirtschaftliches Archiv*, 130 (1), 77-100.

Greenway, D., R. Hine, and C. Milner. 1995. "Vertical and Horizontal Intra-Industry Trade: A Cross Industry Analysis for the United Kingdom", *Economic Journal*, 105, 1505-1519.

Grubel, H. and P. J. Lloyd. 1971. "The Empirical Measurement of Intra-Industry Trade", *Economic Record*, 470, 494-517.

Grubel, H. and P. J. Lloyd. 1975. Intra Industry Trade: Theory and Measurement of International Trade in Differentiated Products. New York, NY: John Wiley&Sons,Inc.

Jones, R. W., H. Kierzkowski, and G. Leonard (2002). 'Fragmentation and Intra-Industry Trade', In P. J. Lloyd and H. H. Lee (eds.), Frontiers of Research in Intra-Industry Trade (Palgrave Macmillan Ltd.).

Hausman J. A. and W. E. Taylor. 1981. "Panel Data and Unobservable Individual Effects", *Econometrica*, 49, 1377-98.

Helpman, E. 1987. "Imperfect Competition and International Trade: Evidence from 14 Industrial Countries", *Journal of Japanese and International Economics*, 1, 62-81.

Helpman, E. and P. Krugman. 1985. Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy. Cambridge, MA: MIT Press.

Hummels, David and Peter J. Klenow. 2005. "The Variety and Quality of a Nation's Exports," *American Economic Review*, 95(3), 704-23.

Hummels, D. and J. Levinsohn. 1995. "Monopolistic Competition and International Trade: Reconsidering the Evidence", *Quarterly Journal of Economics*, 110, 799-836.

Ito, K. and M. Umemoto. 2004. "Intra-Industry Trade in the ASEAN Region: The Case of Automotive Industry", ICSEAD Working Paper Series, No. 2004-23.

Kehoe, TimothyJ. And Kim J. Ruhl. 2009. "How Important is the New Goods Margin in International Trade?", *Federal Reserve Bank of Minnesota Staff Reports*, No. 324.

Klier, T. L. and J. M. Rubenstein. 2006. "Competition and Trade in the US Auto-Parts Sector", *Chicago Fed Letter*, No.222, January.

Krugman, P. 1980. "Scale Economies, Product Differentiation, and the Pattern of Trade", *American Economic Review*, 70, 950-959.

Lall, S., M. Albaladejo, and J. Zhang. 2004. "Mapping Fragmentation: Electronics and Automobiles in East Asia and Latin America", *Oxford Development Studies*, 32 (3), 407-432.

Lefilleur, J. 2008. “Geographic Reorganization of the European Automobile Sector”, *Eastern Economic Studies*, 46 (5), 71-94.

Leitao, N., F. Horacio. and Y. Yoshido. 2009. “Determinants of Vertical Intra-Industry Trade in the Automobile Manufacturing Sector: Globalization and Fragmentation,” Technical University of Lisbon, Department of Economics Working Papers, No. 06.

Linder, S. B. 1961. An Essay on Trade and Transformation. New York, NY: John Wiley and Sons.

Melitz, M. 2003. “The Impact of Trade on Intra-Industry Reallocation and Aggregate Industry Productivity”, *Econometrica*, 71 (6): 1695-1725.

Montout, S., J. L. Mucchielli, and S. Zignago. 2001. “Horizontal and Vertical Intra Industry Trade of NAFTA and MERCOSUR: The Case of Automobile Industry,” Presented at 3rd Annual Conference of European Trade Study Group (ETSG), Brussels, 14-16 September 2001.

Montout, S., J. L. Mucchielli and S. Zignago. 2002. “Regionalization and Intra Industry Trade. An Analysis of Automobile Industry Trade in NAFTA,” *Revue Region et Developpement*,16, 137-159.

Sadler, D. 1999. “Internationalization and Specialization in the European Automotive Components Sector: Implications for the Hollowing-out Thesis” *Regional Studies*, 33 (2), 109-119.

Türkcan, Kemal, 2010. “Vertical Intra-Industry Trade and Product Fragmentation in the Auto-Parts Industry”, *Journal of Industry, Competition and Trade*, DOI 10.1007/s10842-010-0067-0.

Türkcan, Kemal and Aysegul Ates. 2008. “Vertical Intra-Industry Trade and Fragmentation: An Empirical Examination of the US Auto-Parts Industry”, Tenth Meeting of the European Trade Study Group (ETSG), 11-13 September 2008, Warsaw, Poland.

Tharakan, P.K. and B. Kerstens. 1995. “Does North-South Horizontal Intra-Industry Trade Really Exist? An Analysis of the Toy Industry”, *Weltwirtschaftliches Archiv*, 131, 86-105.

Thorpe, M. and Z. Zhang. 2005. “Study of the Measurement and Determinants of Intra-Industry Trade in East Asia”, *Asian Economic Journal*, 19, 231-247.

Torstensson, J. 1996. “Determinants of Intra-Industry Trade: A Sensitivity Analysis”, *Oxford Bulletin of Economics and Statistics*, 58, 507-524.

Umemoto, M. (2005). ‘Development of Intra-Industry Trade between Korea and Japan: The Case of Automobile Parts Industry’, CITS Working Paper Series, No. 2005-03 (Yokohoma National University).

Yoshida, Yushi. 2008. “Intra-Industry Trade between Japan and Korea: Vertical Intra-Industry Trade, Fragmentation and Export Margins”, Kyushu Sangyo University Faculty of Economics Discussion Paper, No. 32.

APPENDIX

Definitions and Sources of Auto-Industry Trade and Explanatory Variables

Definition of Auto-Industry Trade

The dependent variables and export margins in the models, measured at the 6-digit Harmonized Tariff Schedule of the US used in this study, were derived from the United States International Trade Commission's (USITC) website: http//www.usitc.gov. For the measurement of IIT and export margins in the auto-industry, we employed the list provided by the Office of Aerospace and Automotive Industries' Automotive Team, which is part of the US Department of Commerce's International Trade Administration. The list can be found at http//www.ita.doc.gov/td/auto.html. In the end, we chose to identify 17 items as motor vehicle products and 98 items as auto parts from the 6-digit product level of HTS. Table 1 presents the list of auto-industry products used in the calculations of the IIT index and export margins. Furthermore, trade series are converted into real terms using the US CPI with a base year of 2005, obtained from the World Bank's World Development Indicators (WDI) CD-ROM.

Definition of Explanatory Variables

Country-level variables for the US and its 203 trading partners are retrieved primarily from the World Bank's World Development Indicators (WDI) CD-ROM. The full list of countries included in the analysis is shown in Table 2. In addition, we divided our sample of countries into low income, lower middle income, upper middle income, and high income countries using the categorization drawn up by the World Bank.

GDP_USA_t is the log of the GDP of the US at time t, expressed in constant 2005 US dollars. $GDP\_PARTNER_{kt}$ represents the log of the GDP of the trading partner k at time t, expressed in constant 2005 US dollars. $DGDPPC_{kt}$ is the log of the absolute difference in GDP per capita between the US and a trading partner k at time t.

$DIST_k$ is the geographic distance between the US's capital and its trading partner's capital, and is taken from the CEPII's Distance Database that can be downloaded from http://www.cepii.fr.

Table 3 provides the summary statistics for IIT index (total auto-industry products, motor vehicle products, auto-parts) and explanatory variables.

Table 1. HTS-6 Codes Relevant to Auto-Industry

Product Groups	HTS Code	Descriptions
Motor Vehicle	870120	Road tractors for semi-trailers
	870210	Motor vehicles for the transport of ten or more persons
	870290	Motor vehicles for the transport of ten or more persons, nesoi
	870322	Passenger motor vehicles with spark-ignition internal combustion reciprocating piston engine, cylinder capacity over 1,000 cc but not over 1,500 cc
	870323	Passenger motor vehicles with spark-ignition internal combustion reciprocating piston engine, cylinder capacity over 1,500 cc but not over 3,000 cc
	870324	Passenger motor vehicles with spark-ignition internal combustion reciprocating piston engine, cyclinder capacity over 3,000 cc
	870331	Passenger motor vehicles with compression-ignition internal combustion piston engine (diesel), cylinder capacity not over 1,500 cc
	870332	Passenger motor vehicles with compression-ignition internal combustion piston engine (diesel), cylinder capacity over 1,500 cc but not over 2,500 cc
	870333	Passenger motor vehicles with compression-ignition internal combustion piston engine (diesel), cylinder capacity over 2,500 cc
	870390	Passenger motor vehicles, nesoi
	870421	Motor vehicles for goods transport nesoi, with compression-ignition internal combustion piston engine (diesel), gvw not over 5 metric tons
	870422	Motor vehicles for goods transport nesoi, with compression-ignition internal combustion piston engine (diesel), gvw over 5 but not over 20 metric tons
	870423	Motor vehicles for goods transport nesoi, with compression-ignition internal combustion piston engine (diesel), gvw over 20 metric tons
	870431	Motor vehicles for goods transport nesoi, with spark-ignition internal combustion piston engine, gvw not over 5 metric tons
	870432	Motor vehicles for goods transport nesoi, with spark-ignition internal combustion piston engine, gvw over 5 metric tons
	870490	Motor vehicles for the transport of goods, nesoi
	870600	Chassis fitted with engines for tractors, motor vehicles for passengers, goods transport vehicles and special purpose motor vehicles
Auto- Parts	381900	Hydraulic brake fluids and prepared liquids for hydraulic transmission, with less than 70% (if any) by weight of petroleum or bituminous mineral oils
	382000	Antifreezing preparations and prepared deicing fluids
	400912	Tubes, pipes and hoses of vulcanized rubber other than hard rubber, not reinforced or combined w/other materials, with fittings
	400922	Tubes, pipes and hoses of vulcanized rubber other than hard rubber, reinforced or combined only with metal, with fittings
	400932	Tubes, pipes and hoses of vulcanized rubber other than hard rubber, reinforced or combined only with textile materials, with fittings
	400942	Tubes, pipes and hoses of vulcanized rubber other than hard rubber, reinforced or combined with other materials nesoi, with fittings
	400950	Tubes, pipes and hoses, of vulcanized rubber, except hard rubber, with fittings
	401110	New pneumatic tires, of rubber, of a kind used on motor cars (including station wagons and racing cars)
	401120	New pneumatic tires, of rubber, of a kind used on buses or trucks
	401210	Retreaded tires, of rubber
	401211	Retreaded pnuematic tires, of rubber, of a kind used on motor cars (including station wagons and racing cars)
	401212	Retreaded pnuematic tires, of rubber, of a kind used on buses or trucks
	401219	Retreaded pnuematic tires, of rubber, not elsewhere specified or included
	401220	Used pneumatic tires, of rubber
	401310	Inner tubes, of rubber, of a kind used on motor cars (including station wagons and racing cars), buses or trucks
	401699	Articles of vulcanized rubber other than hard rubber, nesoi
	681310	Brake linings and pads with basis of asbestos, other mineral substances

Table 1—Continued.

Product Groups	HTS	Descriptions
Auto- Parts	681320	Friction material & articles thereof, containing asbestos
	681381	Brake linings and pads not containing asbestos
	681389	Friction material & articles thereof with a basis of mineral substances (other than asbestos) or of cellulose, nesoi
	681390	Friction material and articles thereof (except brake linings or pads), unmounted, with a basis of asbestos, other mineral substances or of cellulose
	700711	Toughened (tempered) safety glass, of size and shape suitable for incorporation in vehicles, aircraft, spacecraft or vessels
	700721	Laminated safety glass, of size and shape suitable for incorporation in vehicles, aircraft, spacecraft or vessels
	700910	Rear-view mirrors for vehicles
	732010	Leaf springs and leaves therefor, of iron or steel
	732020	Helical springs of iron or steel
	830120	Locks of a kind used on motor vehicles, of base metal
	830210	Hinges, and parts thereof, of base metal
	830230	Mountings, fittings and similar articles nesoi (except hinges), and parts thereof, suitable for motor vehicles, of base metal
	840734	Spark-ignition reciprocating piston engines for propulsion of vehicles except railway or tramway stock, over 1,000 cc cylinder capacity
	840820	Compression-ignition internal combustion piston engines (diesel or semi-diesel), for the propulsion of vehicles except railway or tramway stock
	840991	Parts for use with spark-ignition internal combustion piston engines (including rotary engines), nesoi
	840999	Parts for use with compression-ignition internal combustion piston engines, nesoi
	841330	Fuel, lubricating or cooling medium pumps for internal combustion piston engines
	841391	Parts of pumps for liquids
	841459	Fans, nesoi
	841520	Automotive air conditioners
	842123	Oil or fuel filters for internal combustion engines
	842131	Intake air filters for internal combustion engines
	842139	Filtering or purifying machinery and apparatus for gases, nesoi
	842549	Jacks, nesoi; hoists of a kind used for raising vehicles, nesoi
	842691	Lifting or handling machinery designed for mounting on road vehicles
	843110	Parts for pulley tackle and hoists (other than skip hoists), winches, capstans and jacks
	848210	Ball bearings
	848220	Tapered roller bearings, including cone and tapered roller assemblies
	848240	Needle roller bearings
	848250	Cylindrical roller bearings nesoi
	848310	Transmission shafts (including camshafts and crankshafts) and cranks
	850710	Lead-acid storage batteries of a kind used for starting piston engines
	850790	Parts of electric storage batteries, including separators therefor
	851110	Internal combustion engine spark plugs
	851120	Internal combustion engine ignition magnetos, magneto-dynamos and magnetic flywheels
	851130	Internal combustion engine distributors and ignition coils
	851140	Internal combustion engine starter motors and dual purpose starter-generators
	851150	Internal combustion engine generators, nes0i
	851180	Electrical ignition or starting equipment used for internal combustion engines, nesoi, and equipment used in conjunction with such engines, nesoi
	851190	Parts for electrical ignition or starting equipment used for internal combustion engines; parts for generators and cut-outs used with such equipment
	851220	Electrical lighting or visual signaling equipment, for use on cycles or motor vehicles, except for use on bicycles

Table 1—Continued.

Product Groups	HTS	Descriptions
Auto-Parts	851230	Electrical sound signaling equipment used for cycles or motor vehicles
	851240	Electrical windshield wipers, defrosters and demisters used for cycles or motor vehicles
	851290	Parts of electrical lighting or signaling equipment, windshield wipers, defrosters and demisters, used for cycles or motor vehicles
	851712	Telephones for cellular networks or for other wireless networks
	852520	Transmission apparatus incorporating reception apparatus for radiotelephony, radiotelegraphy, radiobroadcasting or television
	852560	Transmission apparatus for radiobroadcasting
	852721	Radiobroadcast receivers for motor vehicles, combined with sound recording or reproducing apparatus, not capable of operating without outside power
	852729	Radiobroadcast receivers for motor vehicles, not capable of operating without outside power, nesoi
	853180	Electric sound or visual signaling apparatus (for example, bells, sirens, indicator panels), nesoi
	853641	Relays for a voltage not exceeding 60 v
	853910	Sealed beam electric lamp units
	854430	Insulated ignition wiring sets and other wiring sets for vehicles, aircraft and ships
	870710	Bodies (including cabs) for motor cars and other vehicles principally designed for transport of persons (except public-transport of passengers)
	870790	Bodies (including cabs) for road tractors for semi-trailers, motor vehicles for public-transport of passengers, goods transport and special purpose
	870810	Bumpers and parts thereof for motor vehicles
	870821	Safety seat belts for motor vehicles
	870829	Parts and accessories of bodies (including cabs) for motor vehicles, nesoi
	870830	Brakes and servo-brakes and parts thereof nesoi, for motor vehicles
	870831	Mounted brake linings for motor vehicles
	870839	Brakes and servo-brakes and parts thereof nesoi, for motor vehicles
	870840	Gear boxes and parts thereof, for motor vehicles
	870850	Drive axles with differential and non-drive axles and parts thereof, for motor vehicles
	870860	Non-driving axles and parts thereof for motor vehicles
	870870	Road wheels and parts and accessories thereof for motor vehicles
	870880	Suspension systems and parts thereof, for motor vehicles
	870891	Radiators and parts thereof, for motor vehicles
	870892	Mufflers and exhaust pipes and parts thereof, for motor vehicles
	870893	Clutches and parts thereof for motor vehicles
	870894	Steering wheels, steering columns and steering boxes and parts thereof, for motor vehicles
	870895	Safety airbag with inflator system and parts thereof, for motor vehicles
	870899	Parts and accessories for motor vehicles, nesoi
	871690	Parts of trailers, semi-trailers and other vehicles, not mechanically propelled
	902910	Revolution counters, production counters, taximeters, odometers, pedometers and the like
	902920	Speedometers and tachometers; stroboscopes
	902990	Parts and accessories for revolution counters, production counters, taximeters, odometers, pedometers etc., speedometers, tachometers and strobosopes
	910400	Instrument panel clocks and clocks of a similar type for vehicles, aircraft, spacecraft or vessels
	940120	Seats of a kind used for motor vehicles
	940190	Parts of seats (except parts of medical, dentist', barbers' and similar seats), nesoi
	940390	Parts of furniture, nesoi

Note: To select the automotive products from the trade data, we employ the list provided by the Office of Aerospace and Automotive Industries' Automotive Team, part of the U.S Department of Commerce's International Trade Administration. Their definition of auto-parts products can be found at http://www.ita.doc.gov/td/auto.html.

Table 2. Countries Included in the Analysis

Country	W.Bank Income Group	Economic Integration	Country	W.Bank Income Group	Economic Integration
Afghanistan	Low		Congo R.	Lower middle	
Albania	Lower middle		Costa Rica	Upper middle	
Algeria	Upper middle		Côte d'Ivoire	Lower middle	
American Samoa	Upper middle		Croatia	High	
Angola	Lower middle		Cuba	Upper middle	
Antigua&Barbuda	High		Cyprus	High	EU
Argentina	Upper middle		Czech R.	High	EU
Armenia	Lower middle		Denmark	High	EU
Aruba	High		Djibouti	Lower middle	
Australia	High	APEC	Dominica	Upper middle	
Austria	High	EU	Dominican R.	Upper middle	
Azerbaijan	Lower middle		Ecuador	Lower middle	
Bahamas	High		Egypt.	Lower middle	
Bahrain	High		El Salvador	Lower middle	
Bangladesh	Lower middle		Eq. Guinea	High	
Barbados	High		Eritrea	Low	
Belarus	Upper middle		Estonia	High	EU
Belgium	High	EU	Ethiopia	Low	
Belize	Lower middle		Faeroe Is.	High	
Benin	Low		Fiji	Upper middle	
Bermuda	High		Finland	High	EU
Bhutan	Lower middle		France	High	EU
Bolivia	Lower middle		French Poly.	High	
Bosnia&Her.	Upper middle		Gabon	Upper middle	
Botswana	Upper middle		Gambia	Low	
Brazil	Upper middle		Georgia	Lower middle	
Brunei	High	APEC	Germany	High	EU
Bulgaria	Upper middle	EU	Ghana	Low	
Burkina Faso	Low		Greece	High	EU
Burundi	Low		Greenland	High	
Cambodia	Low		Grenada	Upper middle	
Cameroon	Lower middle		Guatemala	Lower middle	
Canada	High	Nafta, Apec	Guinea	Low	
Cape Verde	Lower middle		Guinea-Bissau	Low	
Cayman Is.	High		Guyana	Lower middle	
Central Afr.R.	Low		Haiti	Low	
Chad	Low		Honduras	Lower middle	
Channel Is.	High		Hong Kong	High	APEC
Chile	Upper middle	APEC	Hungary	High	EU
China	Lower middle	APEC	Iceland	High	
Colombia	Upper middle		India	Lower middle	
Comoros	Low		Indonesia	Lower middle	APEC
Congo Dem.R.	Low		Iran.	Lower middle	

Table 2---Continued.

Country	W.Bank Income Group	Economic Integration	Country	W.Bank Income Group	Economic Integration
Iraq	Lower middle		Namibia	Upper middle	
Ireland	High	EU	Nepal	Low	
Israel	High		Netherlands	High	EU
Italy	High	EU	Nether. Antilles	High	
Jamaica	Upper middle		New Caledonia	High	
Japan	High	APEC	New Zealand	High	APEC
Jordan	Lower middle		Nicaragua	Lower middle	
Kazakhstan	Upper middle		Niger	Low	
Kenya	Low		Nigeria	Lower middle	
Kiribati	Lower middle		Norway	High	
North Korea.	Low		Oman	High	
South Korea	High	APEC	Pakistan	Lower middle	
Kuwait	High		Palau	Upper middle	
Kyrgyz R.	Low		Panama	Upper middle	
Lao PDR	Low		Papua New G.	Lower middle	APEC
Latvia	Upper middle	EU	Paraguay	Lower middle	
Lebanon	Upper middle		Peru	Upper middle	APEC
Lesotho	Lower middle		Philippines	Lower middle	APEC
Liberia	Low		Poland	Upper middle	EU
Libya	Upper middle		Portugal	High	EU
Liechtenstein	High		Puerto Rico	High	
Lithuania	Upper middle	EU	Qatar	High	
Luxembourg	High	EU	Romania	Upper middle	EU
Macao, China	High		Russia	Upper middle	
Macedonia	Upper middle		Rwanda	Low	
Madagascar	Low		Samoa	Lower middle	
Malawi	Low		San Marino	High	
Malaysia	Upper middle	APEC	São Tomé	Lower middle	
Maldives	Lower middle		Saudi Arabia		
Mali	Low		Senegal	Low	
Malta	High	EU	Serbia	Upper middle	
Marshall Is.	Lower middle		Seychelles	Upper middle	
Mauritania	Low		Sierra Leone	Low	
Mauritius	Upper middle		Singapore	High	APEC
Mayotte	Upper middle		Slovak R.	High	EU
Mexico	Upper middle	NAFTA, APEC	Slovenia	High	EU
Moldova	Lower middle		Solomon Is.	Lower middle	
Monaco	High		Somalia	Low	
Mongolia	Lower middle		South Africa	Upper middle	
Montenegro	Upper middle		Spain	High	EU
Morocco	Lower middle		Sri Lanka	Lower middle	
Mozambique	Low		St. Kitts&N.	Upper middle	
Myanmar	Low		St. Lucia	Upper middle	

Table 2---Continued.

Country	W.Bank Income Group	Economic Integration	Country	W.Bank Income Group	Economic Integration
St. Vince. &G.	Upper middle				
Sudan	Lower middle				
Suriname	Upper middle				
Swaziland	Lower middle				
Sweden	High	EU			
Switzerland	High				
Syria	Lower middle				
Tajikistan	Low				
Tanzania	Low				
Thailand	Lower middle	APEC			
Timor-Leste	Lower middle				
Togo	Low				
Tonga	Lower middle				
Trinidad&Tobago	High				
Tunisia	Lower middle				
Turkey	Upper middle				
Turkmenistan	Lower middle				
Uganda	Low				
Ukraine	Lower middle				
United Arab E.	High				
United Kingdom	High	EU			
Uruguay	Upper middle				
Uzbekistan	Low				
Vanuatu	Lower middle				
Venezuela	Upper middle				
Vietnam	Low	APEC			
West Bank&Gaza	Lower middle				
Yemen R.	Low				
Zambia	Low				
Zimbabwe	Low				

Notes: Countries are classified into income groups using the World Bank categorization as *low* income, *lower middle* income, *upper middle* income, and *high* income.
NAFTA refers to the North American Free Trade Agreement.
APEC indicates Asia-Pacific Economic Cooperation.
EURO refers to the European Union.

Table 3. Summary Statistics of Intra-Industry Trade Index and Explanatory Variables

Variable	Mean	St. Deviation	Minimum	Maximum	Observations
IIT_{jkt} (total)	0.052	0.102	0.000	0.636	2626
IIT_{jkt} (motor vehicles)	0.018	0.076	0.000	0.871	2626
IIT_{jkt} (auto-parts)	0.071	0.125	0.000	0.743	2626
EM_{kt} (total)	0.573	0.331	0.000	1.000	2626
IM_{kt} (total)	0.004	0.040	0.000	0.605	2626
EM_{kt} (motor vehicles)	0.662	0.338	0.000	1.000	2626
IM_{kt} (motor vehicles)	0.004	0.039	0.000	0.627	2626
EM_{kt} (auto-parts)	0.516	0.355	0.000	1.000	2626
IM_{kt} (auto-parts)	0.004	0.041	0.000	0.595	2626
GDP_USA_t	29.937	0.104	29.743	30.082	2626
$GDP\_PARTNER_{kt}$	23.147	2.315	17.352	29.281	2347
$DGDPPC_{kt}$	10.164	0.593	3.783	10.548	2337
$DIST_k$	8.956	0.546	6.602	9.703	2626

Note: The intra-industry index variables and extensive margin and intensive margin variables are shown here in levels; for the regressions, the variables were Box-Cox transformed. The other explanatory variables are in natural logarithmic form.

Table 4. Extensive Margins and Intensive Margins of the US Auto Industry by Product Groups

Country	Auto Industry Products			Motor Vehicle Products			Auto-Parts		
	Overall	EM	IM	Overall	EM	IM	Overall	EM	IM
Afghanistan	0.00094	0.8749	0.0011	0.00137	0.8181	0.0017	0.00049	0.9347	0.0005
Albania	0.00005	0.5696	0.0001	0.00007	0.8355	0.0001	0.00002	0.2896	0.0001
Algeria	0.00020	0.8010	0.0002	0.00004	0.8251	0.0001	0.00036	0.7756	0.0005
American Samoa	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Angola	0.00164	0.9341	0.0018	0.00291	0.9878	0.0029	0.00031	0.8775	0.0004
Antigua&Barbuda	0.00006	0.8758	0.0001	0.00007	0.9845	0.0001	0.00005	0.7613	0.0001
Argentina	0.00265	0.9925	0.0027	0.00106	0.9858	0.0011	0.00433	0.9994	0.0043
Armenia	0.00077	0.4410	0.0017	0.00146	0.7003	0.0021	0.00005	0.1679	0.0003
Aruba	0.00013	0.8972	0.0001	0.00016	0.9579	0.0002	0.00009	0.8333	0.0001
Australia	0.01506	0.9998	0.0151	0.01407	1.0000	0.0141	0.01610	0.9996	0.0161
Austria	0.00315	0.8936	0.0035	0.00064	0.8032	0.0008	0.00579	0.9888	0.0059
Azerbaijan	0.00011	0.6521	0.0002	0.00020	0.7759	0.0003	0.00002	0.5216	0.0000
Bahamas	0.00054	0.8782	0.0006	0.00075	0.8625	0.0009	0.00032	0.8947	0.0004
Bahrain	0.00155	0.9156	0.0017	0.00292	0.9689	0.0030	0.00012	0.8594	0.0001
Bangladesh	0.00001	0.2471	0.0000	0.00000	0.3672	0.0000	0.00002	0.1205	0.0001
Barbados	0.00007	0.9123	0.0001	0.00005	0.9469	0.0000	0.00009	0.8760	0.0001
Belarus	0.00034	0.6368	0.0005	0.00040	0.6948	0.0006	0.00027	0.5757	0.0005
Belgium	0.00579	0.9985	0.0058	0.00454	0.9998	0.0045	0.00710	0.9972	0.0071
Belize	0.00012	0.8492	0.0001	0.00014	0.9784	0.0001	0.00011	0.7132	0.0002
Benin	0.00341	0.5949	0.0057	0.00639	0.9488	0.0067	0.00028	0.2223	0.0013
Bermuda	0.00003	0.8781	0.0000	0.00002	0.8977	0.0000	0.00005	0.8575	0.0001
Bhutan	0.00000	0.1948	0.0000	0.00000	0.3672	0.0000	0.00000	0.0132	0.0000
Bolivia	0.00035	0.9331	0.0004	0.00042	0.9573	0.0004	0.00027	0.9076	0.0003
Bosnia&Her.	0.00004	0.5995	0.0001	0.00008	0.7879	0.0001	0.00000	0.4012	0.0000
Botswana	0.00000	0.2024	0.0000	0.00000	0.3672	0.0000	0.00000	0.0289	0.0000
Brazil	0.00839	0.9937	0.0084	0.00244	0.9878	0.0025	0.01465	0.9998	0.0147
Brunei	0.00003	0.4668	0.0001	0.00004	0.6795	0.0001	0.00001	0.2427	0.0000
Bulgaria	0.00043	0.8455	0.0005	0.00079	0.9053	0.0009	0.00005	0.7825	0.0001
Burkina Faso	0.00000	0.5162	0.0000	0.00000	0.6855	0.0000	0.00000	0.3379	0.0000
Burundi	0.00000	0.1526	0.0000	0.00000	0.2974	0.0000	0.00000	0.0000	0.0000
Cambodia	0.00091	0.6767	0.0014	0.00174	0.9682	0.0018	0.00004	0.3698	0.0001
Cameroon	0.00008	0.6128	0.0001	0.00014	0.9505	0.0001	0.00002	0.2572	0.0001
Canada	0.43426	0.9948	0.4365	0.38399	1.0000	0.3840	0.48721	0.9893	0.4925
Cape Verde	0.00000	0.1889	0.0000	0.00001	0.3672	0.0000	0.00000	0.0011	0.0001
Cayman Is.	0.00024	0.8936	0.0003	0.00040	0.9419	0.0004	0.00008	0.8428	0.0001
Central Afr.R.	0.00001	0.6082	0.0000	0.00001	0.8081	0.0000	0.00000	0.3977	0.0000
Chad	0.00000	0.0848	0.0000	0.00000	0.0000	0.0000	0.00000	0.1740	0.0000
Channel Is.	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Chile	0.00654	0.9998	0.0065	0.00721	1.0000	0.0072	0.00584	0.9995	0.0058
China	0.01573	1.0000	0.0157	0.01589	1.0000	0.0159	0.01556	0.9999	0.0156
Colombia	0.00235	0.9880	0.0024	0.00179	0.9767	0.0018	0.00294	0.9999	0.0029
Comoros	0.00000	0.2036	0.0000	0.00000	0.3672	0.0000	0.00000	0.0312	0.0000
Congo Dem.R.	0.00009	0.5733	0.0002	0.00016	0.7609	0.0002	0.00001	0.3758	0.0000
Congo R.	0.00008	0.6247	0.0001	0.00013	0.8377	0.0002	0.00002	0.4004	0.0001
Costa Rica	0.00136	0.9959	0.0014	0.00159	1.0000	0.0016	0.00111	0.9916	0.0011
Côte d'Ivoire	0.00016	0.6469	0.0002	0.00024	0.9375	0.0003	0.00007	0.3410	0.0002
Croatia	0.00018	0.7460	0.0002	0.00033	0.8013	0.0004	0.00003	0.6879	0.0000
Cuba	0.00000	0.0159	0.0000	0.00000	0.0000	0.0000	0.00000	0.0327	0.0000
Cyprus	0.00005	0.7052	0.0001	0.00006	0.7958	0.0001	0.00004	0.6097	0.0001
Czech R.	0.00056	0.9171	0.0006	0.00057	0.9033	0.0006	0.00054	0.9315	0.0006
Denmark	0.00065	0.9499	0.0007	0.00065	0.9477	0.0007	0.00065	0.9522	0.0007

Table 4—Continued.

Country	Auto Industry Products			Motor Vehicle Products			Auto-Parts		
	Overall	EM	IM	Overall	EM	IM	Overall	EM	IM
Djibouti	0.00002	0.6273	0.0000	0.00002	0.6798	0.0000	0.00001	0.5721	0.0000
Dominica	0.00004	0.7440	0.0001	0.00002	0.9202	0.0000	0.00006	0.5584	0.0001
Dominican R.	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Ecuador	0.00121	0.9756	0.0012	0.00121	0.9745	0.0012	0.00121	0.9766	0.0012
Egypt.	0.00079	0.9740	0.0008	0.00031	0.9726	0.0003	0.00129	0.9755	0.0013
El Salvador	0.00035	0.9192	0.0004	0.00035	0.9845	0.0004	0.00036	0.8505	0.0004
Eq. Guinea	0.00004	0.5899	0.0001	0.00002	0.7135	0.0000	0.00005	0.4599	0.0001
Eritrea	0.00000	0.0124	0.0000	0.00000	0.0000	0.0000	0.00000	0.0254	0.0000
Estonia	0.00019	0.7326	0.0003	0.00031	0.8335	0.0004	0.00006	0.6264	0.0001
Ethiopia	0.00001	0.5575	0.0000	0.00000	0.7003	0.0000	0.00001	0.4070	0.0000
Faeroe Is.	0.00000	0.3417	0.0000	0.00001	0.6646	0.0000	0.00000	0.0016	0.0001
Fiji	0.00000	0.2885	0.0000	0.00000	0.3672	0.0000	0.00000	0.2055	0.0000
Finland	0.01176	0.9914	0.0119	0.02145	0.9958	0.0215	0.00156	0.9867	0.0016
France	0.00758	0.9837	0.0077	0.00292	0.9686	0.0030	0.01250	0.9997	0.0125
French Poly.	0.00012	0.7394	0.0002	0.00021	0.9364	0.0002	0.00002	0.5319	0.0000
Gabon	0.00013	0.6883	0.0002	0.00022	0.9222	0.0002	0.00003	0.4420	0.0001
Gambia	0.00007	0.5509	0.0001	0.00013	0.8544	0.0002	0.00001	0.2314	0.0000
Georgia	0.00179	0.7678	0.0023	0.00332	0.9514	0.0035	0.00017	0.5745	0.0003
Germany	0.08648	0.9937	0.0870	0.14023	0.9878	0.1420	0.02986	1.0000	0.0299
Ghana	0.00057	0.8404	0.0007	0.00096	0.9858	0.0010	0.00016	0.6872	0.0002
Greece	0.00065	0.8452	0.0008	0.00105	0.8265	0.0013	0.00022	0.8649	0.0003
Greenland	0.00001	0.2677	0.0000	0.00002	0.3958	0.0000	0.00000	0.1329	0.0000
Grenada	0.00002	0.6421	0.0000	0.00002	0.7986	0.0000	0.00001	0.4772	0.0000
Guatemala	0.00137	0.9458	0.0014	0.00131	0.9847	0.0013	0.00143	0.9048	0.0016
Guinea	0.00012	0.6231	0.0002	0.00016	0.8495	0.0002	0.00008	0.3846	0.0002
Guinea-Bissau	0.00000	0.1884	0.0000	0.00000	0.3672	0.0000	0.00000	0.0000	0.0000
Guyana	0.00007	0.8987	0.0001	0.00006	0.9826	0.0001	0.00007	0.8104	0.0001
Haiti	0.00020	0.8856	0.0002	0.00031	0.9392	0.0003	0.00008	0.8291	0.0001
Honduras	0.00151	0.9808	0.0015	0.00090	1.0000	0.0009	0.00216	0.9606	0.0022
Hong Kong	0.00280	0.9023	0.0031	0.00356	0.8124	0.0044	0.00200	0.9969	0.0020
Hungary	0.00084	0.8312	0.0010	0.00027	0.8013	0.0003	0.00145	0.8628	0.0017
Iceland	0.00030	0.6989	0.0004	0.00047	0.8018	0.0006	0.00012	0.5906	0.0002
India	0.00177	0.9655	0.0018	0.00020	0.9584	0.0002	0.00343	0.9728	0.0035
Indonesia	0.00031	0.4227	0.0007	0.00003	0.0433	0.0008	0.00060	0.8224	0.0007
Iran.	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Iraq	0.00110	0.9560	0.0011	0.00161	0.9644	0.0017	0.00055	0.9472	0.0006
Ireland	0.00019	0.8532	0.0002	0.00011	0.8142	0.0001	0.00026	0.8942	0.0003
Israel	0.00212	0.9841	0.0022	0.00343	0.9817	0.0035	0.00074	0.9867	0.0008
Italy	0.00413	0.9916	0.0042	0.00525	0.9836	0.0053	0.00295	1.0000	0.0030
Jamaica	0.00037	0.9765	0.0004	0.00039	0.9981	0.0004	0.00035	0.9537	0.0004
Japan	0.01827	1.0000	0.0183	0.01002	1.0000	0.0100	0.02695	1.0000	0.0269
Jordan	0.00211	0.9127	0.0023	0.00394	0.9907	0.0040	0.00019	0.8305	0.0002
Kazakhstan	0.00051	0.8773	0.0006	0.00090	0.9564	0.0009	0.00010	0.7941	0.0001
Kenya	0.00008	0.7872	0.0001	0.00006	0.8562	0.0001	0.00010	0.7146	0.0001
Kiribati	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
North Korea.	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
South Korea	0.00674	0.9839	0.0068	0.00623	0.9691	0.0064	0.00727	0.9996	0.0073
Kuwait	0.00810	0.9861	0.0082	0.01395	0.9876	0.0141	0.00193	0.9846	0.0020
Kyrgyz R.	0.00010	0.5054	0.0002	0.00019	0.6779	0.0003	0.00000	0.3236	0.0000
Lao PDR	0.00001	0.4388	0.0000	0.00002	0.7251	0.0000	0.00000	0.1372	0.0000
Latvia	0.00075	0.6470	0.0012	0.00137	0.8451	0.0016	0.00010	0.4384	0.0002
Lebanon	0.00513	0.9310	0.0055	0.00933	0.9689	0.0096	0.00072	0.8911	0.0008
Lesotho	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Liberia	0.00013	0.5964	0.0002	0.00022	0.8362	0.0003	0.00003	0.3440	0.0001

Table 4—Continued.

Country	Auto Industry Products			Motor Vehicle Products			Auto-Parts		
	Overall	EM	IM	Overall	EM	IM	Overall	EM	IM
Libya	0.00095	0.7528	0.0013	0.00162	0.7403	0.0022	0.00025	0.7660	0.0003
Liechtenstein	0.00001	0.4220	0.0000	0.00002	0.6948	0.0000	0.00000	0.1347	0.0000
Lithuania	0.00335	0.7799	0.0043	0.00635	0.8635	0.0073	0.00019	0.6918	0.0003
Luxembourg	0.00051	0.7435	0.0007	0.00008	0.7821	0.0001	0.00096	0.7029	0.0014
Macao, China	0.00001	0.3039	0.0000	0.00000	0.3806	0.0000	0.00001	0.2231	0.0000
Macedonia	0.00001	0.4791	0.0000	0.00001	0.6720	0.0000	0.00000	0.2760	0.0000
Madagascar	0.00003	0.5253	0.0001	0.00006	0.8069	0.0001	0.00001	0.2287	0.0000
Malawi	0.00001	0.4407	0.0000	0.00002	0.6836	0.0000	0.00000	0.1850	0.0000
Malaysia	0.00024	0.8189	0.0003	0.00001	0.6798	0.0000	0.00049	0.9654	0.0005
Maldives	0.00000	0.1973	0.0000	0.00000	0.0000	0.0000	0.00001	0.4052	0.0000
Mali	0.00002	0.5596	0.0000	0.00002	0.7995	0.0000	0.00001	0.3069	0.0000
Malta	0.00001	0.6738	0.0000	0.00001	0.6846	0.0000	0.00001	0.6625	0.0000
Marshall Is.	0.00000	0.5140	0.0000	0.00001	0.8153	0.0000	0.00000	0.1967	0.0000
Mauritania	0.00003	0.3110	0.0001	0.00000	0.3746	0.0000	0.00005	0.2440	0.0002
Mauritius	0.00001	0.3567	0.0000	0.00001	0.3859	0.0000	0.00002	0.3260	0.0001
Mayotte	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Mexico	0.15906	1.0000	0.1591	0.08062	1.0000	0.0806	0.24167	1.0000	0.2417
Moldova	0.00006	0.4783	0.0001	0.00011	0.6646	0.0002	0.00000	0.2821	0.0000
Monaco	0.00000	0.4351	0.0000	0.00001	0.6646	0.0000	0.00000	0.1933	0.0000
Mongolia	0.00009	0.6441	0.0001	0.00016	0.8001	0.0002	0.00002	0.4798	0.0000
Montenegro	0.00008	0.5788	0.0001	0.00015	0.7964	0.0002	0.00001	0.3495	0.0000
Morocco	0.00020	0.7855	0.0003	0.00030	0.8389	0.0004	0.00009	0.7292	0.0001
Mozambique	0.00014	0.5189	0.0003	0.00026	0.8314	0.0003	0.00002	0.1898	0.0001
Myanmar	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Namibia	0.00035	0.6655	0.0005	0.00034	0.8731	0.0004	0.00035	0.4468	0.0008
Nepal	0.00001	0.2570	0.0000	0.00000	0.3672	0.0000	0.00002	0.1409	0.0001
Netherlands	0.00570	0.9996	0.0057	0.00656	1.0000	0.0066	0.00479	0.9992	0.0048
Nether. Antilles	0.00033	0.9142	0.0004	0.00044	0.9628	0.0005	0.00021	0.8630	0.0002
New Caledonia	0.00007	0.6731	0.0001	0.00012	0.9054	0.0001	0.00002	0.4285	0.0000
New Zealand	0.00102	0.9337	0.0011	0.00124	0.8864	0.0014	0.00078	0.9836	0.0008
Nicaragua	0.00021	0.9454	0.0002	0.00016	0.9857	0.0002	0.00026	0.9031	0.0003
Niger	0.00013	0.4673	0.0003	0.00024	0.7455	0.0003	0.00001	0.1742	0.0001
Nigeria	0.00753	0.9523	0.0079	0.01366	1.0000	0.0137	0.00108	0.9021	0.0012
Norway	0.00096	0.9721	0.0010	0.00120	0.9645	0.0012	0.00071	0.9802	0.0007
Oman	0.00320	0.8882	0.0036	0.00595	0.9592	0.0062	0.00031	0.8134	0.0004
Pakistan	0.00014	0.7170	0.0002	0.00015	0.7291	0.0002	0.00013	0.7043	0.0002
Palau	0.00000	0.3080	0.0000	0.00001	0.3746	0.0000	0.00000	0.2379	0.0000
Panama	0.00145	0.9981	0.0015	0.00215	1.0000	0.0022	0.00071	0.9961	0.0007
Papua New G.	0.00001	0.3603	0.0000	0.00001	0.3994	0.0000	0.00000	0.3192	0.0000
Paraguay	0.00068	0.8736	0.0008	0.00076	0.9859	0.0008	0.00060	0.7553	0.0008
Peru	0.00167	0.9819	0.0017	0.00143	0.9878	0.0014	0.00194	0.9756	0.0020
Philippines	0.00088	0.8308	0.0011	0.00068	0.7752	0.0009	0.00108	0.8893	0.0012
Poland	0.00330	0.9556	0.0035	0.00500	0.9887	0.0051	0.00151	0.9206	0.0016
Portugal	0.00049	0.7992	0.0006	0.00044	0.8091	0.0005	0.00055	0.7888	0.0007
Puerto Rico	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Qatar	0.00302	0.9009	0.0034	0.00553	0.9420	0.0059	0.00039	0.8575	0.0004
Romania	0.00035	0.8430	0.0004	0.00056	0.8165	0.0007	0.00013	0.8710	0.0002
Russia	0.01229	0.9934	0.0124	0.01990	0.9998	0.0199	0.00427	0.9867	0.0043
Rwanda	0.00000	0.3336	0.0000	0.00000	0.4634	0.0000	0.00000	0.1969	0.0000
Samoa	0.00000	0.2893	0.0000	0.00000	0.3852	0.0000	0.00000	0.1883	0.0000
San Marino	0.00000	0.2038	0.0000	0.00001	0.3672	0.0000	0.00000	0.0316	0.0000
São Tomé	0.00001	0.1951	0.0000	0.00002	0.3672	0.0000	0.00000	0.0139	0.0000
Saudi Arabia	0.03145	0.9939	0.0316	0.05680	0.9998	0.0568	0.00476	0.9877	0.0048
Senegal	0.00015	0.5471	0.0003	0.00026	0.7534	0.0003	0.00003	0.3298	0.0001

Table 4—Continued.

Country	Auto Industry Products			Motor Vehicle Products			Auto-Parts		
	Overall	EM	IM	Overall	EM	IM	Overall	EM	IM
Serbia	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000	0.00000	0.0000	0.0000
Seychelles	0.00000	0.0712	0.0000	0.00000	0.0000	0.0000	0.00000	0.1462	0.0000
Sierra Leone	0.00008	0.6664	0.0001	0.00013	0.8415	0.0002	0.00003	0.4819	0.0001
Singapore	0.00317	0.9579	0.0033	0.00029	0.9185	0.0003	0.00620	0.9995	0.0062
Slovak R.	0.00030	0.7194	0.0004	0.00036	0.8074	0.0004	0.00025	0.6267	0.0004
Slovenia	0.00006	0.7223	0.0001	0.00007	0.7970	0.0001	0.00005	0.6436	0.0001
Solomon Is.	0.00000	0.2264	0.0000	0.00000	0.3672	0.0000	0.00000	0.0782	0.0000
Somalia	0.00000	0.2059	0.0000	0.00000	0.3783	0.0000	0.00000	0.0243	0.0000
South Africa	0.00574	0.9390	0.0061	0.00696	0.8872	0.0078	0.00445	0.9934	0.0045
Spain	0.00313	0.9706	0.0032	0.00249	0.9491	0.0026	0.00380	0.9933	0.0038
Sri Lanka	0.00003	0.3587	0.0001	0.00005	0.3821	0.0001	0.00001	0.3340	0.0000
St. Kitts&N.	0.00004	0.7155	0.0001	0.00004	0.8072	0.0001	0.00003	0.6190	0.0001
St. Lucia	0.00004	0.7724	0.0001	0.00002	0.8227	0.0000	0.00006	0.7194	0.0001
St. Vince. &G.	0.00002	0.4811	0.0000	0.00002	0.5439	0.0000	0.00002	0.4150	0.0000
Sudan	0.00000	0.0294	0.0000	0.00000	0.0000	0.0000	0.00000	0.0604	0.0000
Suriname	0.00010	0.9315	0.0001	0.00012	0.9542	0.0001	0.00008	0.9076	0.0001
Swaziland	0.00000	0.1919	0.0000	0.00000	0.3672	0.0000	0.00000	0.0073	0.0002
Sweden	0.00306	0.9781	0.0031	0.00237	0.9651	0.0025	0.00380	0.9917	0.0038
Switzerland	0.00070	0.9690	0.0007	0.00093	0.9554	0.0010	0.00047	0.9834	0.0005
Syria	0.00000	0.0157	0.0000	0.00000	0.0149	0.0001	0.00000	0.0164	0.0000
Tajikistan	0.00001	0.3409	0.0000	0.00002	0.6646	0.0000	0.00000	0.0000	0.0000
Tanzania	0.00010	0.6062	0.0002	0.00004	0.8371	0.0001	0.00015	0.3630	0.0004
Thailand	0.00113	0.9027	0.0013	0.00030	0.8154	0.0004	0.00202	0.9947	0.0020
Timor-Leste	0.00000	0.0062	0.0000	0.00000	0.0000	0.0000	0.00000	0.0128	0.0000
Togo	0.00053	0.5466	0.0010	0.00098	0.7638	0.0013	0.00006	0.3177	0.0002
Tonga	0.00000	0.2555	0.0000	0.00000	0.3821	0.0000	0.00000	0.1221	0.0000
Trinidad&Tobago	0.00026	0.9620	0.0003	0.00014	0.9794	0.0001	0.00039	0.9437	0.0004
Tunisia	0.00006	0.5031	0.0001	0.00009	0.7455	0.0001	0.00002	0.2479	0.0001
Turkey	0.00142	0.8630	0.0016	0.00112	0.8294	0.0013	0.00174	0.8984	0.0019
Turkmenistan	0.00001	0.3637	0.0000	0.00001	0.3863	0.0000	0.00002	0.3398	0.0001
Uganda	0.00001	0.3612	0.0000	0.00001	0.4143	0.0000	0.00002	0.3052	0.0001
Ukraine	0.00181	0.8313	0.0022	0.00308	0.9527	0.0032	0.00047	0.7034	0.0007
United Arab E.	0.02275	0.9999	0.0227	0.04008	1.0000	0.0401	0.00449	0.9997	0.0045
United Kingdom	0.01817	0.9999	0.0182	0.01871	1.0000	0.0187	0.01760	0.9999	0.0176
Uruguay	0.00014	0.8242	0.0002	0.00008	0.7386	0.0001	0.00019	0.9144	0.0002
Uzbekistan	0.00003	0.5057	0.0001	0.00005	0.6706	0.0001	0.00001	0.3322	0.0000
Vanuatu	0.00000	0.2486	0.0000	0.00000	0.3672	0.0000	0.00000	0.1236	0.0000
Venezuela	0.00958	1.0000	0.0096	0.00414	1.0000	0.0041	0.01531	0.9999	0.0153
Vietnam	0.00224	0.8928	0.0025	0.00416	0.8744	0.0048	0.00021	0.9123	0.0002
West Bank&Gaza	0.00000	0.0717	0.0000	0.00000	0.1010	0.0000	0.00000	0.0408	0.0000
Yemen R.	0.00031	0.5531	0.0006	0.00055	0.7133	0.0008	0.00006	0.3844	0.0001
Zambia	0.00005	0.6467	0.0001	0.00001	0.7378	0.0000	0.00010	0.5508	0.0002
Zimbabwe	0.00001	0.6081	0.0000	0.00000	0.6968	0.0000	0.00002	0.5147	0.0000

Notes: All variables are for 2008.
Overall=EM*IM, equation (4) in the text.
EM= Extensive margin of equation (2) in the text.
IM=Intensive margin of equation (3) in the text.
The variables are shown here in levels; for the regressions, the variables are Box-Cox transformed.
Source: USITC Dataweb, authors' own calculations.

Table 5. Development of Intra-Industry Trade in the US Auto Industry, by Country, 1996-2008

Country	1996			2008		
	Auto Industry	Motor Vehicle	Auto Parts	Auto Industry	Motor Vehicle	Auto Parts
Afghanistan	0.00000	0.00000	0.00000	0.00015	0.00000	0.00059
Albania	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Algeria	0.00144	0.00000	0.00175	0.00060	0.00000	0.00068
American Samoa	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Angola	0.00095	0.00000	0.00295	0.00054	0.00000	0.00581
Antigua&Barbuda	0.00000	0.00000	0.00000	0.00088	0.00000	0.00214
Argentina	0.17818	0.00024	0.28319	0.27007	0.00342	0.31361
Armenia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Aruba	0.00356	0.00410	0.00121	0.00000	0.00000	0.00000
Australia	0.21635	0.38808	0.13206	0.17694	0.16319	0.19890
Austria	0.07908	0.01074	0.07989	0.15710	0.00889	0.44031
Azerbaijan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Bahamas	0.00016	0.00000	0.00077	0.00494	0.00000	0.01704
Bahrain	0.00000	0.00000	0.00000	0.00058	0.00056	0.00122
Bangladesh	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Barbados	0.00090	0.00000	0.00210	0.00246	0.00000	0.00372
Belarus	0.00000	0.00000	0.00000	0.00173	0.00000	0.00438
Belgium	0.26113	0.32536	0.13765	0.25737	0.27624	0.22007
Belize	0.00637	0.00888	0.00236	0.02294	0.00000	0.05183
Benin	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Bermuda	0.00000	0.00000	0.00000	0.00161	0.00000	0.00222
Bhutan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Bolivia	0.00000	0.00000	0.00000	0.02190	0.00019	0.05645
Bosnia&Her.	0.00000	0.00000	0.00000	0.01460	0.00000	0.14761
Botswana	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Brazil	0.21771	0.00544	0.24251	0.35543	0.02482	0.37481
Brunei	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Bulgaria	0.04259	0.00000	0.04682	0.04609	0.00000	0.31725
Burkina Faso	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Burundi	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Cambodia	0.00000	0.00000	0.00000	0.00167	0.00000	0.07247
Cameroon	0.00000	0.00000	0.00000	0.00761	0.00000	0.04940
Canada	0.55208	0.49478	0.62717	0.61352	0.58967	0.64551
Cape Verde	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Cayman Is.	0.00023	0.00000	0.00201	0.00419	0.00000	0.02438
Central Afr.R.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Chad	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Channel Is.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Chile	0.02537	0.00000	0.07864	0.04273	0.00024	0.09097
China	0.23427	0.00175	0.24123	0.16195	0.02729	0.17578
Colombia	0.04270	0.00000	0.05861	0.06240	0.00260	0.09562
Comoros	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 5—Continued.

Country	1996			2008		
	Auto Industry	Motor Vehicle	Auto Parts	Auto Industry	Motor Vehicle	Auto Parts
Congo Dem.R.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Congo R.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Costa Rica	0.03697	0.00000	0.08813	0.05829	0.00063	0.08855
Côte d'Ivoire	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Croatia	0.00387	0.00000	0.01097	0.00389	0.00000	0.04760
Cuba	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Cyprus	0.00912	0.00000	0.02471	0.01017	0.00000	0.02332
Czech R.	0.13915	0.02009	0.16787	0.11203	0.05655	0.11698
Denmark	0.15422	0.00000	0.19467	0.18365	0.00771	0.28665
Djibouti	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Dominica	0.00149	0.00000	0.00997	0.00000	0.00000	0.00000
Dominican R.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecuador	0.00635	0.00000	0.01232	0.01414	0.00000	0.02880
Egypt.	0.00259	0.00216	0.00279	0.02610	0.01144	0.02964
El Salvador	0.00244	0.00000	0.00512	0.00276	0.00000	0.00426
Eq. Guinea	0.06039	0.00000	0.24521	0.00000	0.00000	0.00000
Eritrea	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Estonia	0.05049	0.01936	0.15416	0.00709	0.00267	0.02055
Ethiopia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Faeroe Is.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Fiji	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Finland	0.13533	0.00580	0.31825	0.31441	0.30790	0.37992
France	0.30212	0.03574	0.32593	0.36640	0.11810	0.40660
French Poly.	0.00000	0.00000	0.00000	0.00360	0.00000	0.04838
Gabon	0.00084	0.00000	0.00334	0.00000	0.00000	0.00000
Gambia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Georgia	0.03970	0.00000	0.21101	0.00231	0.00000	0.04369
Germany	0.29791	0.24628	0.42907	0.32502	0.33980	0.28089
Ghana	0.00000	0.00000	0.00000	0.00049	0.00035	0.00134
Greece	0.01537	0.00000	0.03717	0.02699	0.00000	0.09612
Greenland	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Grenada	0.00000	0.00000	0.00000	0.00046	0.00000	0.00125
Guatemala	0.01129	0.00000	0.03137	0.00263	0.00000	0.00514
Guinea	0.00000	0.00000	0.00000	0.00212	0.00000	0.00660
Guinea-Bissau	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Guyana	0.02470	0.00000	0.03771	0.04574	0.00000	0.08605
Haiti	0.00179	0.00000	0.00959	0.00000	0.00000	0.00000
Honduras	0.00263	0.00000	0.00490	0.38663	0.00000	0.43208
Hong Kong	0.08348	0.00000	0.12766	0.12771	0.00000	0.27869
Hungary	0.11629	0.00000	0.12106	0.12274	0.08768	0.14335
Iceland	0.00660	0.00000	0.01934	0.00612	0.00000	0.03086
India	0.33076	0.00000	0.33185	0.35609	0.03353	0.36044
Indonesia	0.17343	0.00000	0.18453	0.08018	0.00000	0.08048

Table 5—Continued.

Country	1996			2008		
	Auto Industry	Motor Vehicle	Auto Parts	Auto Industry	Motor Vehicle	Auto Parts
Iran.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Iraq	0.00000	0.00000	0.00000	0.00229	0.00000	0.00927
Ireland	0.15682	0.02526	0.17089	0.11132	0.00000	0.14420
Israel	0.05459	0.00000	0.10523	0.12595	0.00002	0.27234
Italy	0.34141	0.10153	0.40800	0.13724	0.08683	0.19149
Jamaica	0.00869	0.00000	0.02732	0.02431	0.00000	0.05152
Japan	0.22005	0.21021	0.23503	0.06754	0.02266	0.19334
Jordan	0.00000	0.00000	0.00000	0.00059	0.00000	0.01280
Kazakhstan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Kenya	0.00442	0.00000	0.02236	0.00776	0.00000	0.01238
Kiribati	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
North Korea.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
South Korea	0.16039	0.10227	0.23634	0.08636	0.06739	0.12120
Kuwait	0.00476	0.00000	0.03816	0.00038	0.00010	0.00251
Kyrgyz R.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Lao PDR	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Latvia	0.00000	0.00000	0.00000	0.00015	0.00000	0.00240
Lebanon	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Lesotho	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Liberia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Libya	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Liechtenstein	0.00096	0.00000	0.00097	0.00059	0.00000	0.00060
Lithuania	0.00000	0.00000	0.00000	0.00075	0.00000	0.02459
Luxembourg	0.18901	0.00000	0.22303	0.04993	0.00000	0.05361
Macao, China	0.00000	0.00000	0.00000	0.07932	0.00000	0.11448
Macedonia	0.00000	0.00000	0.00000	0.01302	0.00000	0.07477
Madagascar	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Malawi	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Malaysia	0.10817	0.00000	0.10907	0.10514	0.00000	0.10536
Maldives	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mali	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Malta	0.00000	0.00000	0.00000	0.05562	0.00000	0.06941
Marshall Is.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mauritania	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mauritius	0.15339	0.00000	0.15339	0.00289	0.00000	0.00369
Mayotte	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mexico	0.34036	0.19666	0.43916	0.46230	0.35570	0.53607
Moldova	0.00000	0.00000	0.00000	0.00080	0.00000	0.09055
Monaco	0.00000	0.00000	0.00000	0.11308	0.10435	0.12966
Mongolia	0.00000	0.00000	0.00000	0.00071	0.00000	0.00733
Montenegro	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 5—Continued.

Country	1996			2008		
	Auto Industry	Motor Vehicle	Auto Parts	Auto Industry	Motor Vehicle	Auto Parts
Morocco	0.00000	0.00000	0.00000	0.03332	0.00000	0.06210
Mozambique	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Myanmar	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Namibia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Nepal	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Netherlands	0.21447	0.00540	0.28534	0.15225	0.02227	0.27987
Nether. Antilles	0.00198	0.00000	0.00943	0.01106	0.00060	0.03397
New Caledonia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
New Zealand	0.04146	0.00000	0.05534	0.05060	0.01710	0.10295
Nicaragua	0.00000	0.00000	0.00000	0.00064	0.00000	0.00067
Niger	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Nigeria	0.00000	0.00000	0.00000	0.00009	0.00010	0.00000
Norway	0.06751	0.00000	0.21123	0.15208	0.00014	0.29063
Oman	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Pakistan	0.00042	0.00000	0.00064	0.10867	0.00000	0.20236
Palau	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Panama	0.04544	0.00000	0.09669	0.00519	0.00006	0.02137
Papua New G.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Paraguay	0.00135	0.00000	0.00193	0.00650	0.00000	0.01521
Peru	0.00891	0.00000	0.01657	0.05395	0.00000	0.09235
Philippines	0.20360	0.00019	0.23133	0.11509	0.00070	0.12261
Poland	0.05307	0.00000	0.12762	0.16018	0.00000	0.39144
Portugal	0.15307	0.00000	0.22155	0.08588	0.03243	0.20900
Puerto Rico	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Qatar	0.00000	0.00000	0.00000	0.00015	0.00000	0.00247
Romania	0.02159	0.00000	0.02747	0.02131	0.00000	0.02617
Russia	0.00521	0.00016	0.01396	0.01488	0.00001	0.08274
Rwanda	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Samoa	0.00000	0.00000	0.00000	0.04803	0.00000	0.06295
San Marino	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
São Tomé	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Saudi Arabia	0.00091	0.00012	0.00449	0.00030	0.00009	0.00280
Senegal	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Serbia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Seychelles	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Sierra Leone	0.05922	0.00000	0.14592	0.00328	0.00000	0.01773
Singapore	0.13750	0.00000	0.14029	0.15045	0.00000	0.15679
Slovak R.	0.07854	0.00000	0.08337	0.02596	0.02051	0.08403
Slovenia	0.02389	0.00000	0.02961	0.12713	0.00000	0.14611
Solomon Is.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Somalia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
South Africa	0.12450	0.00869	0.18988	0.15798	0.12618	0.26710

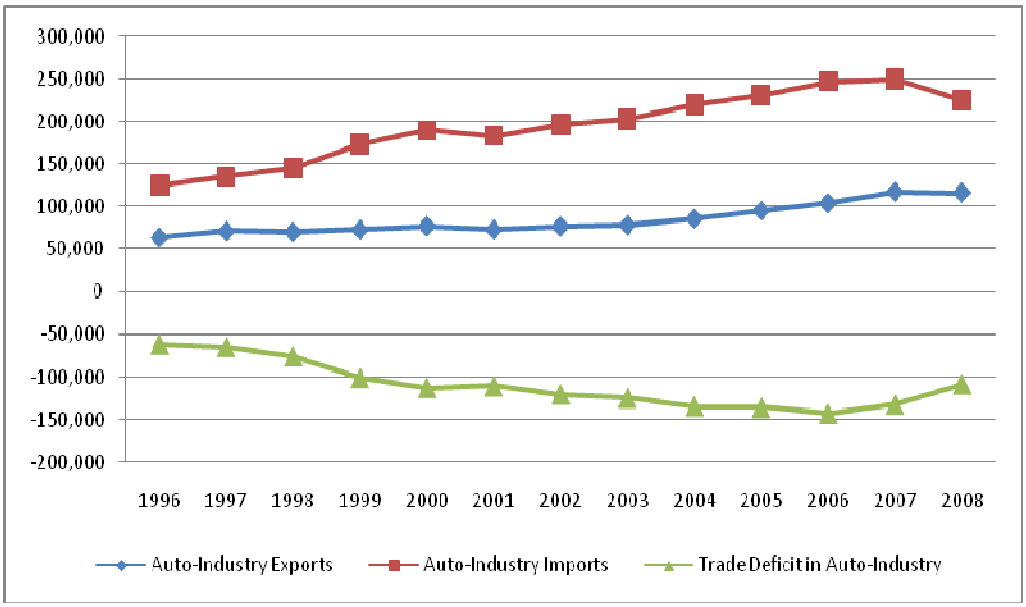
Table 5—Continued.

Country	1996			2008		
	Auto Industry	Motor Vehicle	Auto Parts	Auto Industry	Motor Vehicle	Auto Parts
Spain	0.36409	0.00005	0.44589	0.30973	0.01650	0.38981
Sri Lanka	0.08764	0.00000	0.08919	0.00727	0.00000	0.01711
St. Kitts&N.	0.01186	0.00000	0.04183	0.00853	0.00000	0.01998
St. Lucia	0.00509	0.00000	0.00832	0.00000	0.00000	0.00000
St. Vince. &G.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Sudan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Suriname	0.00227	0.00000	0.00780	0.14982	0.00000	0.32495
Swaziland	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Sweden	0.07206	0.02728	0.26651	0.16251	0.13225	0.26495
Switzerland	0.13615	0.00862	0.31008	0.13627	0.00921	0.19239
Syria	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Tajikistan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Tanzania	0.00044	0.00000	0.00238	0.00701	0.00000	0.00905
Thailand	0.30171	0.00022	0.32558	0.12408	0.00298	0.12577
Timor-Leste	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Togo	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Tonga	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Trinidad&Tobago	0.00411	0.00000	0.00556	0.00798	0.00000	0.01108
Tunisia	0.00294	0.00000	0.00420	0.08927	0.00000	0.22007
Turkey	0.16235	0.00000	0.22564	0.22705	0.01067	0.29362
Turkmenistan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Uganda	0.00000	0.00000	0.00000	0.01368	0.00000	0.01945
Ukraine	0.02877	0.00000	0.13670	0.01386	0.00022	0.06798
United Arab E.	0.00096	0.00035	0.00362	0.00222	0.00000	0.02224
United Kingdom	0.24574	0.07677	0.47312	0.31649	0.22578	0.55890
Uruguay	0.01500	0.00000	0.02827	0.05041	0.00242	0.06803
Uzbekistan	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Vanuatu	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Venezuela	0.18026	0.00212	0.21488	0.04938	0.00024	0.06278
Vietnam	0.00482	0.00000	0.03974	0.02311	0.00000	0.04997
West Bank&Gaza	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Yemen R.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Zambia	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Zimbabwe	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Notes: Intra-Industry Index for each product group is calculated using equation (1) in the text. The variables are shown here in levels; for the regressions, the variables are Box-Cox transformed.

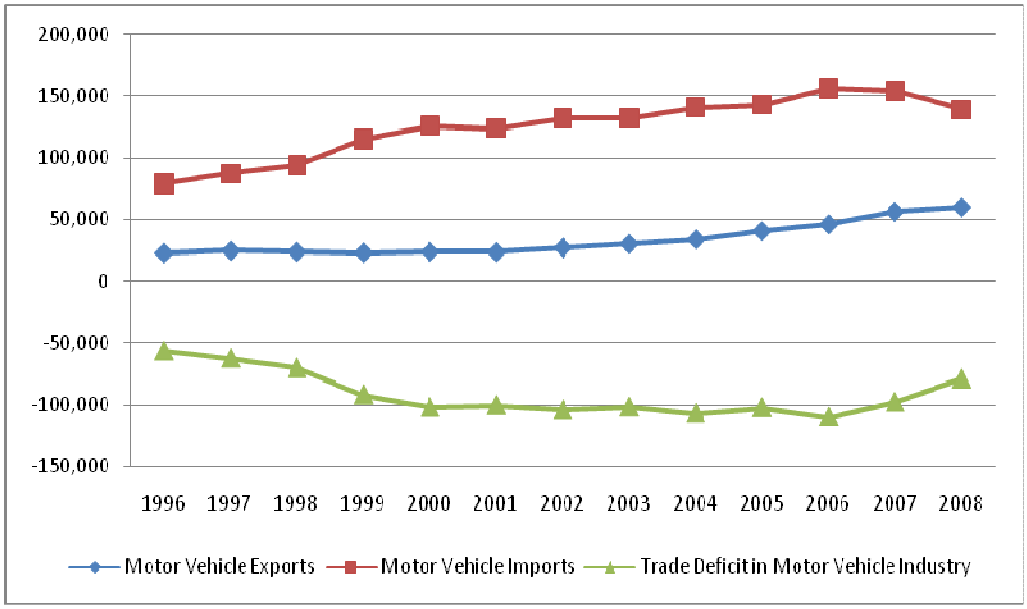
Source: USITC Dataweb, authors' own calculations.

Figure 1: The U.S. Auto-Industry Trade with World (Millions $), 1996-2008



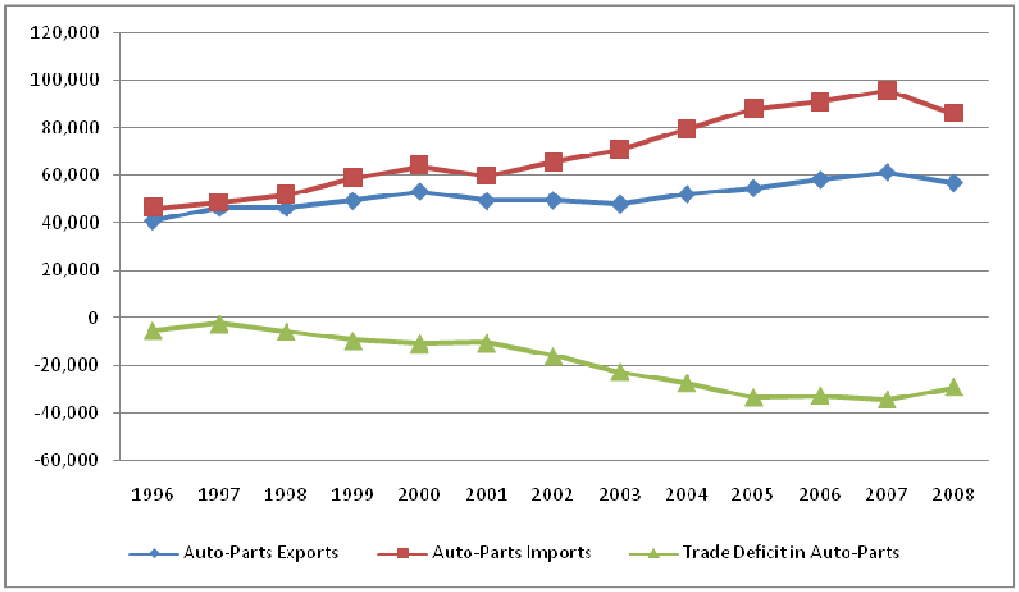
Source: USITC Dataweb, authors' own calculations

Figure 2: The U.S. Motor Vehicle Industry Trade with World (Millions $), 1996-2008



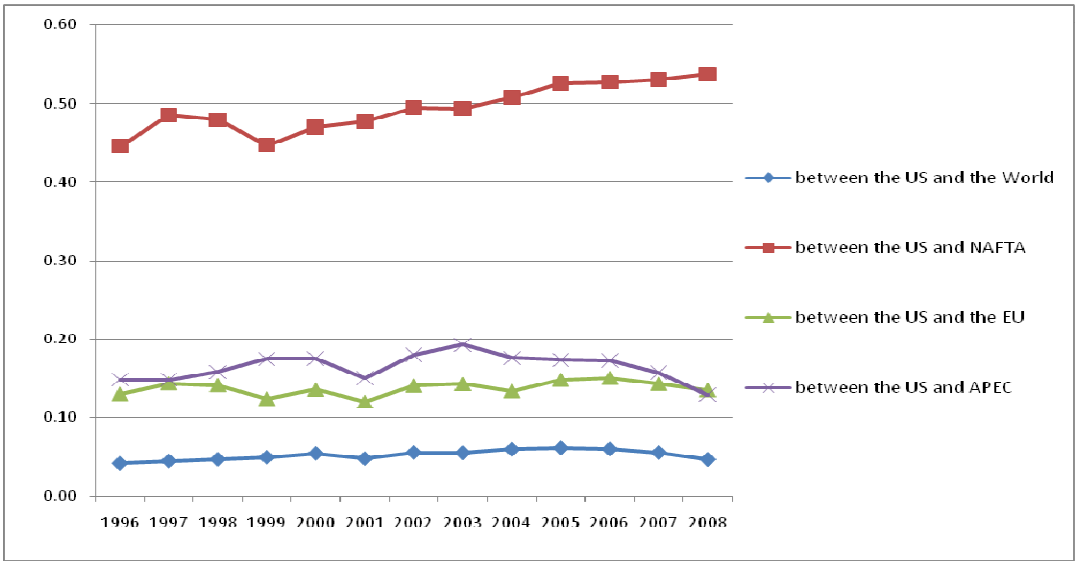
Source: USITC Dataweb, authors' own calculations

Figure 3: The U.S. Auto-Parts Trade with World (Millions $), 1996-2008



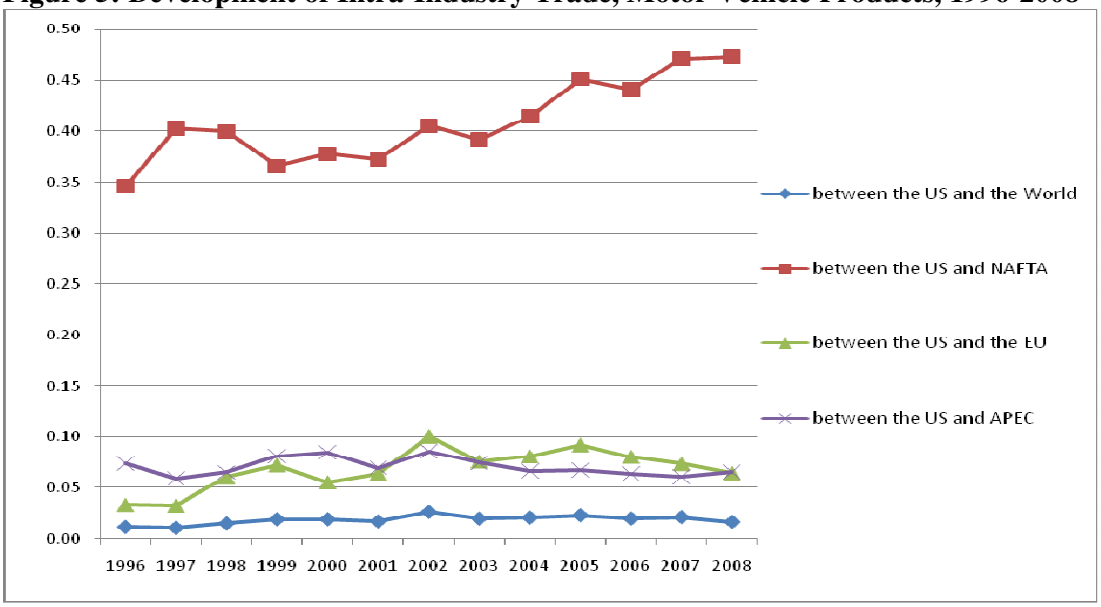
Source: USITC Dataweb, authors' own calculations

Figure 4: Development of Intra-Industry Trade, Auto-Industry Products, 1996-2008



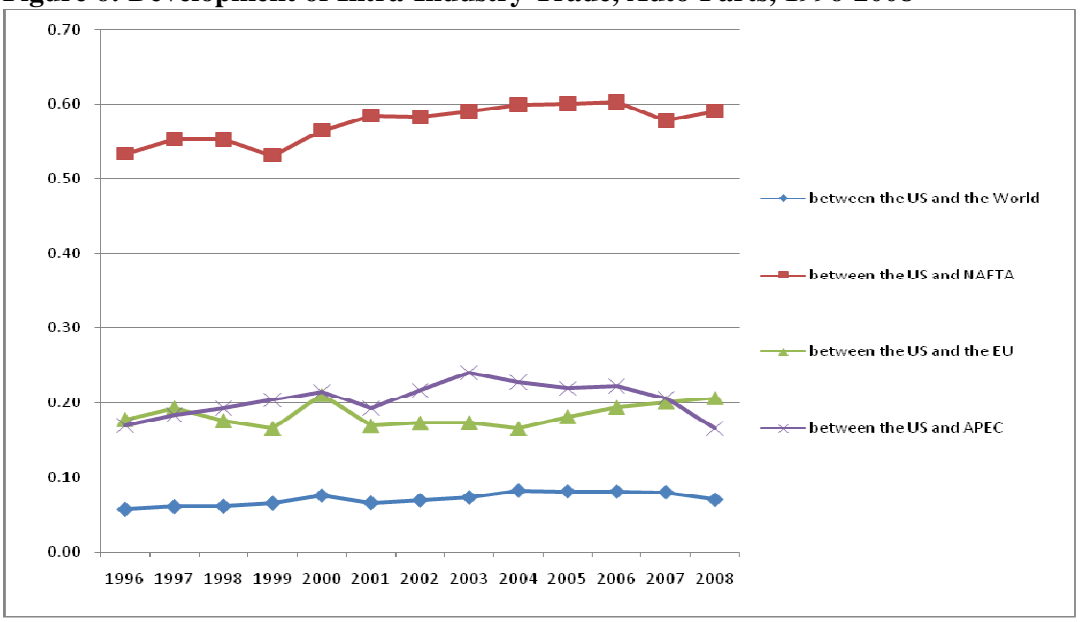
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 5: Development of Intra-Industry Trade, Motor Vehicle Products, 1996-2008



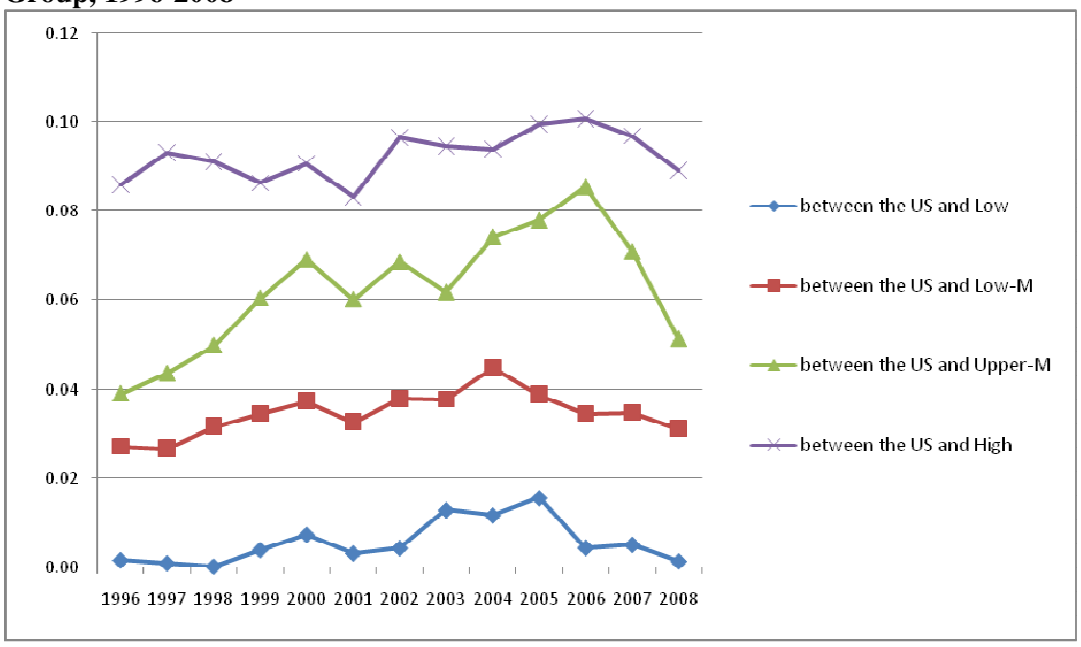
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 6: Development of Intra-Industry Trade, Auto-Parts, 1996-2008



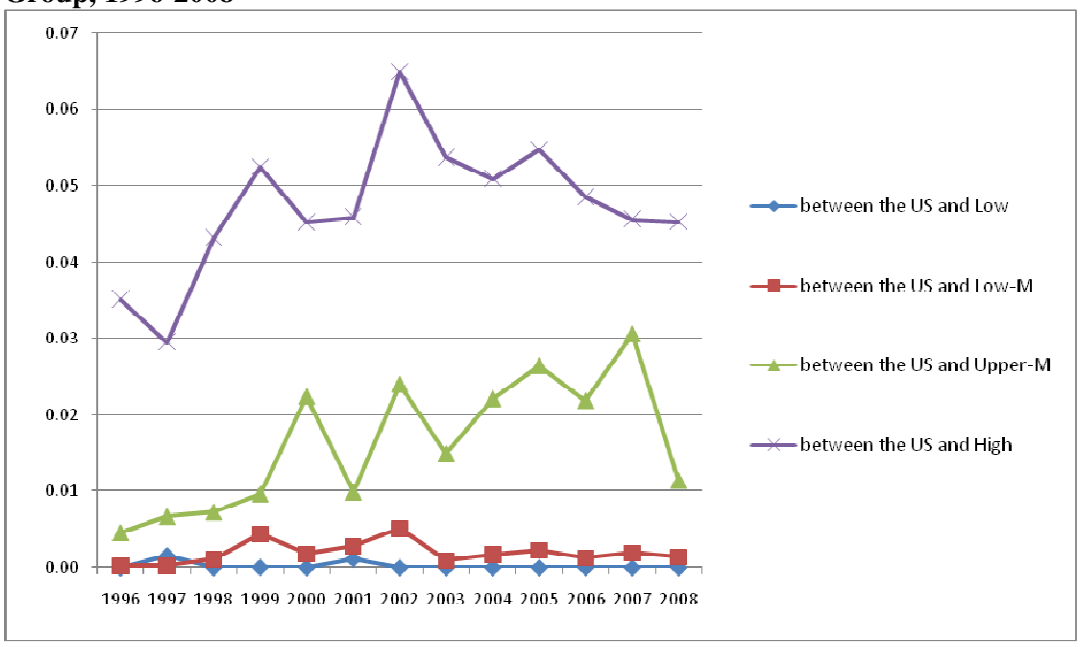
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 7: Development of Intra-Industry Trade, Auto-Industry Products, by Income Group, 1996-2008



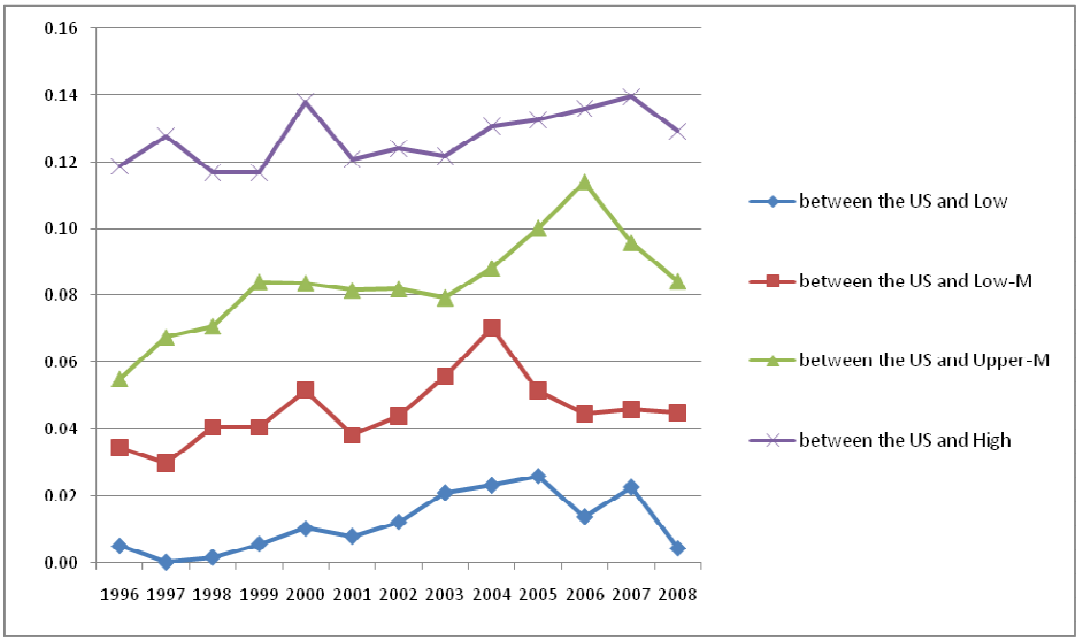
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 8: Development of Intra-Industry Trade, Motor Vehicle Products, by Income Group, 1996-2008



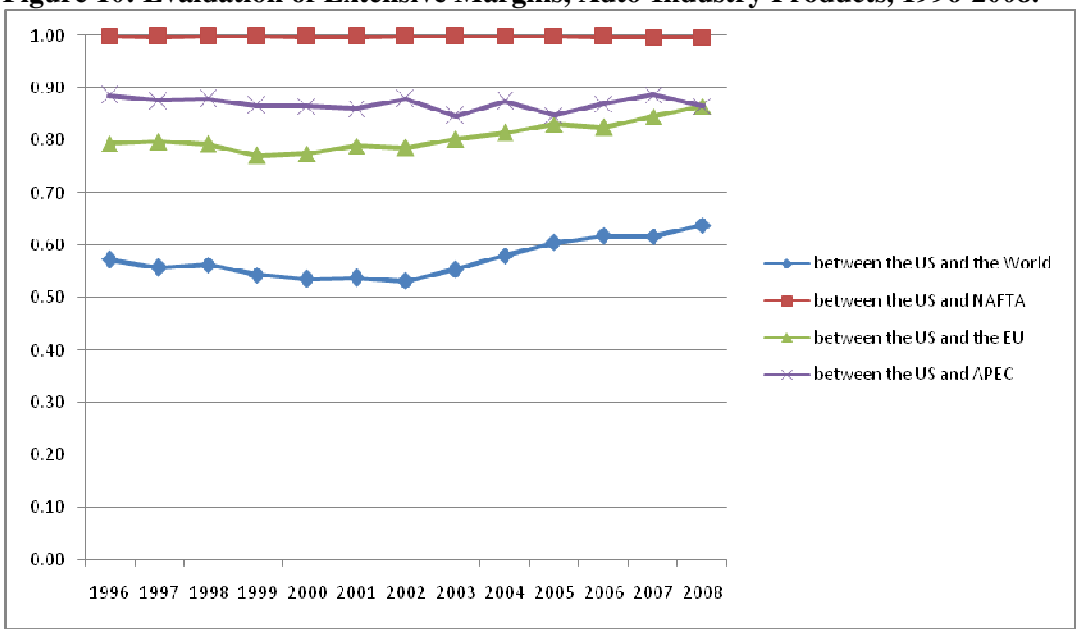
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 9: Development of Intra-Industry Trade, Auto-Parts, by Income Group, 1996-2008.



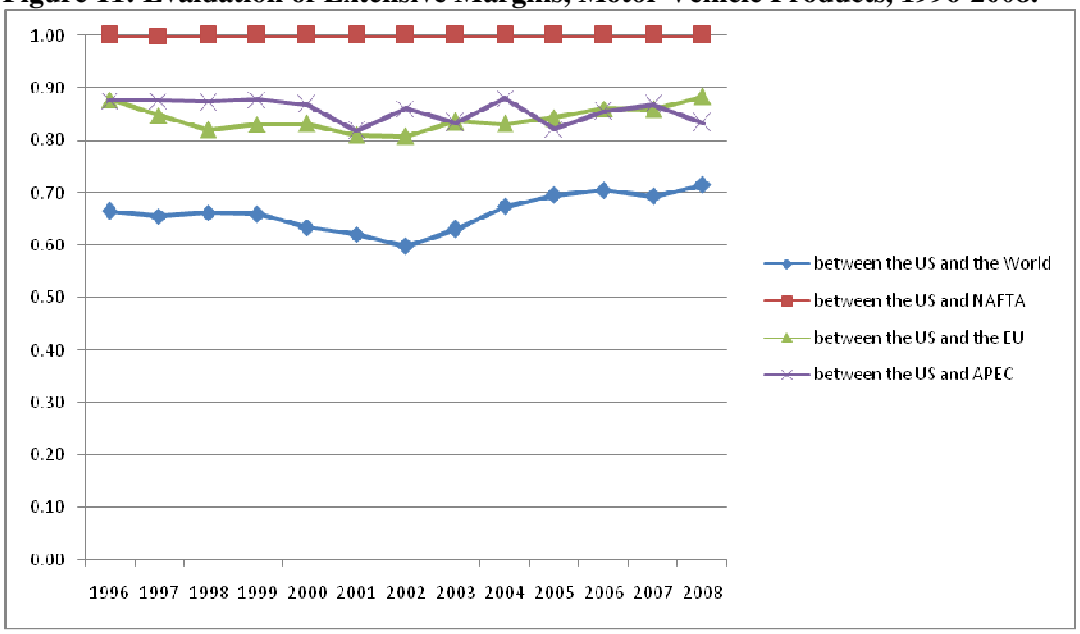
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 10: Evaluation of Extensive Margins, Auto-Industry Products, 1996-2008.



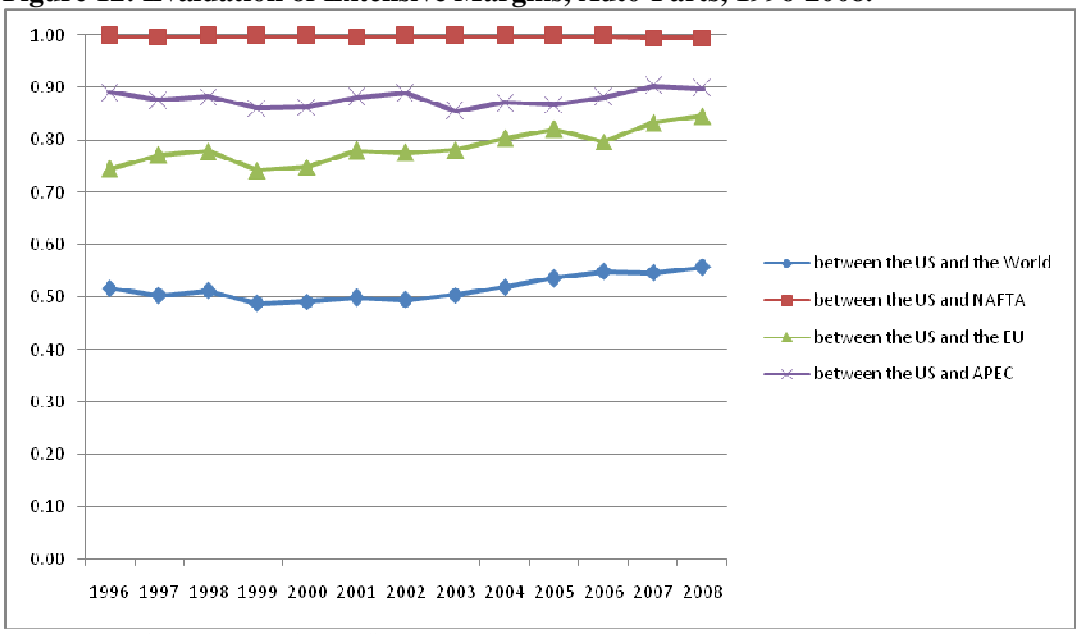
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 11: Evaluation of Extensive Margins, Motor Vehicle Products, 1996-2008.



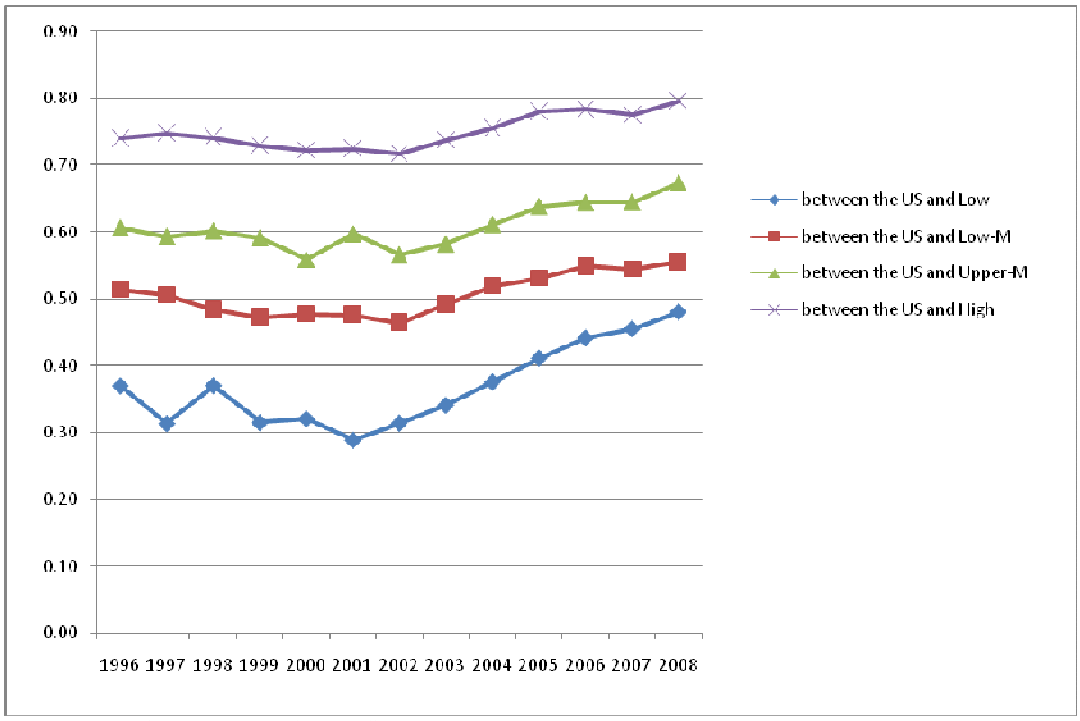
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 12: Evaluation of Extensive Margins, Auto-Parts, 1996-2008.



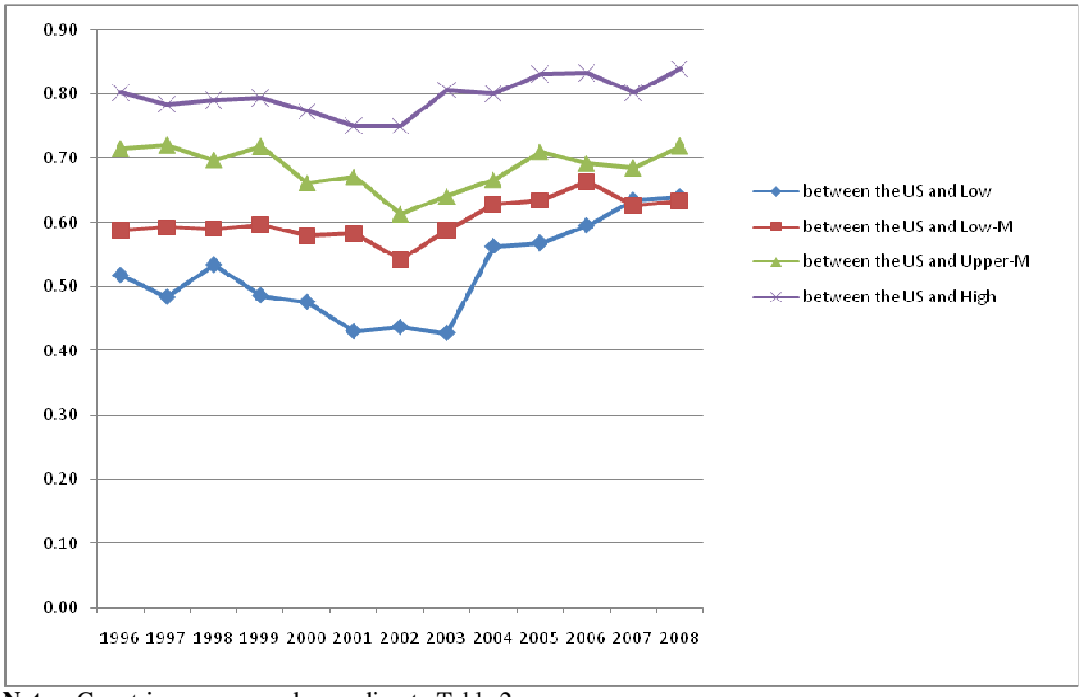
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 13: Evaluation of Extensive Margins, Auto-Industry Products, by Income Group, 1996-2008.



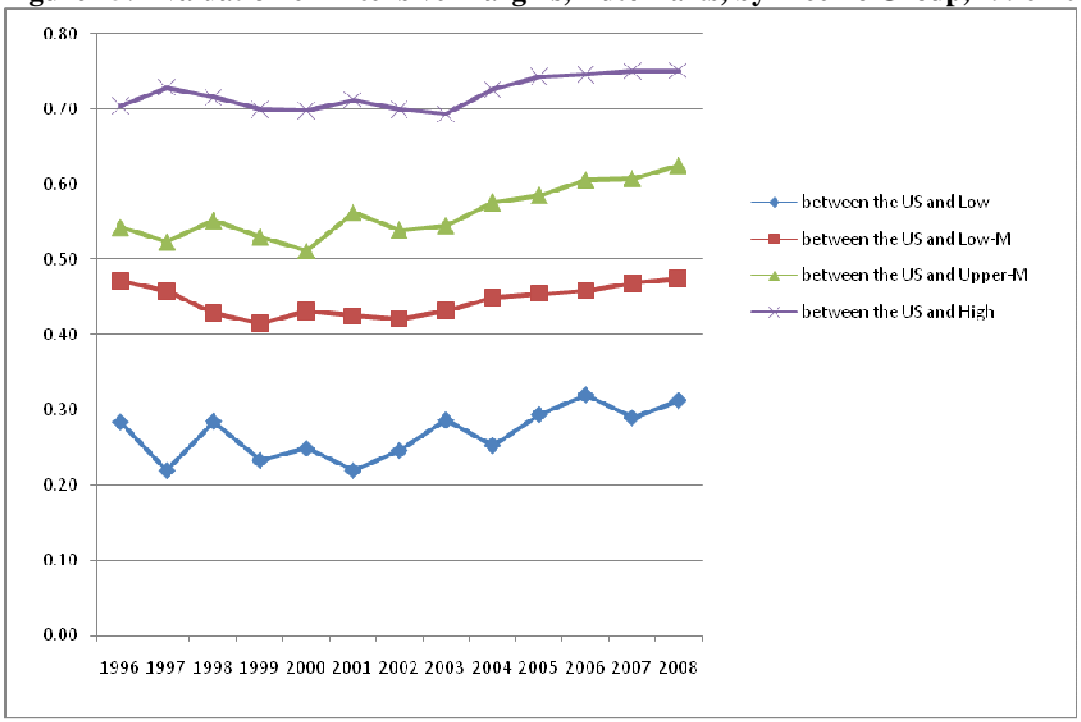
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 14: Evaluation of Extensive Margins, Motor Vehicle Products, by Income Group, 1996-2008.



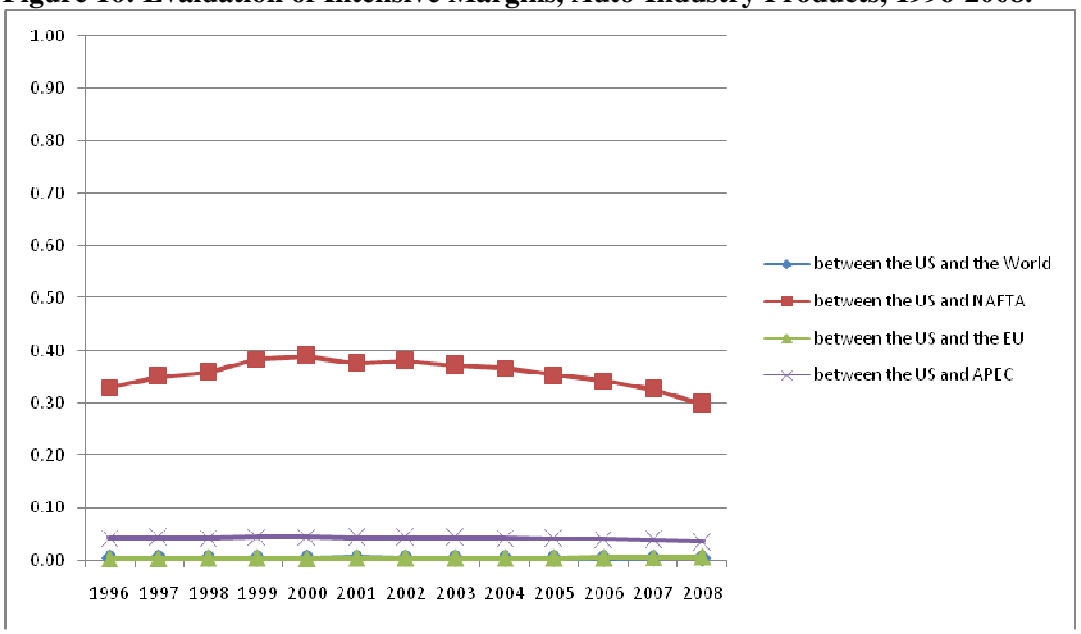
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 15: Evaluation of Extensive Margins, Auto-Parts, by Income Group, 1996-2008.



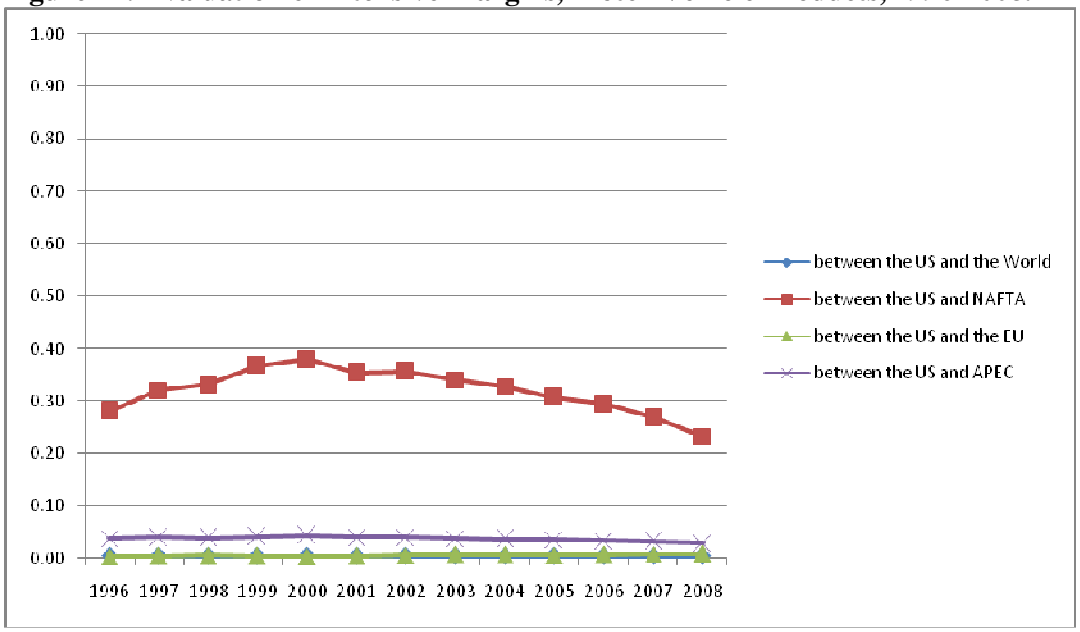
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 16: Evaluation of Intensive Margins, Auto-Industry Products, 1996-2008.



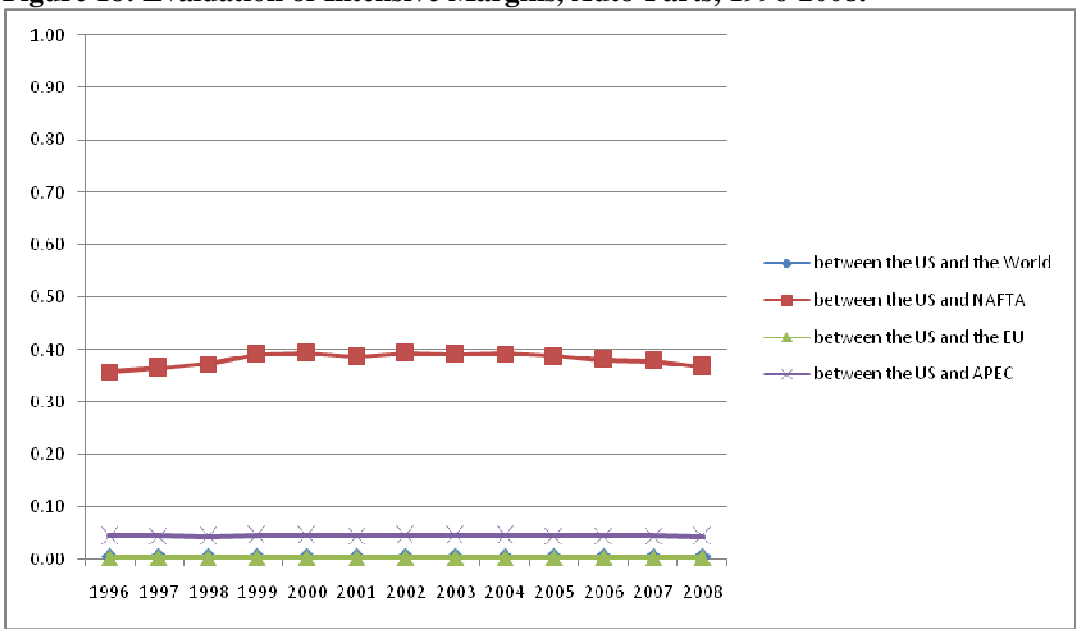
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 17: Evaluation of Intensive Margins, Motor Vehicle Products, 1996-2008.



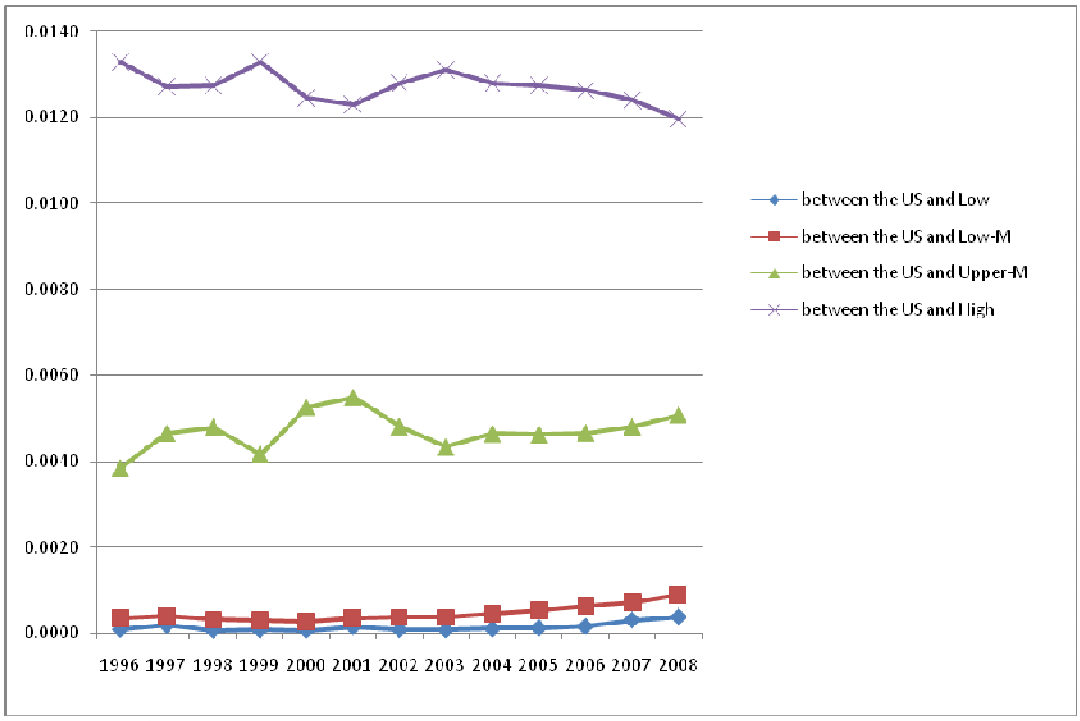
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 18: Evaluation of Intensive Margins, Auto-Parts, 1996-2008.



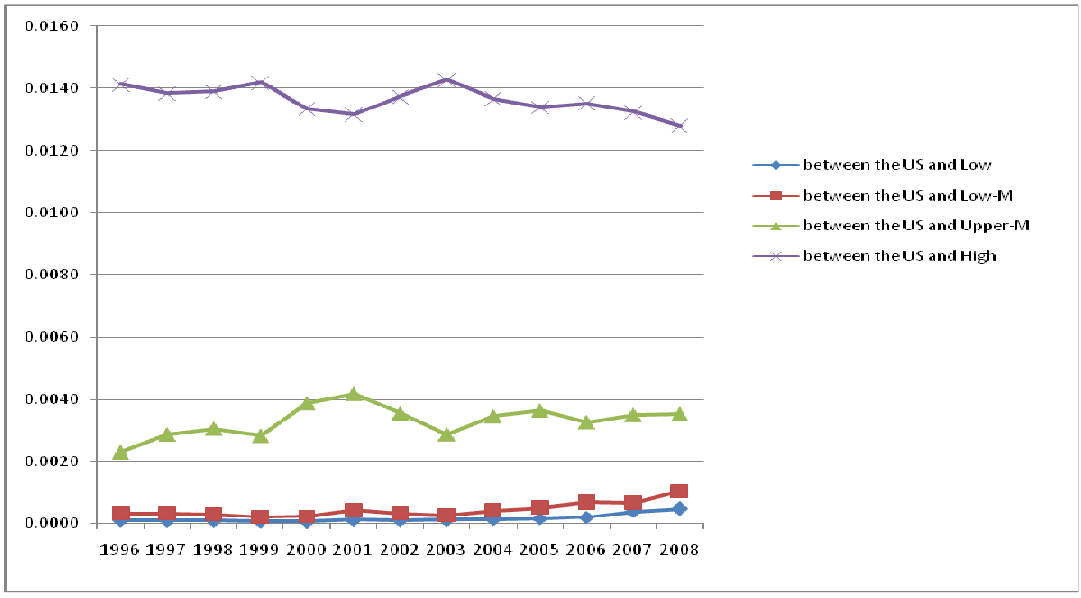
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 19: Evaluation of Intensive Margins, Auto-Industry Products, by Income Group, 1996-2008.



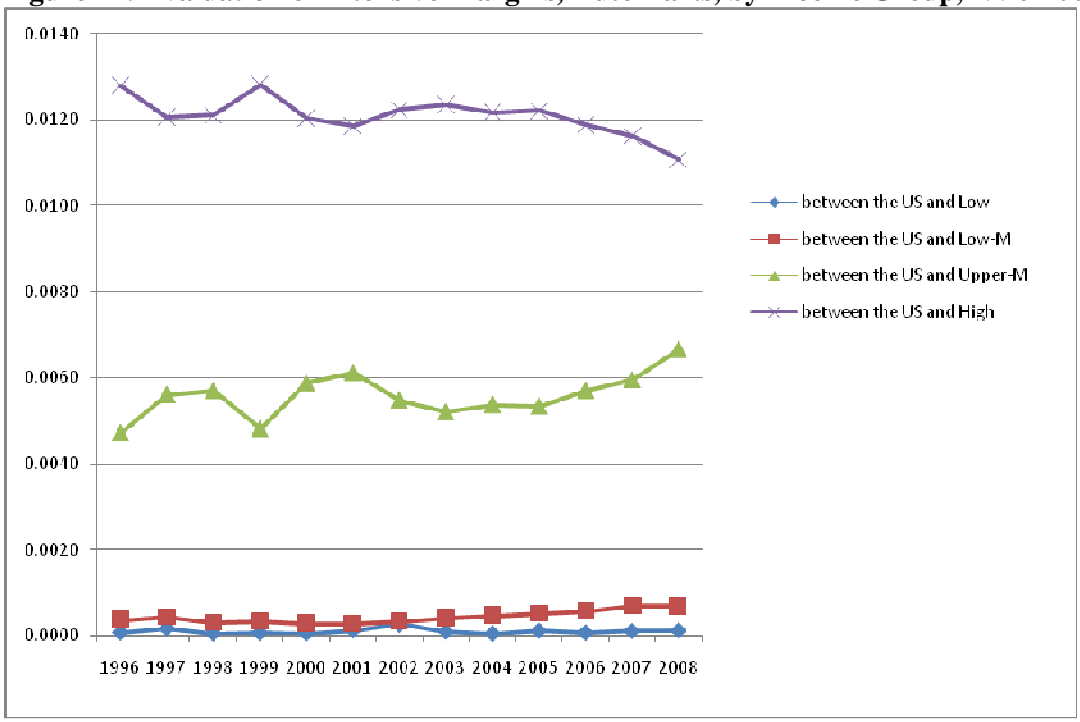
Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 20: Evaluation of Intensive Margins, Motor Vehicle Products, by Income Group, 1996-2008.



Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Figure 21: Evaluation of Intensive Margins, Auto-Parts, by Income Group, 1996-2008.



Notes: Countries are grouped according to Table 2.
Source: USITC Dataweb, authors' own calculations.

Table 6. Determinants of Intra-Industry Trade in the U.S. Auto-Industry, 1996-2008

Independent Variables	Pooled OLS	Fixed Effects	FGLS	HT
GDP_USA_t	7.772 (2.19)[b]	6.075 (2.35) [b]	1.864 (1.57)	7.750 (2.23) [b]
$GDP\_PARTNER_{kt}$	0.770 (26.15)[a]	0.483 (0.71)	1.076 (63.74) [a]	0.776 (26.09) [a]
$DGDPPC_{kt}$	-0.232 (-3.28)[a]	0.091 (0.36)	-0.192 (-3.83) [a]	-0.232 (-3.25) [a]
EM_{kt} (auto-industry)	0.210 (8.84)[a]	0.028 (1.63)	0.026 (3.34) [a]	0.206 (8.78) [a]
IM_{kt} (auto-industry)	0.194 (2.79) [a]	-0.101 (-1.58)	0.005 (0.20)	0.190 (2.76) a
$DIST_k$	-1.182 (-10.92) [a]	-	-1.398 (-18.15) [a]	-1.190 (-10.83) [a]
R-squared	0.56	0.44		0.55
F-statistics	715.84 [a]	3.90 [a]		700.28 [a]
Wald statistic: χ^2 (6)			12,081.85 [a]	
Wooldridge test for autocorrelation: F (1,186)			16.29 [a]	
LR-test for heteroscedasticity: χ^2 (186)			1,577.20 [a]	
Chow test of FE vs OLS: F (196,2134)		234.19 [a]		
Breusch-Pagan test of RE vs OLS: χ^2 (1)			3,760.46 [a]	
Hausman test of RE vs FE: χ^2 (7)			60.49 [a]	
Hansen overid. test: χ^2 (1)				0.001
# of groups	187	187	187	187
# of observations	2,337	2,337	2,337	2,337

Notes: The dependent variable is the Box-Cox logistic transformation of the IIT in auto-industry. The extensive margin (EM) and intensive margin (IM) are also Box-Cox transformed. The parameter lamda for Box-Cox is set equal to 0.01. The other explanatory variables are in logarithmic form. Figures in parenthesis are t-statistics (Heteroskedasticity-consistent t-statistics are reported in the first and second columns. [a], [b], [c] indicate statistical significance at 1%, 5 %, and 10% levels, respectively.

Table 7. Determinants of Intra-Industry Trade in the U.S. Motor Vehicle Industry, 1996-2008

Independent Variables	Pooled OLS	Fixed Effects	FGLS	HT
GDP_USA_t	7.367 (2.50)[b]	5.163 (2.33)[b]	1.134 (1.82)[c]	7.335 (2.59)[b]
$GDP\_PARTNER_{kt}$	0.610 (23.78)[a]	-0.329 (-1.50)	0.394 (19.87)[a]	0.620 (23.39) [a]
$DGDPPC_{kt}$	-0.783 (-7.13)[a]	0.532 (1.29)	-1.094 (-13.33)[a]	-0.779 (-6.79) [a]
EM_{kt} (motor vehicle)	-0.040 (-1.90)[c]	-0.001 (-0.02)	0.001 (0.07)	-0.034 (-1.64)
IM_{kt} (motor vehicle)	0.412 (6.30)[a]	-0.058 (-0.80)	0.014 (1.16)	0.377 (5.86) [a]
$DIST_k$	-0.244 (-2.74)	-	-0.318 (-7.13)[a]	-0.254 8-2.76) [a]
R-squared	0.48	0.44		0.46
F-statistics	253.28[a]	3.44 [a]		239.04 [a]
Wald statistic: χ^2 (6)			10,008.64[a]	
Wooldridge test for autocorrelation: F (1,186)			6.76[b]	
LR-test for heteroscedasticity: χ^2 (186)			46.108.55[a]	
Chow test of FE vs OLS: F (196,2134)		192.41[a]		
Breusch-Pagan test of RE vs OLS: χ^2 (1)			3,175.34[a]	
Hausman test of RE vs FE: χ^2 (7)			72.44[a]	
Hansen overid. test: χ^2 (1)				0.001
# of groups	187	187	187	187
# of observations	2,337	2,337	2,337	2,337

Notes: The dependent variable is the Box-Cox logistic transformation of the IIT in motor vehicle industry. The extensive margin (EM) and intensive margin (IM) are also Box-Cox transformed. The parameter lamda for Box-Cox is set equal to 0.01. The other explanatory variables are in logarithmic form. Figures in parenthesis are t-statistics (Heteroskedasticity-consistent t-statistics are reported in the first and second columns. [a], [b], [c] indicate statistical significance at 1%, 5 %, and 10% levels, respectively.

Table 8. Determinants of Intra-Industry Trade in the U.S. Auto-Parts Industry, 1996-2008

Independent Variables	Pooled OLS	Fixed Effects	FGLS	HT
GDP_USA_t	6.018 (1.59)	4.876 (1.82)[c]	2.434 (1.80)[c]	6.006(1.62)
$GDP\_PARTNER_{kt}$	0.713 (21.12)[a]	0.785 (0.93)	1.095 (54.76)[a]	0.720 (21.13) [a]
$DGDPPC_{kt}$	-0.236 (-3.12)[a]	-0.027 (-0.13)	-0.365 (-6.06)[a]	-0.237 (-3.10) [a]
EM_{kt} (auto-parts)	0.225 (9.84)[a]	0.042 (1.61)	0.031 (3.81) [a]	0.221 (9.74) [a]
IM_{kt} (auto-parts)	0.174 (2.65)[a]	-0.089 (-1.52)	0.017 (0.74)	0.170 (2.61) [a]
$DIST_k$	-1.312 (-11.58)[a]	-	-1.392 (-17.55) [a]	-1.319 (-11.46) [a]
R-squared	0.55	0.46		0.54
F-statistics	766.90[a]	5.30[a]		748.51 [a]
Wald statistic: χ^2 (6)			9,955.76	
Wooldridge test for autocorrelation: F (1,186)			13.05 [a]	
LR-test for heteroscedasticity: χ^2 (186)			1,690.98 [a]	
Chow test of FE vs OLS: F (196,2134)		200.91 [a]		
Breusch-Pagan test of RE vs OLS: χ^2 (1)			3,348.97 [a]	
Hausman test of RE vs FE: χ^2 (7)			51.55 [a]	
Hansen overid. test: χ^2 (1)				0.001
# of groups	187	187	187	187
# of observations	2337	2337	2337	2337

Notes: The dependent variable is the Box-Cox logistic transformation of the IIT in auto-parts industry. The extensive margin (EM) and intensive margin (IM) are also Box-Cox transformed. The parameter lamda for Box-Cox is set equal to 0.01. The other explanatory variables are in logarithmic form. Figures in parenthesis are t-statistics (Heteroskedasticity-consistent t-statistics are reported in the first and second columns. [a], [b], [c] indicate statistical significance at 1%, 5 %, and 10% levels, respectively.