

# Driving up the Local Content of Brazilian Cars:

The Inovar-Auto Program and Supply Chain Strategy



**A BrazilWorks Briefing Paper  
September 2015**

**By Etienne Michaud**

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# Driving up the Local Content of Brazilian Cars: Inovar-Auto and Supply Chain Strategy

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## FOREWORD

*By Mark S. Langevin, Ph.D., Director of BrazilWorks*

BrazilWorks is pleased to publish this BrazilWorks Briefing Paper, “Driving up the Local Content of Brazilian Cars: The Inovar-Auto Program and Supply Chain Strategy”\*\* written by Etienne Michaud. Mr. Michaud’s work on Brazilian industrial policy makes an important contribution to understanding development and industrial policy experiences, outcomes and evolving alternatives during the first half of the twenty-first century. This briefing follows up on his BrazilWorks Briefing Paper published earlier this year, “Assembling the World’s Most Expensive iPhone: Global Value Chains, Industrial Policy and Electronics in Brazil”.

In this briefing, Michaud describes Brazil’s Inovar-Auto local content policy for automobile manufacturing within the context of Trade-Related Investment Measures (TRIMs) and the 1994 TRIMs agreement of the World Trade Organization (WTO), analyzes its role in the supply chain strategy of major global automobile manufacturing firms, and summarizes the findings of his application of a partial equilibrium model to the pricing of the Brazilian car market. His report reveals the responses of the major global automobile firms to the Brazilian Inovar-Auto industrial policy and its most important outcome, namely the relocation of manufacturing facilities to Brazil.

Michaud makes a notable contribution to a scholarly understanding of developing country industrial policy and the global automotive industry, but more importantly, he provides a policy analysis that should inform the Brazilian debate precisely as the government contends with the European Union and Japan’s challenges to this local content requirement policy at the WTO. Moreover, Michaud’s analysis assists policymakers and business leaders to better understand alternatives for advancing Brazil’s economic development for decades to come.

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\*\* This BrazilWorks Briefing Paper is an edited extract of Mr. Michaud’s dissertation submitted in partial fulfillment of the requirements for a Master in International Economics at the Graduate Institute, Geneva, entitled “Trade-Related Investment Measures and Supply Chain Strategy: a Simulation of Brazilian Local Content Requirements”. Please contact the author for a copy of the research.

# Driving up the Local Content of Brazilian Cars: Inovar-Auto and Supply Chain Strategy

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## EXECUTIVE SUMMARY

- Brazil's large and growing automotive market coupled with its government's pro-active industrial policy serve as powerful magnets for foreign direct investment (FDI) in this sector. The recent decisions of global automotive players to locate or expand production facilities in Brazil are very much a response to the Inovar-Auto program, a global value chain (GVC)-oriented industrial policy introduced in 2012 under the umbrella of the Plano Brasil Maior (Bigger Brazil Plan).
- A key feature of the Inovar-Auto program is a local content requirement (LCR) incentivizing firms to carry out a minimum number of production stages in Brazil with large tax advantages (up to 30 percentage points of IPI, a value-added tax).
- This feature of the policy is being challenged by the European Union and Japan at the World Trade Organization (WTO). The LCR measures adopted to attract FDI seem to violate GATT Article III:4, as defined by the illustrative list of the Agreement on Trade-Related Investment Measures (TRIMs), and a line of defense justifying TRIMs measures on industrial development grounds is unlikely to persuade the dispute panel.
- According to my simulations, Brazilian consumers may benefit from this industrial policy through lower prices *on average*, in particular on models for which assembly is relocated from Europe to Brazil. The larger output of these cars is produced with more local content, fostering the industrial development of the country.
- However, content protection also has drawbacks. It reduces the range of segments served and may increase the price of those models for which the LCR is only marginally binding. The policy goes against its industrial development objective as long as car makers are in non-compliance and are hit by the tax hike.
- Brazil's Inovar-Auto policy has been successful from an industrial policy point of view, but this success may be transitory. If Brazil loses the Inovar-Auto case at the WTO, it may be compelled by forces beyond its control to engage and deepen its participation in the automotive global value chain (GVC). In the end, this may be the only real option for the Brazilian industry.

## I. INTRODUCTION

Brazil's development policies have attracted much fanfare and scrutiny during the past decade. Currently, Brazil's evident economic stagnation has raised questions about its national industrial policies and role in the global economy. These questions have come to a head with the emergence of an international trade dispute challenging the local content requirements (LCRs) of Brazil's Inovar-Auto policy at the World Trade Organization (WTO).<sup>1</sup> This dispute was officially lodged on December 17, 2014 following a request from the European Union (EU). The United States, Japan and Argentina joined as third parties, followed by ten other nations. According to the EU, the tax incentives granted to Brazil's electronics<sup>2</sup> and automotive industries discriminate against imported products, violating Brazil's international trade obligations (WTO 2014). A dispute panel was composed on March 26, 2015 to rule on the dispute, which is ongoing at the time of writing. The EU and third parties claim that under the requirements of Inovar-Auto inputs and equipment imported by Brazil are afforded less favorable treatment than similar nationally manufactured products (a breach of Art. III:4 of the GATT). The parties point to the 1994 Agreement on Trade-Related Investment Measures (TRIMs) that explicitly prohibits LCRs. Japan consequently requested consultations with Brazil on July 2, 2015 following similar lines as the EU.<sup>3</sup> This case calls into question several of the most important dimensions of Brazilian development policy and the ways in which public policy advances or detracts from the national economy's integration into the global economy.

In the new era of economic globalization, goods increasingly cross borders for further processing and upgrading until they are assembled into finished goods and reach final consumers. This international cooperation in production – commonly referred to as global value chains (GVCs) – was made possible by recent innovations in container shipping, air cargo and information technology that reduce the cost of transporting and coordinating complementary stages of production

around the globe (Baldwin 2006). Global assembly lines lift productivity through scale economies and a more efficient resource allocation to deliver cheaper and more sophisticated baskets of goods for consumers. This new global production paradigm also fosters development, as some countries – most of them in Asia – have worked to develop supply chain production strategies that incorporate vertical (i.e. export-oriented) foreign direct investment (FDI) targeting specific stages or “fragments” of developed countries' GVCs to “move up” the value scale over time (Gereffi et al. 2001, Baldwin 2011).

### ***The Brazilian automotive sector, a major pillar of national economic development for decades, is dependent upon foreign firms and their investment decisions.***

The world's economic center of gravity moves south, but some of the largest emerging markets maintained policies designed to protect national production and infant industries financed by domestic capital and horizontal (i.e. market-seeking) FDI (Canuto 2014). In Brazil, import-substitution industrialization (ISI) frames much of the evolution of the world's seventh largest automotive industry<sup>4</sup> and composed almost exclusively of foreign firms' subsidiaries<sup>5</sup> that manage this sector's industrial development for national and regional markets (Humphrey and Memedovic 2003). Thus, the Brazilian automotive sector, a major pillar of national economic development for decades, is dependent upon foreign firms and their investment decisions, especially as they concern Brazil's hefty barriers to trade and comparatively low domestic productivity. The 2008 global financial crisis only made matters worse by raising the price of Brazilian manufactured cars, as the national currency, the Real, appreciated and car makers increased the volume of finished imported vehicles relative to intermediate goods and auto-parts. The more

<sup>1</sup>Dispute DS472: *Brazil - Certain Measures Concerning Taxation and Charges*, the status of the dispute can be followed at [http://www.wto.org/english/tratop\\_e/dispu\\_e/cases\\_e/ds472\\_e.htm](http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds472_e.htm).

<sup>2</sup>The measures concerning electronics are reviewed in detail by Michaud (2015).

<sup>3</sup>Dispute DS497: *Brazil – Certain Measures Concerning Taxation and Charges*, the status of the dispute can be followed at [https://www.wto.org/english/tratop\\_e/dispu\\_e/cases\\_e/ds497\\_e.htm](https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds497_e.htm).

<sup>4</sup>According to the 2014 Production Statistics of the International Organization of Motor Vehicle Manufacturers (OICA).

<sup>5</sup>For example, old-fashioned Beetles, called Fusca in Portuguese, are common in Brazil and the Volkswagen Gol (meaning goal in Portuguese) was the best-selling car in the country for the last quarter of century. The cars look similar to their European counterpart but are made in and tailored for Brazil. The VW Gol, for example, has a flex-fuel engine that can be powered entirely with ethanol.

recent slide of the Brazilian Real partially rectified this situation, but uncertainties remain regarding the path of development that will follow the industry.

Today, Brazil's large and growing automotive markets coupled to the Inovar-Auto policy serve as powerful magnets for FDI in this sector. The Renault-Nissan alliance was first to announce a \$1.5 billion investment project to produce 23 new models of cars in Brazil (Nissan 2011). Unlike the CKD (completely knocked down) system that ships kits across borders to be assembled with little domestic value-added (Sturgeon and Florida 2000), the Renault-Nissan enterprise announced that a minimum of 65 percent of auto-parts would be produced locally. Also, between 2012 and 2014, other global automotive manufacturers kicked off similar projects with additional investments of at least \$4.1 billion (see VI Appendix), well above the annual average of \$116 million for this sector between 2007 and 2010 (UNCTAD 2013). The process of vertical industrial integration of the automotive industry in Brazil is best exemplified by the recent Fiat Chrysler Automobile project – the largest ever for the group – that includes an on-site supplier park providing 40 percent of the total 80 percent local content for each manufactured vehicle (FCA 2014). Moreover, this expanding process now includes premium brands with the recent installation by BMW, Mercedes and Land Rover of facilities for passenger car manufacturing to serve the national and South American markets. These examples of foreign automotive firm investment in Brazil confirm a rapid and decisive shift in these companies' supply chain strategy.

***The decisions to locate or expand production facilities in Brazil are very much responses to the Inovar-Auto program, a GVC-oriented industrial policy introduced in 2011.***

The decisions of global automotive players to locate or expand production facilities in Brazil are very much responses to the Inovar-Auto program, a GVC-oriented industrial policy introduced in 2012 under the umbrella of the Plano Brasil Maior, or Bigger Brazil Plan (MDIC 2011). Under the program, Brazil offers substantial tax incentives conditioned upon an LCR defined as a minimum number of production stages carried out by the MNEs or suppliers within Brazilian

territory, Mercosur or Mexico. Under the Inovar-Auto program, Brazil succeeded in retaining and upgrading the regional automotive value chain within which it plays a central role. This LCR policy is stereotypical of a broader global trend of increasing local content protectionism since the global economic crisis. Since 2008, Hufbauer et al. (2013) identified as many as 112 LCR measures implemented around the world and affecting approximately 5 percent of global trade. Of these, Brazil has implemented fifteen or just over 13 percent of the global total.

***This LCR policy is stereotypical of a broader global trend of increasing local content protectionism since the global economic crisis.***

This BrazilWorks Briefing Paper features a description and analysis of the Brazilian LCR policy, Inovar-Auto, to deepen our understanding of current Brazilian industrial policy and possible alternatives for the future.

## II. TRIMS AND DEVELOPMENT

Given the EU and Japan's recent challenges to Brazil's Inovar-Auto LCR policy, it is important to understand such an industrial policy option from the perspective of international trade law, in particular Trade-Related Investment Measures or TRIMs. Negotiations for a multilateral agreement regulating the use of trade-distorting national investment policies were started during the Uruguay Round. The ministerial declaration published on September 20, 1986 stated that "following an examination of the operation of GATT Articles related to the trade restrictive and distorting effects of investment measures, negotiations should elaborate, as appropriate, further provisions that may be necessary to avoid such adverse effects on trade" (GATT 1986, p. 8). The TRIMs Agreement was signed in 1994, just before the creation of the WTO.

The need for these negotiations on TRIMs was brought to light by the landmark case *Canada – Administration of the Foreign Investment Review Act (FIRA)*, the first complaint related to investment measures in the history of the GATT (GATT 1984). Under FIRA, foreign investors in Canada were mandated under national law to meet the following requirements: (1) purchase a minimum share of domestic goods (LCR) and (2) export a minimum share of their total production

(export performance requirement). The dispute panel, established at the request of the United States, ruled against Canada and its LCR, arguing that it treats foreign suppliers less favorably than domestic suppliers and is inconsistent with GATT article III:4. However, the panel did not find the second requirement to be in violation of the GATT. This case set a precedent and frames international trade policy over national industrial policy.

The Uruguay Round TRIMs negotiations were marked by disagreements between developed and developing countries. Whereas developed countries argued for the ban of a large set of investment measures, developing nations tried to obtain exceptions that would allow their national industries to “catch up”. The consensus that was adopted is a quite narrow set of measures embodied in an illustrative list coupled with exceptions for developing countries under Article 4, which only includes exceptions based on balance-of-payments related difficulties (GATT 1994).

***As a matter of fact, India and Brazil did not stop using LCRs to promote their domestic industries following the signature of the Agreement on TRIMs.***

The strong advocacy of developing countries led by Brazil and India during the negotiation and implementation of this agreement reveals the rationale guiding the formulation of Brazil’s developmentalist industrial policy framework and the Inovar-Auto policy. On October 9, 2002, the two countries submitted a proposal to the Committee on TRIMs to carry out a quantitative study on the effects of a reduction in TRIMs on the industries of developing countries and to amend Article 4 to give the “South” more flexibility to use TRIMs for development purposes (ICTSD 2002, p. 9). Since the 1994 agreement was enacted, Brazil and India have advocated a number of exceptions, including four that are relevant to examining the Inovar-Auto policy and listed below (WTO 2005, pp. 1-2):

- *“Promote domestic manufacturing capabilities in high value-added sectors or technology-intensive sectors;”*
- *“Stimulate the transfer or indigenous development of technology;”*
- *“Stimulate environment-friendly methods or products and contribute to sustainable development;”*

- *“Promote small- and medium-sized enterprises as they contribute to employment generation.”*

The proposed study to examine the possible effects of greater TRIMs flexibility for developing countries was never conducted due to a lack of consensus, and the requested exceptions were also not amended to the final agreement. However, the Brazilian and Indian positions on TRIMs reveals how these countries understand their industrial development, including how international trade law may constrain industrialization and broader national development initiatives. As a matter of fact, India and Brazil did not stop using LCRs to promote their domestic industries following the signature of the Agreement on TRIMs. Instead, both nations launched particularly successful policies targeting FDI from global car manufacturers.

In India, large tariffs on cars were already in place, but in 1997 the country opened up to foreign investment, under specific conditions. To enter the country, car makers had to sign a Memorandum of Understanding, a type of public-private contract including an LCR provision set at 50 percent by the third year and 70 percent by the fifth year. Automotive MNEs from the United States, Europe and Japan consequently set up operations in the country. This led the European Communities and the United States to officially complain at the WTO for violation of GATT article III and TRIMs article 2. The panel in *India – Measures Affecting the Automotive Sector* ruled in favor of the complainants, confirming the enforcement of the agreement on TRIMs. In doing so it also rejected the balance-of-payment justification, putting the burden of proof on India and arguing that it did not receive the necessary evidence justifying such a situation (Bagwell and Sykes 2004, pp. 160-161). Although India did appeal the decision, it later reversed its position and withdrew the appeal on March 14, 2002.

***In five years, seven new lead firms started to produce in Brazil and installed capacity increased by almost 40 percent.***

In Brazil, a 60 percent LCR for the automotive sector coupled with a trade balancing requirement was put in place in December of 1995. MNEs assembling in the country were offered reductions on import tariffs for final goods and for auto-parts until 2001. In five years, seven new lead firms started to produce in Brazil and installed capacity increased by almost 40 percent

(Humphrey 2003, pp. 128-129). These measures led Japan, the United States and the European Communities to individually request consultations with Brazil at the WTO between 1996 and 1997, but the establishment of a compliance panel was never requested (WTO 1996).

***FDI decisions are likely to change the path of industrialization in the long run and deepen market-based conditions to produce and sell in large emerging markets.***

Yet, Brazil is now in a difficult position considering the current dispute with the EU. The LCR measures adopted to attract FDI seem to contradict GATT Article III:4 and a line of defense justifying TRIMs measures on industrial development grounds is unlikely to persuade the dispute panel. However, the Brazilian Inovar-Auto policy may have already achieved measurable success. For example, India benefited from a reprieve of four years during which it attracted FDI and developed domestic automotive capabilities, possibly deepening the country's comparative advantage in automotive manufacturing. The period coincides almost exactly with the rise of the Indian automotive firm Tata Motors that launched its first fully indigenous passenger car in 1998. Moreover, Tata sold 500,000 units by 2002 and was ringing the bell of the New York Stock Exchange by 2004. Although the full effects of India's breach of the 1994 TRIMs agreement is a subject for future research, this case demonstrates the incapacity of the WTO to prevent the use of TRIMs during significant periods that may trigger snowball effects far exceeding the date of eventual compliance. Hence, developing countries such as Brazil and India may formulate LCR related policies for shorter-term implementation, especially during times of economic stagnation and crisis.

Based on simulations and variable settings (see Box 1), my findings suggest that one can estimate the damages caused to an automotive sector MNE as well as the expected shift in industrial capacity (and by extension economic activity and jobs) from the complainant to the defendant countries. Nevertheless, it is critical to note that in practice an LCR may not be the only reason that global manufacturers decide to invest and manufacture in a developing country like Brazil. Even if causality is demonstrated, these decisions are likely to change

the path of industrialization in the long run and deepen market-based conditions to produce and sell in large emerging markets. For these reasons it is necessary to examine all aspects of the Inovar-Auto policy and the WTO dispute, *Brazil – Certain Measures Concerning Taxation and Charges*.

### III. THE INOVAR-AUTO PROGRAM

Automotive goods represent a non-negligible share of households' spending and of many countries' industrial production. For both developed and developing countries, automobiles symbolize an individual's status and their production is often associated with national achievement and pride. This visibility brings politics to the center of the automotive MNEs' production strategy and leads to a strong home bias in the localization of the value chain, more often making them regional in nature rather than global (Sturgeon and al. 2008, p. 303).

***The large and growing consumer base gives the government the necessary leverage to impose domestic assembly with high levels of local content. It does so both with the carrot and the stick.***

The case of Brazil is particularly interesting in this regard. The country hosts the 7th largest automotive industry in the world, ahead of countries such as Spain, France, the United Kingdom and Italy. Yet, despite the size of the Brazilian marketplace, the country does not have any large national automobile manufacturer as it does in aviation with Embraer. Brazilian automobile manufacturing is based on the expanding presence of subsidiaries of foreign MNEs and its success is driven by the huge domestic demand that makes Brazil the fourth largest car market after China, the United States and Japan (KPMG 2013, slide 8). Despite the foreign ownership of capital, strong capabilities have been developed in Brazil since General Motors assembled its first Chevrolet in the country in 1925, making Brazil the center of a South American regional automotive value chain governed by bilateral trade agreements<sup>6</sup> and representing a third of intra-Mercosur trade in 2011

<sup>6</sup>Automotive and sugar are the two industries not covered by the Mercosur custom union (IDB 2012).

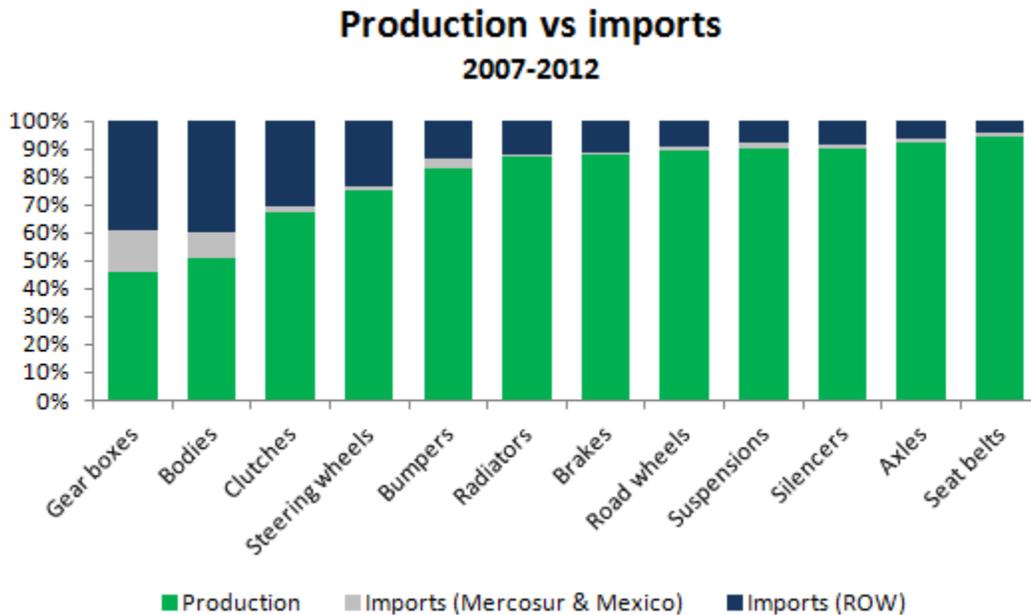


Fig. 1: Relative Shares of Brazilian Production and Import of Auto-Parts, 2007-2012.

Source: author's elaboration with data from IBGE - SIDRA and UN Comtrade.

(IDB 2012, p. 21). This large and growing consumer base gives the government the necessary leverage to impose domestic assembly with high levels of local content. It does so both with the carrot (long-term financing from the Brazilian Economic and Social Development Bank (known as BNDES) of about \$35 billion between 2002 and 2012 (UNCTAD 2013, p. 61)) and the stick (hefty tariffs and the LCRs). Figure 1 reports the relative distribution of national production and imports by automotive component as an average for the years 2007 to 2012.<sup>7</sup>

***42 percent of auto-part imports originated from the EU, as much as Argentina, Japan, South Korea, the United States and China combined.***

In absolute value, imports of auto-parts amount to over \$3.7 billion in 2010, \$5.3 billion in 2011 and \$6.4 billion in 2012. During these three years, 42 percent of this trade originated from the European Union (EU), about as much as Argentina (14 percent), Japan (11 percent), South Korea (7 percent), the United States

(7 percent) and China (4 percent) combined. This is disproportionately higher than final goods, for which the EU accounted to 13 percent of total imports.<sup>8</sup> Hence, the EU is potentially the most exposed to the consequences of an LCR in Brazil.

Brazilian trade balance in the automotive sector deteriorated sharply since the global financial crisis. In 2005, the value of Brazilian exports of motor vehicles was over five times superior to that of imports. The trade balance turned negative in 2009 and imports peaked at 1.8 times the value of exports in 2011,<sup>9</sup> despite total charges on some imported cars reaching over two-thirds of their retail price. This post-crisis trend is also confirmed by recent industry-level data from the Trade in Value Added (TiVA) initiative as reported in Figure 2.

The crisis hit the automotive industry particularly strongly and government interventions created explicit or implicit pressures to limit capacity reductions at home (Van Biesebroeck and Sturgeon 2009, p. 301). Furthermore, the Brazilian Central Bank's effort against inflation coupled with the Fed's quantitative easing led to a high interest rate gap and an overvaluation of the Brazilian Real, effectively increasing the cost of production in Brazil relative to Europe (Wise and del

<sup>7</sup>Exports or re-exports of auto-parts are low with the exception of bodies and clutches. Production and import data are reported by Brazil and can be mapped at the 6-digit level of the Harmonized System classification until 2012 for a selection of auto-parts.

<sup>8</sup>Author's calculation based on UN Comtrade data, HS codes 8701-8705 (final goods) and 8706-8708 (auto-parts).

<sup>9</sup>Exports and imports with the rest of the world in USD as reported by Brazil.

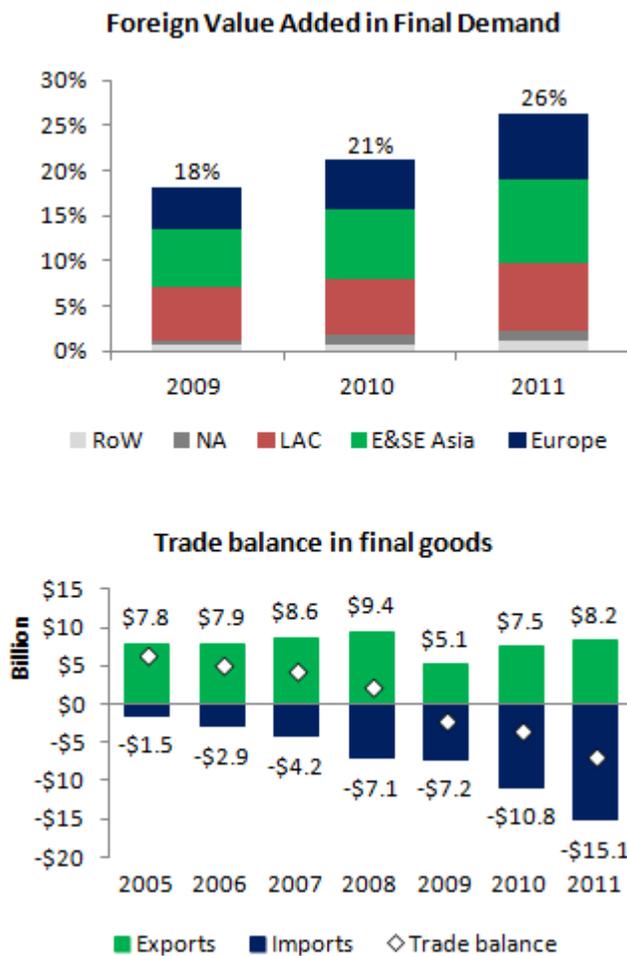


Fig. 2: The Brazilian Automotive Sector, Origin of Value Added, and Trade Balance in Finished Goods. Source: author’s elaboration with data from TiVA June 2015 Release and UN Comtrade.

Tedesco Lins 2014, pp. 172-173).

The “Program of Incentive to the Technological Innovation and the Intensification of the Productive Chain of Automotive Vehicles” (in short Inovar-Auto) that was introduced in October 2012 to answer this lack of competitiveness is a complicated regulation mixing various purposes. The scheme affects the automotive industry through the Tax on Industrialized Products (IPI), a Brazilian federal value-added tax levied on domestic or imported industrialized products at a rate specified at the highly disaggregated 6-digit HS level. For imported products, the tax is levied at the time of customs clearance on the cost, insurance and freight (CIF) value including the tariff amount:

$$Charge = Tariff + IPI + Tariff \times IPI$$

The IPI is regularly and selectively modified by executive decree and is non-discriminatory in principle, incentivizing domestic consumption of some goods

over others without regards to origin. However, on September 15, 2011 the IPI on final automotive products was increased by 30 percentage points effective immediately, and car makers became eligible for a total or partial exemption of this substantial hike on vehicles with at least 65 percent of content originating from Mercosur or Mexico (Leahy 2011). The effective ad valorem tax burden by component for January 2012 is reported in Figure 3.

On October 20, 2011, the Supreme Court of Brazil ruled that the government must grant a grace period of 90 days before the entering into force of the tax hike (PwC 2011). As a result, imports of final automotive products increased by 48 percent in Q4 2011 relative to Q4 2010 (see Figure 5), a rise mainly led by China (286 percent increase).

This temporary measure was initially supposed to remain in place until the end of 2012 but Brazil sequentially replaced the straightforward LCR with more sophisticated building blocks of a broader policy, Inovar-Auto, which quickly raised concerns at the WTO Committee on TRIMs. At their annual meeting on October 1, 2012, Brazil replied to questions from Australia and the EU, putting forward its overvalued currency and the “systemic effects of the recovery plans adopted by several developed countries to rescue their own domestic automotive industry” to justify the new five-year program designed to “allow Brazil’s domestic

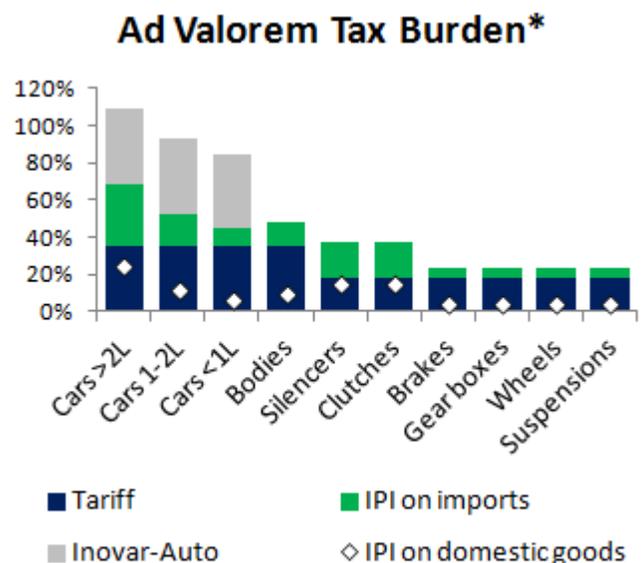


Fig. 3: Brazilian Ad Valorem Tax Burden (\*Jan 2012, exceptions and other taxes apply) for a Selection of Automotive Products.

Source: author’s elaboration with data from WTO Tariff Database and TIPI 2012.

## Box 1: Economic Impacts of LCRs: a Simulation

The tailored economic model used to simulate the expected effects of Inovar-Auto is inspired by the “spider” structure of supply chains (Baldwin and Venables 2013), a metaphor describing parts (the legs) assembled into a final product (the body). The framework considers a European MNE with market power producing different models of car for the Brazilian market that are constituted of a number of auto-parts. The location of the final assembly line and the sourcing of each auto-part are determined by the fundamental trade-off between FDI and exports; the former entails large investments in Brazil but ensures that goods are produced close to final consumers, whereas the latter concentrates production in efficient high-scale factories in Europe but requires goods to pass through steep policy and non-policy trade barriers. In addition to tariffs, key decision factors include transport and coordination costs, relative productivity and consumer demand. The LCR aspect of Inovar-Auto adds an extra constraint to the MNE’s optimization problem by setting the minimum number of auto-parts that must be produced domestically to avoid the 30 percentage point hike in value-added tax (IPI).

A probability distribution is assigned to each parameter to fit the context of Brazil and the model is operationalized through repeated iterations, both pre- and post-Inovar-Auto. The results show that Brazilian consumers may benefit from this industrial policy through lower prices *on average*, in particular on models for which assembly is relocated to Brazil. The larger output of these cars is produced with a larger share of local content (see figure 4), fostering Brazilian industrial development. But content protection also has drawbacks. The price of models for which the LCR is only marginally binding increases and some market segments may also stop being served. Furthermore, the effect of the LCR is reversed when a firm does not comply and is hit by the penalty IPI, which results in dramatic price increases and a reduction in industrialization. The LCR unambiguously trims the earnings of the MNE.

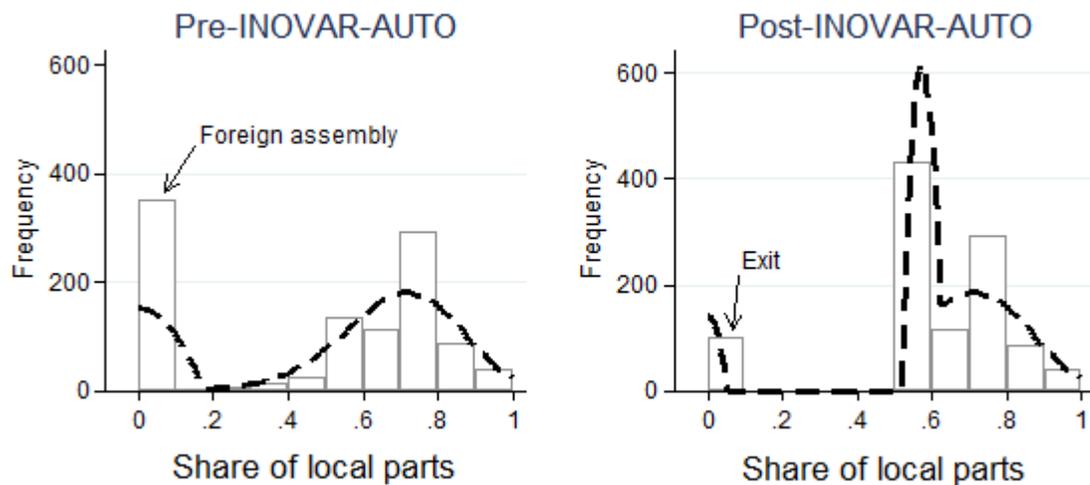


Fig. 4: Effect of LCR on the Distribution of Local Content under Compliance.

automotive industry to regain its competitiveness, provide support to technological development, innovation, safety, environmental protection, energy efficiency and improve the quality of cars, trucks, buses and auto parts” (WTO 2012, pp. 3-4). The Brazilian government approved the final decree two days later.

The Inovar-Auto program grants a partial or total refund of the extra 30 percentage point IPI to accredited

companies that manufacture, plan to manufacture, or commercialize final automotive goods under the following escalating requirements (ICCT 2013 and WTO 2013a, pp. 133 to 135):

- 1) Improve average vehicle energy-efficiency by 12 percent between 2012 and 2017;
- 2) Fulfill at least three of the four conditions below:

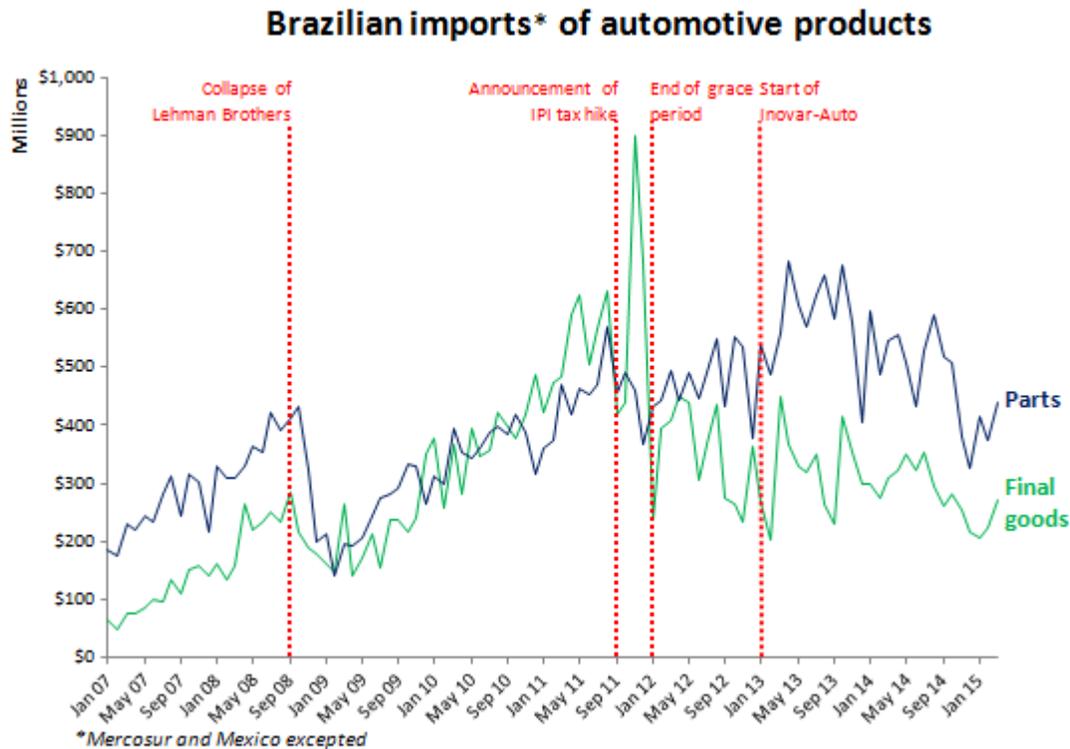


Fig. 5: Post-Crisis Composition of Automotive Imports and the Inovar-Auto “Effect”.

Source: author’s elaboration with data from AliceWeb.

- Perform a minimum number of a list of 14 defined production stages in Brazil for at least 80 percent of the fleet. In addition to final assembly and other specific tasks, these stages include the production of the motor, gear boxes, steering system and suspensions, chassis, and drive-axles and brakes. The minimum increases from 8 in 2013 to 10 in 2017.
- Invest a share of gross revenues net of sales tax from 0.15 percent in 2013 to 0.50 percent in 2017 in research and development in Brazil.
- Invest a share of gross revenues net of sales tax from 0.50 percent in 2013 to 1.00 percent in 2017 in industrial technology, engineering and supplier training.
- Comply with the Brazilian Program of Vehicle Labelling (PBEV) for a minimum percentage of sales from 36 percent in 2013 to 100 percent in 2017.

In theory, firms are thus not required to obey the LCR defined as a minimum number of production stages in order to benefit from the tax break, as long as they comply with the three other conditions. In practice, the tax break is capped at 4,800 imported vehicles per year and the tax becomes discriminatory as soon as this relatively low volume is reached. The number of

companies that had received this accreditation was 6 in the end of November 2012 and 37 in the end of May 2013 (WTO 2013b, p. 46), suggesting a high level of compliance. In this sense, Inovar-Auto was successful in pulling FDI from the global automotive sector for national manufacturing, so successful that it is now being challenged in a WTO dispute panel.

#### IV. CONCLUDING REMARKS

Although the results of the LCR on trade in finished automotive goods have been felt almost instantly, the impact of large-scale investments on production takes time to materialize. In Brazil, only recently have cars been rolled out from MNE assembly lines under the Inovar-Auto policy, and the introduction of additional, planned MNE assembly lines will become operational in the coming years (Appendix 1). This calls for an ex-post validation of the results found in my simulation, especially the expected fall in the price level and increase in domestic content of models found in the Brazilian market. Very detailed production data that can be mapped with trade data at the disaggregated 6-digit HS level is publicly available,<sup>10</sup> but the databases

<sup>10</sup>See “Table 3463 – Production and sales of industrial products and services per activity and product (Prodlist Industria)”, Banco de Dados Agregados, IBGE.

derived from firm surveys take about the same time to build as automobile plants, the latest year currently available being 2012. This holds true for GVC data as well. The June 2015 TiVA release<sup>11</sup> brings particularly interesting insights on the value added embodied in final goods at the sector-level and for a wide range of countries, including Brazil, but the most recent available data is for the year 2011. Further research could consider which auto-parts have been relocated and relate this choice with the comparative advantages of Brazil. The value-added content of final goods may be informative with respect to the losses incurred by other countries' manufacturing base due to Brazil's automotive sector LCR.

***If Brazil loses the Inovar-Auto case at the WTO, it may be compelled by forces beyond its control to engage and deepen its participation in the automotive GVC.***

The development of the WTO dispute will also be a matter of interest. Looking back at past TRIMs disputes indicates that Brazil is likely to be recommended by the WTO panel to curtail the LCR aspect of Inovar-Auto. Indeed, LCRs are explicitly prohibited by the illustrative list of the Agreement on TRIMs despite the failed attempts by Brazil and India to include a "pro-development" exception to Article 4. Even so, similar industrial policies introduced in the past have been successful in attracting large investments of MNEs at the expense of foreign industries, and the WTO lacks a credible enforcement mechanism that can quickly deter such practices and compensate third parties for their measurable harm.

Brazil's Inovar-Auto policy has been successful from an industrial policy point of view, but this success may be transitory since the WTO dispute could lead to significant policy modifications that undermine its purpose. Brazil needs policy reforms that encourage FDI as a lynchpin for innovation and international competitiveness. This approach would lessen the need for discriminatory policies that protect national industry, but prevent Brazil from developing firm-based competitive advantages in higher value-added segments oriented towards exports. If Brazil loses the Inovar-

Auto case at the WTO, it may be compelled by forces beyond its control to engage and deepen its participation in the automotive GVC. In the end, this may be the only real option for the Brazilian industry.

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## VI. APPENDIX: PLANNED AUTOMOTIVE INVESTMENT PROJECTS ANNOUNCED SINCE SEPTEMBER 2011.

Brand	Press release / opening	Investment	New capacity cars / year	Models	Miscellaneous
Renault-Nissan	Oct 2011 / 2014	\$1.5bn	200,000	23 models and engines	>65% local content. Extra \$224m announced in April 2014.
Toyota	Aug 2012 / 2015	\$495m	n.a.	Engines	200,000 engines per year. Extra \$26m announced in January 2015 for Etios model.
BMW	Oct 2012 / 2014	\$154m	30,000	n.a.	First car plant in Brazil
Honda	Aug 2013 / 2015	\$360m	120,000	Fit-class compact	Capacity doubled
Audi	Sep 2013 / 2015	\$222m	26,000+	A3, Q3 compact SUV	Plant re-opening
Mercedes	Oct 2013 / 2016	\$360m	20,000	C-Class and GLA	First car plant in Brazil
VW	Oct 2013 / n.a.	\$236m	+20%	Golf	Plant extension
General Motors	Aug 2014 / 2018	\$2.9bn	n.a.	Auto-parts	Increase in share of locally produced auto-parts. Extra \$1.9b announced in July 2015.
Land Rover	Dec 2014 / 2016	\$290m	24,000	Discovery Sport	First fully-owned plant outside the UK

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