
The transition of Mexico's automobile industry from its birth to 2016: The past and the future in view of the new Trump administration in the United States

Yasuhiko Kawabe

Hosei University Department of Economics

Hosei University, Japan

Previous Nissan Motor Co., Ltd.

Toshiyuki Baba

Department of International Economics

Hosei University, Japan

Institute of Research on Labor and Employment

UC Berkeley, USA

Keywords: Mexico, Latin America, Nissan, Tsuru, Volkswagen Beetle, Trump administration, automobile parts industry development, import and export, international competitiveness

1. Introduction: Research Purpose and Background

This paper aims to consider the progress of the automobile industry in Mexico, from its birth in the early 20th century until 2016. One of the authors was engaged in Mexico's automobile industry as an employee of Japanese OEM manufacturer Nissan from 1983 to 2012. He is currently engaged in automobile promotion with ProMexico, a Mexican corporation. The authors would also like to consider future situations after 2017, based on the fact findings revealed in our analysis.

Mexico produced 3.6 million automobiles in 2016, or seventh globally, with a share of 3.8% in world automobile productions according to the Organisation Internationale des Constructeurs d'Automobiles (OICA).ⁱ While Brazil has produced 2.2 million units as the 10th worldwide, and Argentina has produced 473,000 units as the 25th, Mexico has become the top automobile-producing country in Latin America. Further, Mexican automobile production is characterized by approximately 80% of its units intended for export,ⁱⁱ with most for the United States. The Mexican automobile industry began in the early 20th century, with most automobile production at the time

aimed toward the domestic market. From the late 1980s to early 1990s, the nation's share of exports gradually expanded (Carrillo 2004).ⁱⁱⁱ The Mexican automobile industry's trends changed in this period, from an import substitution to export-oriented. After the 1994 North American Free Trade Agreement (NAFTA) began, this trend became increasingly stronger. Currently, the new Trump administration in the United States has expressed particular concern regarding the current condition of the automobile industry between Mexico and the United States. The Mexican automobile industry would face a difficult situation if it were to choose to considerably reduce Mexican automobile exports to the United States. It is critical to consider how this has occurred.

2. Analysis: Method and Data

The authors wish to consider the future of the Mexican automobile industry by analyzing it from its early automobile production to a recent stage in 2016. Various viewpoints are used, such as key milestones, automobile manufacturers' management strategies, international competitiveness of automobile and auto parts, and the international value chain of automobiles and auto parts. The authors calculate the international competitiveness of automobile and auto parts by using trade statistics from the UN Comtrade international trade statistics database.^{iv} The global competitiveness index (GCI) is also used as an indicator of international competitiveness (Baba 2016).^v The GCI ranges from -1 to 1; values close to 1 indicate strong international competitiveness, and those close to -1 indicate weak international competitiveness. The authors also analyze automobile and auto parts' international value chains through the UN Comtrade's trade statistics. The Mexican auto industry's progress is divided into six periods to consider key milestones and management strategies: The first period is from the 1920s to 1960s, or the Mexican automobile industry's early stage. The second period is from the 1960s to 1980s, or from CKD production to the increase of domestic procurement; this period is analyzed using a case study from Nissan's factory. The third period is the 1990s, which includes further increases in domestic procurement, analyzed through a case study of Tsuru. The fourth period is the 2000s, in which thoughts spread regarding the importance of quality and durability in Mexican automobile parts suppliers. The fifth period occurs from 2010 to 2016, which involves Mexico's increasing influence. The sixth period will occur after 2017, and especially concerns the new Trump administration.

3. Present Situation in Mexico^{vi}

As Figure 1 illustrates, Mexico's population in 2015 was 127 million with land area of 1.9 million square km, a nominal gross domestic product (GDP) of 1.1 trillion USD, and gross national income (GNI) per capita was 9,710 USD; the World Bank classifies these characteristics as an upper-middle-income economy. The population in 2010 was 119 million, the nominal GDP was 1.1 trillion USD, and the GNI per capita was 8,840 USD. The population in 1990 was 85.6 million, the nominal GDP was 262.7 billion USD, and the GNI per capita was 2,750 USD. This indicates a change in classification from the previous year of 1989, from a lower-middle-income to an upper-middle-income economy. Figure 1 demonstrates that although the economic situation has fluctuated in the short-term, Mexico's economy and population has been expanding in the long-term.

According to the OICA, 3.6 million automobiles were produced in 2016, or seventh worldwide; 35.8 million automobiles were used in 2014, or a motorization rate of 289 (number of vehicles / 1,000 inhabitants), as Figure 1 illustrates. The average motorization rate worldwide in 2014 was 180, with the United States at 808, Europe at 464, and Japan at 607. Mexico is currently a country representative of automobile production and use.

4. Historical Review of Nissan's Automobile Production in Mexico

4.1 The Early Stage of the Mexican Automobile Industry: 1920s to 1960s

Mexico has a long history of automobile production, with its first automobile assembly plant established in 1901 by Daimler and Renault.^{vii} However, the plant was small and ceased production several months later due to the 1910 Mexican Revolution.

Mexico's substantial automobile assembly began in the 1920s, as Buick established a small plant in 1921.^{viii} Ford established its first large-scale automobile plant in Mexico in 1925,^{ix} and General Motors built an assembly plant outside Mexico City in 1935.^x The Automex Company began its operations in 1938 and first produced 50 units a month;^{xi} it was initially Mexican-owned, but Chrysler later purchased one-third of its stock in 1959. Volkswagen began its assembly in Mexico in 1964 in the Xalostoc region, and the first Beetle was manufactured three years later at Puebla, which was the second-largest plant in the entire corporation at the time.^{xii}

Although many global automobile OEM manufacturers already had automobile assembly operations in Mexico by the 1960s, they assembled using a CKD production style; for example, Volkswagen imported CKD parts from Brazil. Nissan was the first automobile assembler to use a full production style, and not merely downward assembly.

4.2 The Start of Nissan in Mexico and Increase in Domestic Procurement: 1960s to 1980s

Nissan, Mitsui & Co., and Itochu began to invest in Mexico in 1955, and Mexico Nissan was established in 1961.^{xiii} They began assembling Datsun's Bluebird 411 sedan in 1966, as Nissan's first overseas production in Cuernavaca, Mexico (Figure 2).^{xiv} Although Nissan's shares were far surpassed by other companies in Mexico at the time, such as Volkswagen, the former decided to build a production plant for engines and transmissions. The company also settled its R&D department there to conduct manufacturing processes in Mexico. It began exporting automobiles overseas in 1971, beginning in Latin America. In 1991, the local content was less than 20%. At that time, it only assembled only.

In 1983, Nissan purchased vast areas of grape fields near the airport in Aguascalientes to realize its long-term vision of automobile production in Mexico (Figure 2). The company hired farmers and trained them gradually. The company established its second factory there for the following reasons: an abundant water supply, proper access to everywhere in Mexico, cheap labor costs, the location had a positive relationship with companies and employee's unions, and favorable support from the local government,^{xv} and note that these reasons are still effective. In 1980 when just before establishing the factory of Aguascalientes, the local content was 40%. It assembled engines and manual transmissions then, adding to automobile itself. The company began assembling automobiles in Aguascalientes factory in 1992.

4.3 Big Step to Gain Top Position in Latin America: 1990s—Modifying Tsuru

Substantial changes began in the 1990s. Nissan moved its R&D department from Cuernavaca to Toluca in 1994. The Nissan Technical Center - Mexico was established there to improve their R&D, and the facility included an airport especially for the company's distribution (Figure 2). Further, OEM manufacturers in the European Union, such as Mercedes or Audi, had also invested there, as the location was useful for both air and land distribution. Nissan later moved its procurement and distribution department to the same location; this move strengthened their abilities in both R&D and procurements and distributions by establishing larger departments in Latin America.

Nissan and Volkswagen were highly competitive in their domestic market shares at the time. Nissan first sold its Tsuru (known as the Sentra in the United

States) in 1984, with the “Sunny” base model priced at 880,000 JPY (7,900 USD) in the early 1990s. Volkswagen then priced its Beetle at 650,000 JPY (5,800 USD). Beetle was produced using the CKD style then. Nissan attempted to reduce production costs for its Tsuru B13 model by collaborating with a specialist with special R&D knowledge, and succeeded in reducing the sales price to 600,000 JPY (5,400 USD), which was less expensive than Volkswagen’s model.

4.4 Key Points to Reduce Production Costs of the Tsuru “Popuraru”

The local content before Tsuru reform was 70%. Though main parts were procured domestically then, some parts were still imported as knock down parts. Auto parts which were depended on imports then, were a part of some parts and chemicals such as follows ; oils; paints and coating materials; rubber hoses; switches; visors; exhaust pipes. After finishing Tsuru reform, local content became up to 90%. Only small volume parts which were used differently in each models, were continuously imported, because of cost merits.

How did Nissan succeed in price reduction to compete with Volkswagen Beetle? At that time, they established targets of more than 80. High priority targets were as follows:

1. To maintain engine, transmission, brake, suspension, and handling performance.
2. To modify the engine system’s joint exhaust pipe styling.
3. To reduce tires’ rim thickness, but to maintain strength in iron wheel discs.
4. Discontinue the use of plates to decrease noises from gasoline moving in the fuel tank.
5. Discontinue the use of painting for the fuel tank.
6. Omit unnecessary parts and components from the body.
7. Abolish door keys on the assist side (a style that later spread globally).

These targets were conceptually believed to match automobile usage in Mexico, and aimed to avoid downgrading performance for long-distance driving in such a large country while maintaining the vehicle occupants’ comfort. Further, automobile parts frequently replaced in aftersales maintenance were changed to those that could be domestically procured.

These concepts and reasonable price were accepted in Mexico, and the durability of the vehicles’ engines and transitions was especially valued. Nissan at one

point successfully claimed an 85% share of the Mexican automobile market with its Tsuru model, and its Datsun truck, which was modified under the same concepts as in the Tsuru's reforms. The Tsuru B13 continued its production since 1992, then finished production in May 2017 to adapt to recent safety standards.

4.5 Development in the NAFTA: 2000s

This period during the 2000s particularly focused on quality improvement. Nissan's basic thinking in the larger picture involved the importance of superior quality and durability, which gradually spread in Mexico's automobile industry. These feelings of quality and durability, perceived as incredibly important, became the most prominent in Latin America. The authors believe these qualities are more highly regarded in Latin American than in the United States. The Tsuru's 1994 reformation also amplified many automobile parts suppliers' high-quality production abilities, unrelated to this reformation, which Nissan later understood. This thought regarding the importance of quality spread not only in Mexico, but also to Latin America, and even to the United States; this improvement in automobile parts' quality led to increased exports of the automobiles themselves.

4.6 Increase of Mexico's Influence: 2010 to 2016

The authors believe that Nissan Mexico's attention to quality production has nearly reached a level similar to that in Japan. Mexico's influence in the automobile industry increased in the United States and Latin America from 2010 to 2016, and many Mexican citizens were hired in the former, generally as low-wage laborers, but also in higher positions. In Nissan's case, important North American posts have been filled by Mexican citizens; moreover, in Brazil Nissan's inception, many important posts were also occupied by Mexicans. Automobile parts manufacturers in the United States also began to hire Mexicans for important positions. The Mexican people's image in North America's automobile industry has changed, to reveal their capability and diligence more so than in the past, an influence that increases even today.

This caused another problem in the United States, as the Mexican people highly value not only education and training, but especially their families. Educated personnel hired from Mexico tend to invite their families to the United States, so they can receive a higher education there. This cycle continues, with an increasing number of Mexican people hired and migrating to the United States. This has caused mounting anti-immigration issues with a corresponding increase of illegal immigration from

Mexico.^{xvi}

4.7 Establishing a New Relationship with the United States, and Globalization After 2017

The Trump administration was born in the United States in January 2017. An important target for the new president involved returning to a “strong America,” which includes increasing domestic automobile production in the United States. President Trump’s regard for Mexico’s automobile industry has already begun to affect it in many ways. For example, in January his Twitter account shocked Japanese automobile manufacturers by stating, “Toyota Motor said will build a new plant in Baja, Mexico, to build Corolla cars for U.S. NO WAY! Build plant in U.S. or pay big border tax.”^{xvii} This will affect Japanese automobile and parts manufacturers’ future investment strategies in Mexico. Ford then announced in January 2017 that it had canceled building its new plant in Mexico, and it had instead decided to invest 700 million USD in Michigan, which would create 700 new jobs in the United States.^{xviii} General Motors, also impacted by the new president’s tweets, also decided to invest 1 billion USD in its US manufacturing operations to create or retain 1,500 jobs in the United States.^{xix} Further, General Motors announced that it would move the production of its pickup axles from Mexico to Michigan, and create at least 5,000 more US jobs in other parts of its business in subsequent years.^{xx}

As aforementioned 80% of automobiles assembled in Mexico are intended for export, with many for the United States. As mentioned in Section 5.3, 90% of automobile parts exports are sent to the United States; although the Mexican automobile and parts industry highly depends on exports to the United States, they may change their trading relations to not depend solely on the that country, but expand trade globally. Mexico has already concluded free trade agreements with 46 countries, including Japan, ^{xxi} which will help ascend to the next stage.

5. An Analysis of Trends and the International Competitiveness of Automobile Parts in Mexico

5.1 Method and Data

The authors’ method involved analyzing the international competitiveness of auto parts in Mexico using the global competitiveness index (GCI), which indicates auto parts’ international competitiveness, as explained by Baba (2016).^{xxii} The GCI formula is $GCI = (Export - Import) / (Export + Import)$; the GCI ranges from -1 to 1, with values close to 1 indicating strong international competitiveness and those close to -1

indicating weak international competitiveness. These GCI values are categorized ranging from “very weak” to “very strong,” as Table 1 illustrates. The trade statistics are extracted from the UN Comtrade database.^{xxiii}

The authors analyzed GCI with Harmonized Commodity Description and Coding System trade statistics. The code used for this analysis is HS8708, which represents auto parts and includes such items as bumpers, seat belts, body parts, brakes, gear boxes, driving axles, wheels, suspensions, radiators, exhaust pipes, clutches, steering wheels, airbags, and other miscellaneous auto parts.

5.2 The Developing Model for Auto Parts in Emerging Economies

Baba (2017)^{xxiv} discussed a developing model for auto parts in both emerging and developed economies by using Figure 3. The horizontal axis represents time, which is a valuable alternative of the automobile industry’s growth. The vertical axis represents the automobile parts industry’s international competitiveness, which can be weak or strong. Emerging economies that wish to develop their automobile industries as a “catch-up” process would ideally have a positive correlation between time and progress in the auto parts industry (the Leaped Model). When the auto parts supply side cannot correspond to the increase in demand for quality and volume, the correlation will be negative (the Dilemma Model).

With increased globalization in production, R&D, and procurement, the interpretation and understanding of GCI values will differ from the previous “catch-up” process stage, as aforementioned. When economies keep the domestic production of auto parts at a certain volume after their auto parts industries’ successful development, although the GCI value will gradually decrease because of globalization, the GCI value may remain “strong” (the Holding Domestic Production Model). Alternatively, when globalization has advanced and the auto parts’ domestic production has decreased, the GCI value may weaken (the Globalization Model).

5.3 Analysis Result

Figure 4 displays Mexico’s trade values for automobile parts imports and exports. As this figure reveals, imports and exports are both in an increasing trend except in 2009, which marked a global recession in the automobile industry. Although imports obviously exceeded the period from 1995 to 2003, they were almost balanced after 2004. Further, Figure 5 indicates the GCI values for automobile parts in Mexico. As imports have increased beyond exports since 1995, the GCI values moved in a weakening direction, then gradually increased in value. They maintained values of

approximately zero, or balanced between imports and exports.

The authors calculate shares of major import and export partners from 1990 to 2015 to discover that over half of the shares of imports were continuously provided by the United States, which received approximately 90% of exports. Further, 77% of imports in 1990 were from the United States and 84% of exports were sent to that country. In 2000, 74% of imports and 94% of exports were from and for the United States respectively. In 2010, 61% of Mexico's imports were from the United States, and 91% of its exports were for that country. In 2015, 63% of Mexico's imports were from the United States, and 8% were from Japan, 8% were from China, 5% were from Germany, and 4% were from Canada. Regarding 2015 exports, 88% were sent to the United States, 3% to Canada, 2% to China, 2% to Brazil, and 1% to Germany. These results demonstrate that Mexico's automobile parts imports and exports highly depend on the United States.

Moreover, NAFTA came into effect in January 1994. Figure 4 illustrates the rapid increase in automobile parts imports from 1994 to 2000, or the "NAFTA effect." After NAFTA's implementation, automobile part imports from the United States increased; as the automobile parts industry developed in Mexico, exports also increased. Recently, and as aforementioned, imports and exports were nearly balanced, and GCI maintained an approximately zero value. Mexico was considered to have a "globalization" development type.

6. Summary

As mentioned in Section 5.3, Mexico has maintained balanced trade in automobile parts after the 2000s with the liberalization of trade through NAFTA. This liberalization of trade in many countries forces them into situations that involve an excess of imports. While the Mexican automobile parts trade initially experienced an excess of imports, it improved and balanced its trade situation. This improvement occurred by enhancing their automobile parts' quality and durability. Nissan contributed to this enhancement through the improvement of its Tsuru model, as mentioned in Section 4.

Further, NAFTA amplified automobile production in Mexico. As of 1998, Mexico's automobile production 1.5 million units, or 11th worldwide, with a 2.5% share of global automobile production. This became 3.6 million produced units in 2006, or 7th worldwide, with a 3.8% share in global automobile production. Most of these units are for export to the United States, as the Mexican automobile industry has grown to become export-oriented. The 2017 birth of a new US presidency may change this

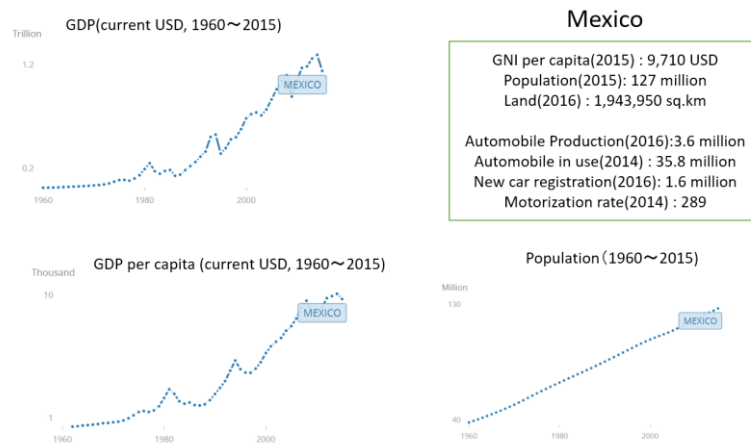
situation. Although the Mexican automobile and parts industry highly depend on exports to the United States, they may change their trading relationships to not only become less dependent on the United States, but also trade more globally.

Many say “Mexico is merely imports CKD parts from USA, assembling automobiles in Mexico, then exports for USA. Mexico is only offering the merits of cheap labor cost.” Authors think that this understanding is too simplistic and superficial. As shown in Section 4, the quality of Mexican automobile parts and the ability of Mexican manufacturing have improved. As shown in Section 5, the increase after NAFTA is not only automobile parts import but also automobile export. Mexico can overturn the reputation of just offering cheap labor, though this trial.

(Acknowledgements: This research was supported by JSPS KAKENHI 26301024.)

Figures and tables

Figure 1. Major Indicators in Mexico (1960–2015)



Source: Authors; data is extracted from the World Bank and OICA

Figure 2. Map of Nissan Plants



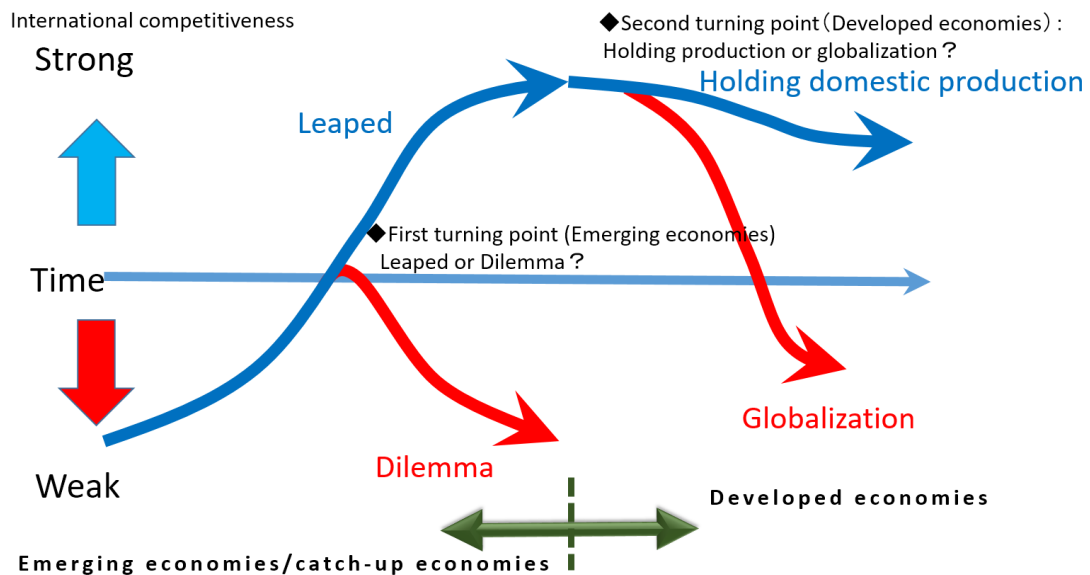
Source: Authors

Table 1. International Competitiveness of Each GCI Value

Value of GCI	International competitiveness	Situation of import / export
Over 0.75	Very Strong	Most of the applicable items are for export, and there are very few imports.
0.50 ~ 0.74	Strong	Many of the applicable items are for export, and there are few imports.
0.10 ~ 0.49	Slightly Strong	There are comparatively more exports.
-0.09 ~ 0.09	Moderate	Exports and imports are almost the same.
-0.10 ~ -0.49	Slightly Weak	There are comparatively more imports.
-0.50 ~ -0.74	Weak	Many of the applicable items are imports, and there are few exports.
Below -0.75	Very Weak	Most of the applicable items are for import, and there are very few exports.

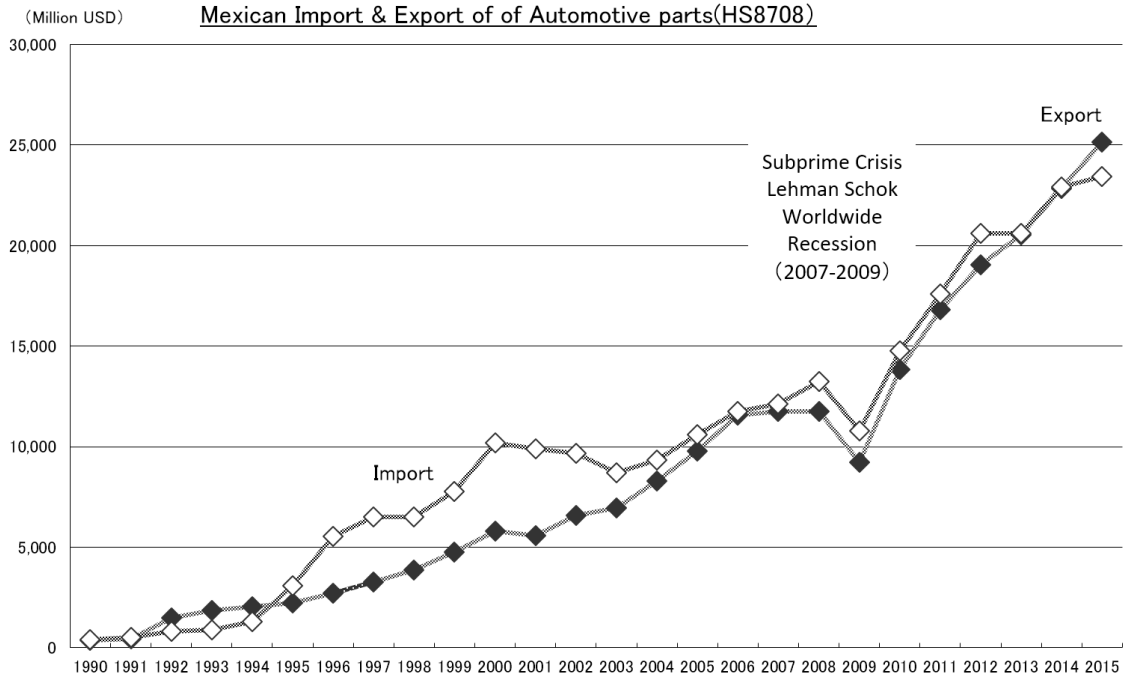
Source: Baba (2016)

Figure 3. Development Model of Auto Parts in Emerging Economies



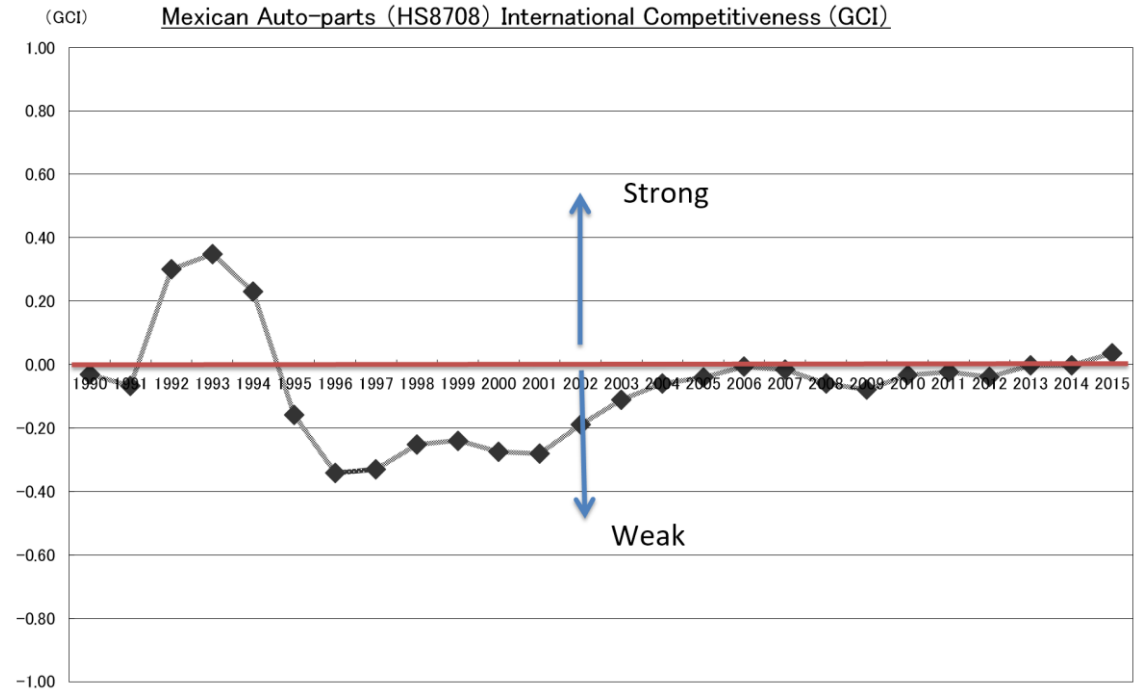
Source: Baba (2017)

Figure 4. Import and Export Trends of Automobile Parts in Mexico (1990–2015)



Source: Authors

Figure 5. International Competitiveness of Auto Parts in Mexico (1990–2015)



Source: Authors

References

(Internet information was retrieved May 20, 2017.)

-
- i <http://www.oica.net/category/production-statistics/>
- ii <http://www.amia.com.mx>
- iii Jorge Carrillo (2004) "The Mexican Auto Industry in the Context of NAFTA" (<http://www.colef.mx/jorgecarrillo/wp-content/uploads/2012/04/PU276.pdf>)
- iv <https://comtrade.un.org/>
- v <http://gerpisa.org/en/node/3327>
- vi <http://data.worldbank.org/country/mexico>, <http://data.worldbank.org/indicator/AG.LND.TOTL.K2>, <http://www.oica.net/>, <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- vii <https://offshoregroup.com/industries/automotive-manufacturing-in-mexico/>
- viii <https://disidentkid.wordpress.com/2012/10/09/primer-automovil-de-combustible-en-mexico/>
- ix <http://www.fundinguniverse.com/company-histories/ford-motor-company-s-a-de-c-v-history/>
- x https://history.gmheritagecenter.com/wiki/index.php/1935,_GM_de_Mexico_Joins_the_Family
- xi <http://negocios.promexico.gob.mx/english/05-2012/art02.html>, <http://www.nytimes.com/1981/03/09/business/chrysler-s-mexican-subsiary-floosishes.html>
- xii <http://www.donquijote.org/culture/mexico/history/volkswagen-in-mexico>
- xiii <http://www.nissan-global.com/JP/IR/INSIDE/INSIDE-SP/MEXICO/visit02.html>
- xiv Ueda (2008) "Automobile Production Sites in Mexico" https://www.jstage.jst.go.jp/article/jjws/78/1/78_42/_pdf
- xv <http://www.nissan-global.com/JP/IR/INSIDE/INSIDE-SP/MEXICO/visit03.html>
- xvi Nimura Miyakuni "The Dilemma of USA: The Rise of Strengthening Anti-Immigration Theory and Surroundings" (<https://apps.v.main.teikyo-u.ac.jp/toshomnimura20.pdf>)
- xvii <https://twitter.com/realdonaldtrump/status/817071792711942145>
- xviii <http://money.cnn.com/2017/01/03/news/economy/ford-700-jobs-trump/>
- xix <https://twitter.com/realdonaldtrump/status/816260343391514624>
- xx <http://www.autonews.com/article/20170116/OEM01/170119817/gm-to-invest-%241-billion-in-u.s.-manufacturing-move-axle-work-from>
- xxi https://www.jetro.go.jp/world/cs_america/mx/trade_01.html
- xxii Toshiyuki Baba (2017) "Developing Model of Auto Parts in Emerging Economies: Comparative Analysis of the International Competitiveness of Auto Parts in Mexico, Brazil and India from 1990 to 2014," Conference Paper, Gerpisa Colloque 2016 (<http://leblog.gerpisa.org/node/3327>)
- xxiii <https://comtrade.un.org/>
- xxiv Toshiyuki Baba (2017) "An Analysis of International Competitiveness in Dies and Molds," *Journal of International Economic Studies*, No.31, 13-35.