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Total sales of lightweight automobiles in Mexico, 1988-2016

FIGUEROA-HERNÁNDEZ, Esther†*, ESPINOSA-TORRES, Luis Enrique and GODÍNEZ-MONTOYA, Lucila

Universidad Autónoma del Estado de México, Licenciatura en Economía, Centro Universitario UAEM Texcoco

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Abstract

The automotive industry in Mexico has been strengthened in such a way that the country is already part of the Top 15 of those that produce and sell the most cars in the world. From 2010 to 2016, it went from place 16 to 12 among the countries that sell more vehicles in the world, according to data from the International Organization of Automobile Manufacturers (OICA). Six years ago, Mexico sold 503 thousand 748 vehicles, which placed it in 16th place worldwide. The country was below Russia (1 million 912 thousand) Canada (694 thousand 349) or Spain (982 thousand 015) (HuffPost, 2017). The objective of the work was to analyze the variables that most influence the total sales of light vehicles in Mexico. To carry out the study, a multiple linear regression model of the total sales of light automobiles in Mexico was elaborated according to the exchange rate, the monthly average remuneration, the interest rate, unemployment and the inflation rate. Of the results obtained, the variation of the VTA according to the coefficient of determination (R^2) was explained in 93.75% by the variables included in the equation, of which, the most statistically significant variables were the monthly average remuneration, the Unemployment rate and the exchange rate. According to the elasticities, the greatest effect on sales was the average monthly remuneration and the exchange rate. Although the interest rate and inflation are very important variables and were not significant.

Automotive industry, Automotive sales, Exchange rate, Inflation and interest rate

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*Correspondence to Autor (e-mail: esfigue_3@yahoo.com.mx)
† Researcher contributing as first author.

Introduction

The global competition on the part of the three large blocks is explained through transnational organizations among the most important firms in terms of production, so that in each country and for each industry regional schemes are imposed on the production networks global economy, at the same time that economic sectors are integrated on a planetary scale. In this framework, under the premise that the industrial sectors have different behaviors, we examine the outlines of the globalization of the automotive industry (AI), which responds to a logic different from that of the transnational networks of light industries that do not depend in the same way the cost of transport, or the demographic processes linked to the growing consumption of durable goods.

The automotive sector, like other manufacturing sectors with high international dynamism, has experienced a persistent development with a favorable impact for the Asia-Pacific region and lower socio-economic effects in other emerging areas, such as the economies of the American continent. In Mexico, the AI has grown like no other industry in recent years and has generated dynamic relationships with producer countries that dispute the United States, the primacy in world leadership or the conquest of new markets consumption of these products (Basurto, 2013).

To understand the importance of the automotive industry in Iran's economy, it is necessary to take into account some data. Iran is the largest car market in the Middle East. Before the sanctions, Iran was the eleventh producer of cars in the world. The automotive sector is today the second industry in the country after the petrochemical industry. According to the World Bank, Iran's automotive sector constitutes 10.0% of the GDP of its economy. This sector employs 700,000 workers, representing 4.0% of the total active workers in the country.

The sanctions were a severe setback for Iran's auto industry. The annual production of cars fell from 1.5 million to 700,000 units, and prices went up to 300.0%. However, after the lifting of the sanctions, the sector comes back to life and the government plans to reach the production of three million cars a year in 2021. The government wants to boost the privatization and competitiveness of the sector to enter the market world car. To achieve these objectives, Iran needs to collaborate with international manufacturers (Iranactual, 2016).

As a market, Iran has been growing in car demand for several years. Even with the sanctions, in Iran there was a thriving market for cars. According to the International Organization of Automobile Manufacturers (OICA), the total sale of vehicles, including commercial vehicles, in Iran places this country in 13th position in the world market. In 2011, with nearly 1.7 million registered sales, Iran ranked 11th in the world market. Due to high tariffs, the importation of finished cars into the country is limited.

In the Iranian year 1393 (March 2014 to March 2015) it was allowed to import 102,000 cars, which represents an increase of 31.0% over the previous year. However, the current regime is relaxing tariff rates. It has recently lowered tariffs for hybrid vehicles to only 4.0%. With the lifting of sanctions, Iran can become a regional power in the sector and a center for selling and exporting cars. European companies (European companies want to compete with Chinese manufacturers in the Iranian market) Renault, Peugeot, Mercedes and Volvo have declared their interest in using Iran as a center for exporting their products to neighboring countries such as Iraq, Azerbaijan, Syria and Afghanistan (Iranactual, 2016).

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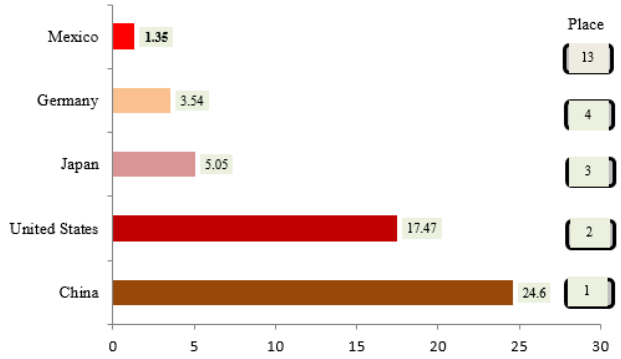

Figure 1 The number of vehicles purchased per country, 2015 (Millions)
Source: Prepared with data from El Financiero, March 17, 2016

In 2015, the number of vehicles purchased by country were: China ranked first (24.6), followed by the United States (17.47), Japan (5.05), Germany (3.54) in place 13 and Mexico with 1.35 million vehicles in the world (Figure 1).

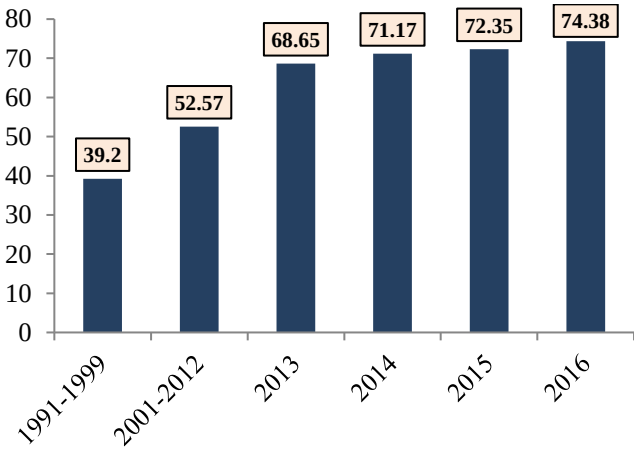

Figure 2 Total number of cars sold worldwide from 1990 to 2016(Millions of units)
Source: Elaborated with data from Statista, 2018

This statistic represents the number of vehicles sold worldwide from 1991 to 2015. In addition, it presents a forecast for the year 2016. It was estimated that a little less than 74.4 million cars would be sold in 2015. It was forecast that sales worldwide cars will exceed 100 million units by 2020 (Statista, 2018).

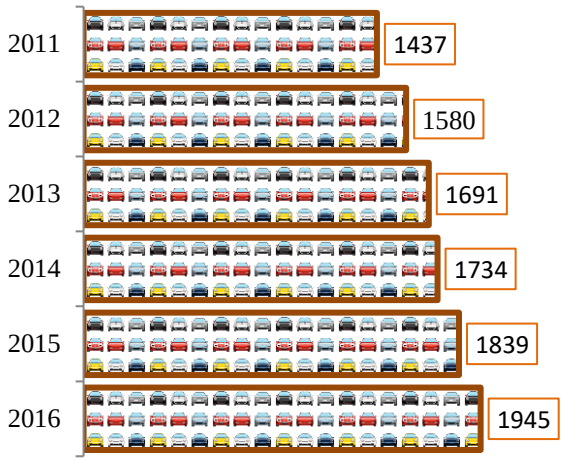

Figure 3 Global overview of light vehicle consumption, 2014 (Billions of dollars)
Source: Elaborated with data from the Ministry of Economy, 2014. The picture of the carts was obtained from: http://www.thetruthaboutcars.com/2016/09/fight-back-bad-emojis-porsche-automoji-sticker-pack-ios-10/

As can be seen in Figure 3, the consumption of light vehicles of 2011 (1,437) -2016 (1,945 million dollars) has been growing. In the light vehicle segment, the main region for the sale of vehicle units was the Asia-Pacific region, which represents 42.7% of the total, followed by Europe with 30.7%, America with 22.9%, Middle East with 2.7 % and the Rest of the World with 1.0%.

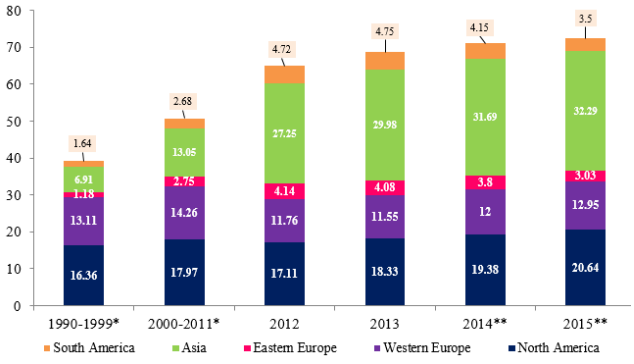

Figure 4 Total number of cars sold per region worldwide from 1990 to 2015 (Millions of units)
Source: Elaborated with data from Statista, 2018.

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Figure 4 shows the number of vehicles sold in the world from 1990-2015, broken down by region. In 2012, around 4.7 million cars were sold in South America, for Asia it was 27.25. Figures for 2015 are projections.

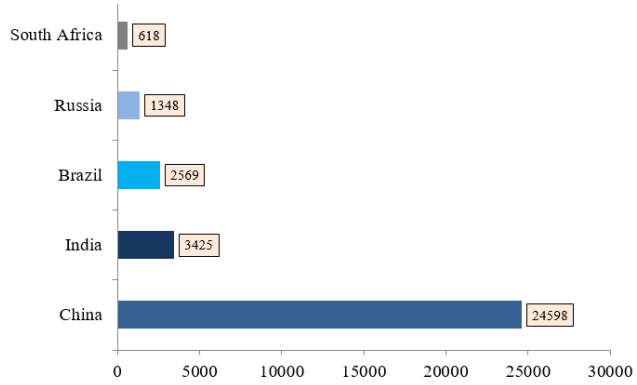

Figure 5 Total number of vehicles sold in the BRICS countries in 2015 (Thousands of units)
Source: Elaborated with data from Statista, 2018

The statistics shows the total number of vehicles sold in each of the BRICS countries in 2015, in thousands of units. In that year, there were total sales of approximately 3.4 million vehicles in India, which was the second highest figure among the group of five countries (Figure 5).

Figure 6 Sales of new light vehicles, Mexico VS EE. UU (Thousands of units)
Source: Elaborated with data from the Ministry of Economy, 2012

New vehicle sales from the US The UU and Mexico show the same long-term behavior, registering an upward trend from 1996 to 2006. This behavior was reversed with the global economic crisis of 2009, since in that year sales of new vehicles globally fell by 4.0%, the North American region being the most affected, as the demand for new light vehicles contracted 20.4%. In Mexico, the drop in sales was 24.7%. Despite the seriousness of the crisis and the levels prior to it have not yet recovered, it should be noted that the recovery of the domestic market for light vehicles was faster than that observed during the 1995 crisis (Secretary of Economy, 2012).

According to the report of Ward's Automotive, in EE. In the US, 1,150,130 light vehicles were sold during January 2017, 1.0% more than what was commercialized in the same month of 2017. In this first month, Mexican vehicles represented 15.5% of the total light vehicles sold in the United States, when exported. 178,667 units (AMIA, 2018).

The automotive industry in Mexico

Although the international car market has shown less dynamism, the national market, on the other hand, is advancing at high rates. In the first six months of the year, vehicle sales in Mexico totaled 722,000 units, equivalent to a growth of 18.4% compared to the same period of the previous year. The sustained growth of these years is mainly due to an offer of varied and competitive credit from the banking sector and the financial arms of the automotive assembly companies, as well as the improvement of consumer confidence. The outlook for the sale of new vehicles for the remainder of the year in Mexico is promising if the good pace of the number of car loans observed so far is maintained. From January to June, financing grew by 25.3% per year considering both financial, banking and even self-financing. At the end of 2016, an advance of new vehicle sales of 13.8% is estimated equivalent to 1,530,000 units (Martínez, 2016).

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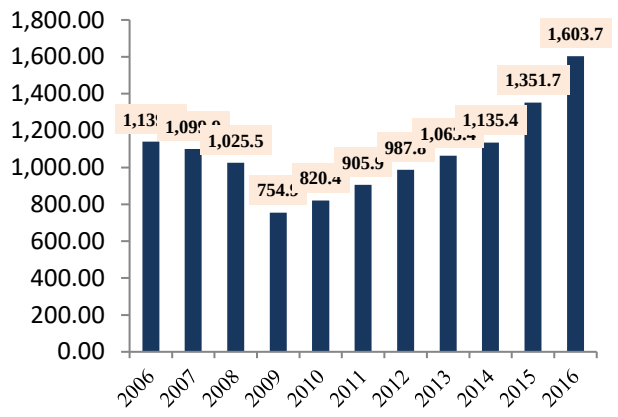

Figure 7 Evolution of the number of light vehicles sold in Mexico, 2006-2016 (Thousands of units)
Source: Elaborated with data from Statista, 2018

According to figure 7, the annual evolution of sales to the public of light vehicles in Mexico, in 2006 was 1,139.7 and in 2009 decreased to 754.9 as a result of the global financial crisis, from 2010 onwards it has been increasing, for 2016 the cars sold directly to consumers in the country were just over one and a half million units, which not only represented an approximate increase of 250,000 vehicles compared to the figure recorded the previous year, but was also greater than the amount of the study period.

In previous years there has been growth in this industry and it was estimated that vehicle production would increase 1.5% in 2016 compared to the previous year, despite an unfavorable start to the year due to a 3.1% drop in the first half of this year. This represents an increase of around 51,000 units. By 2017, it could produce just over four million units which would represent an advance of 17.4%, which would once again place the industry at the forefront of the Mexican economy. The automotive production in the country has gained importance because of the large investments that have been made to serve the domestic market, but primarily because of the potential of the external market.

Up to 79.0% of the cars manufactured in the country are destined for export, primarily to the United States of America. During the first half of this year, 1.3 million vehicles were manufactured to be exported, which meant a reduction of 5.6% compared to the first semester of the previous year. This lower dynamism was partly due to the fact that it was contrasted with what was done in 2015 when an extraordinary increase of 10.4% was observed. The majority of automotive exports are destined for the United States and will continue to grow during this year. In contrast, other regions and countries have decreased their demand for Mexican vehicles, such as Canada, Latin America, Asia and Europe. This result is attributable, among other things, to a lower demand in these countries attributable to a slow expansion of their economies (Martínez, 2016).

The sale of light vehicles decreased 5.3% in June compared to the same month in 2016, from 134 thousand 536 units to 127 thousand 410, which represents the worst figure for a sixth month since 2009, reported the Mexican Association of Distributors Automotores (AMDA) in its Internal Automotive Market Report. According to the report, the category that represented the biggest decrease in units sold was that of heavy trucks, with a 28.9% decrease in units sold, followed by sports cars, with 21.6% fewer units sold, and subcompacts, with 14.7% fewer cars placed on the market. In this regard, the AMDA highlights that June records the second negative rate of the year in the line of commercialization of light vehicles. In fact, the behavior of light car sales last June represents the worst performance of this concept for a sixth month for eight years, when sales plummeted 31.3% in June 2009 in the context of the international financial crisis. Meanwhile, annualized sales were one million 624 thousand 867 units as of June 2017, that is. This figure represents a growth of 11.0% over the same period of 2015-2016, when it closed with one million 463 thousand 679 vehicles (aristeguinoticias.com, 2017).

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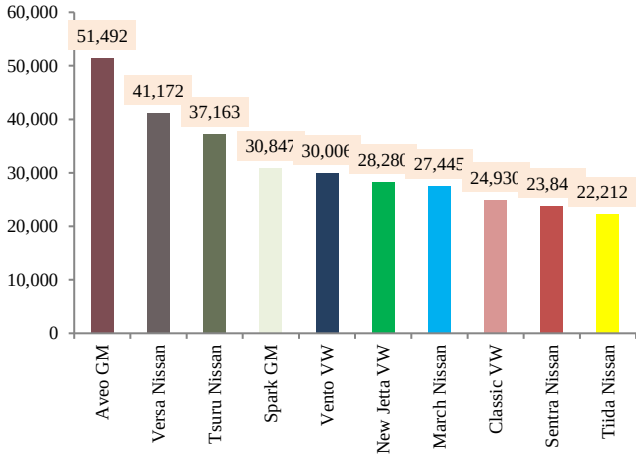

Figure 8 The Top 10 best-selling vehicles in Mexico
Source: Elaborated with data from El Economista, 2014

From Figure 8, the AMDA details that the Aveo of General Motors remains the most sold unit in the country, with 51,492 vehicles marketed so far this year, representing 6.5% market share, followed by the Nissan Versa, with 41,172 units of 5.2% of total sales. Indicates that in third place was the Tsuru of Nissan with 37,163, while the fourth position went to the General Motors Spark with 30,847, followed by the Vento and the New Jetta of Volkswagen with 30,006 and 28,280 units, in each case. Nissan's March model was ranked number seven with 27,445 vehicles placed, then the Volkswagen Classic with 24,930, as well as the Nissan Tiida and Sentra with 23,843 and 22,212 vehicles, respectively, with sites 9 and 10 from the best-seller list.

In this way, adds the AMDA, to October 2014, the 10 best-selling models in the Mexican market accumulated 317,390 units, which meant a coverage of 35.6% of the total light vehicles marketed in the country (El Financiero, 2014).

Figures between January and November		
Model	**Brand**	**Cars**
Versa	Nissan	83,346
NP300	Nissan	66,938
Aveo	Chevrolet	59,453
Vento	Volkswagen	57,441
March	Nissan	48,836
Jetta	Volkswagen	41,645
Sentra	Nissan	38,731
Spark	Chevrolet	32,772
CR-V	Honda	24,198
Tsuru	Nissan	23,156

Table 1 The Top 10 most sold vehicles in Mexico, 2017
Source: Elaborated with data from AMDA, 2018

Based on table 1, the 10 models, of the more than 200 that are offered in the country, were those that dominated the Mexican market and represented 39.0% of the total vehicles sold between January and November of 2017. Mexico will end 2017 with the commercialization of one million 550 thousand cars, 3.3% less than the reported in the same period of 2016, estimated AMDA. This is the first reduction presented by the industry since the economic crisis of 2009.

The objective of the work was to analyze the variable that has the greatest impact on the total sales of light vehicles in Mexico.

Methodology

To carry out this research, different sources were consulted: such as the Statistics Portal (STATISTA), National Institute of Statistics and Geography (INEGI), Bank of Mexico (B de M or Banxico), Mexican Association of Automotive Distributors (AMDA), Mexican Association of the Automotive Industry (AMIA), Center for Public Finance Studies of the Chamber of Deputies (CEFP), among others. From these sources, statistical information was obtained on the following variables: total sales of light automobiles, the vacancy rate, interest rate (CETES), the inflation rate, the average monthly remuneration, and the exchange rate.

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Based on the information collected, a multiple linear regression model was formulated that tries to explain the behavior of total sales of light automobiles in Mexico. The equation was the following:

$$VTA_t = \alpha_0 + \alpha_1 i_t + \alpha_2 E_t + \alpha_3 INF_t + \alpha_4 W_t + \alpha_5 U_t + \varepsilon_t \quad (1)$$

Where: $\alpha_0, \alpha_1, \ldots, \alpha_n$= Are the parameters to be estimated from the model; ε_t = it is the error term; VTA_t = total sales of light vehicles (number of units); i_t = Interest rate (30-day CETES); E_t = Real exchange rate (Pesos / dollar); INF_t = Rate of inflation (%); W_t = Average monthly remuneration (Actual prices for 2008); U_t= Unemployment in Mexico (% of the EAP). The model was estimated by the Ordinary Least Squares Method (MCO), using the SAS Statistical Package version 9; later, the results were analyzed and interpreted from the statistical and economic point of view, for which elasticities were calculated and interpreted.

Results

The results of the model allowed analyzing from the statistical and economic point of view, the parameters obtained from the variables studied of the total sales of light vehicles.

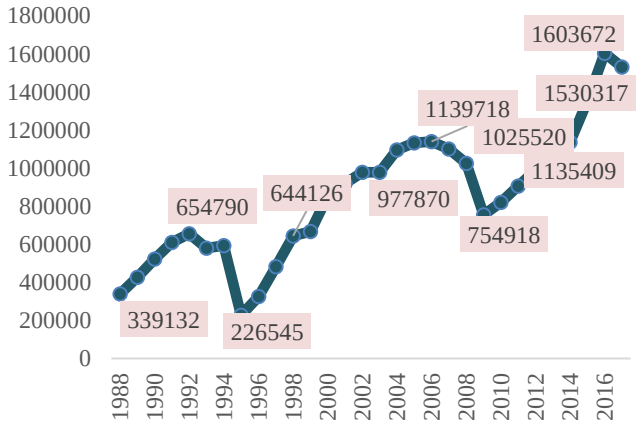

Figure 9 Total sales of light vehicles in Mexico, 1988-2017 (Units)
Source: Elaborated with data from AMDA, 2017

The total sales of light vehicles in the country have been increasing from the period from 1988 to 2017 except for the years 1995 and 2009 as a result of the financial crisis in the United States that took effect worldwide (Figure 9).

The domestic sale of light vehicles registered a decrease in January 2018. During the first month of the year 109,145 units were sold, 11.5% below the units sold during January 2017. The sale in the Mexican market in January 2018 was integrated into 39.0% with vehicles produced in the country and 61.0% of foreign origin (AMIA, 2018).

The Mexican Association of the Automotive Industry (AMIA) reported that sales of the automotive sector had its first contraction since 2009, with the marketing of one million 530 thousand 317 light vehicles in 2017, 4.6% less than in 2016, when they were sold one million 603 thousand 672 units (aristeguinoticias.com, 2018).

The president of the Mexican Association of Automotive Distributors (AMDA) said that the current economic environment, the elections in 2018 and the NAFTA are the factors by which sales lose strength. It was estimated to end in 2017 with 1.55 million units sold. This figure is lower than the expectation that had at the beginning of 2017 to place 1.7 million vehicles, some factors facing the sector are a differentiated growth of the domestic market by regions, a late adjustment in the prices of new vehicles and the own advance in the inflation, as well as the diminution of the unsatisfied internal demand, the federal elections 2018 and the renegotiation of the Free Trade Agreement with North America (NAFTA), are some of the main factors that have to the distribution in a change of market cycle (Expansión, 2017).

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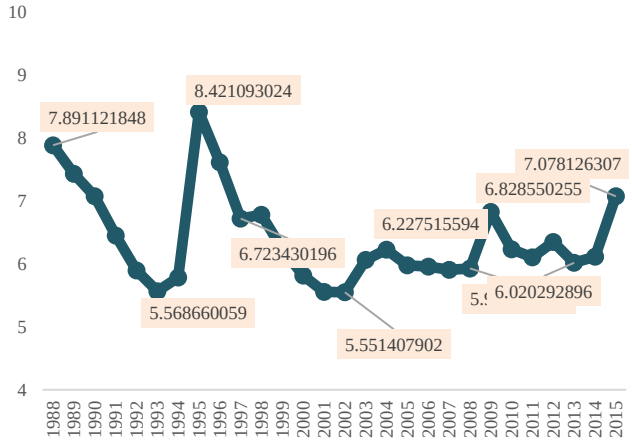

Figure 10 The real exchange rate in Mexico, 1988-2015 (Pesos / dollar)
Source: Elaborated with data from CEFP, 1980-2015

The real exchange rate showed a greater fluctuation from 1988 to 1997, from then on it remained oscillating until 2015 (Figure 10). Since the second half of 2015, the evolution of financial markets has presented transitory episodes of high volatility. In the current year there have been external events that produced conditions of uncertainty and additional volatility: the Brexit, the continuous decline in oil prices, the implementation of divergent monetary policies by central banks, among others.

Against this background, the Mexican currency has depreciated by 8.18%, reaching a maximum of 19.18 pesos per dollar (p / d) (February 11) and a minimum of 17.18 (April 29). Given the volatility conditions in the international financial markets, CGPE establishes that the exchange rate will reach an average of 18.30 pesos per dollar in 2016, a figure higher than that predicted in the Pre-Criteria (18.0). For 2017, it is estimated that the peso will reach 18.2 per dollar (17.2 Pre-Criteria). For its part, the private sector expects that the exchange rate levels will reach 18.50 p / d in 2016 and 18.30 in 2017, placing the exchange rate in horizons higher than those foreseen in CGPE (CEFP, 2016).

Analysts predict that by the end of 2017 the exchange rate will be at 20.15 pesos per dollar, while for 2018 the expectation of closing is 20.01 (Banxico, 2017). At the end of 2016, the 28-day Cete rate stood at 5.69%, while for March 2017, it closed at 6.43 (0.07% below the target) (AMDA, 2017).

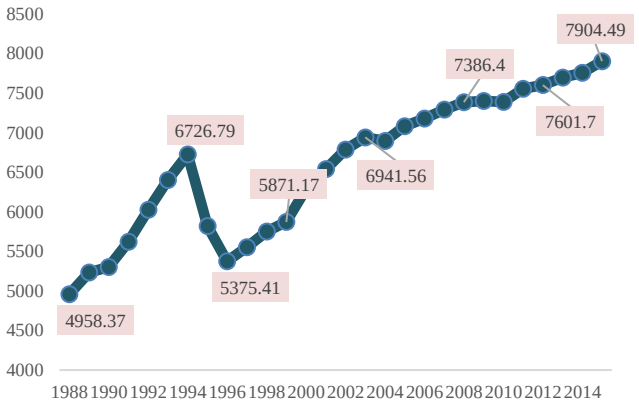

Figure 11 Average monthly remuneration, 1988-2015 (Actual prices for 2008)
Source: Elaborated with data from CAMACRO, 2015

As can be seen in Figure 11, the average monthly remuneration has remained around 6700 and 7900 with the exception of 1988 and 1995 to 1999. The issue of remuneration paid to employed personnel is fundamental in economic statistics because they represent the payment to the labor factor in the productive processes. In general, the remunerations (salaries, salaries, social benefits and utilities) paid to the remunerated personnel (operating personnel, employees, executives, etc.). During 2008, 54.3% of what the economic units paid for remuneration corresponded to salaries paid to operational personnel (workers, counter employees, drivers, etc.); 25.2% to Salaries paid to employees; and 20.6% to Social benefits (employer contributions paid to the Mexican Institute of Social Security (IMSS), Institute of Security and Social Services of State Workers (ISSSTE), National Workers Housing Fund Institute (INFONAVIT), Utilities distributed and Other benefits).

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By economic activity, Fisheries and aquaculture was the activity in which salaries paid to operational personnel had the highest proportion with respect to total remuneration (72.2%), mainly because in these activities the proportion of operational personnel is very high (90.0% of paid employees); whereas, in Electricity, water and gas, social benefits represented the highest proportion with 36.3% (INEGI, 2009).

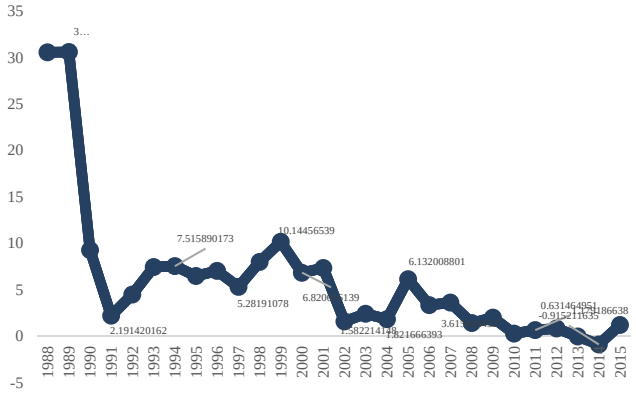

Figure 12 The interest rate for the period 1988-2015 (%)
Source: Elaborated with data from CEFP, 1980-2015

The behavior of the interest rate for the study period of 30.6% in 1988 has been decreasing to 1.2% in 2015 (Figure 12).

During 2014 and 2015 there was a fierce competition in the country among the banks that give loans for housing, by significantly lowering their respective interest rates, to such an extent that the average reached 10.0%. As a result of the period of rate hike by Banxico, which has increased the reference rate by 400 basis points from December 2015 to date (from 3.0 to 7.0%), the banks tried to absorb the increase or at least not act on the same level in mortgage credit. In fact, to say of Enrique Margain, mortgage director of the Association of Banks of Mexico (ABM), in this period the increase in the rate of financing for housing acquisition was 100 basis points in commercial banking.

Now that it seems that the central bank will take a break in its rate increase, commercial banks no longer see that the cost of mortgage credit can rise. The high competition has resulted in more and more people changing their mortgage to another bank that offers them better credit terms. So far in 2017, according to the ABM, 66,000 such financing had improved their conditions; 47,000 with another bank and 19,000 with it (El Economista, August 8, 2017).

Statistic analysis

The statistical analysis was based on the following parameters: the coefficient of determination (R^2), the value of the calculated F (Fc), probability, the value of the partial t's for each of the estimators based on the analysis of the given variance. Finally, to test the statistical significance of the adjusted regression equation, the following sets of hypotheses were considered.: H_0: $\alpha_1 = \alpha_2 = \ldots = \alpha_n = 0$ contra Ha: $\alpha_i \neq 0$ *para* $i \geq 1$ así como H_0: $\beta_1 = \beta_2 = \ldots = \beta_n = 0$ contra Ha: $\beta_i \neq 0$ *para* $i \geq 1$.

Dependent Variable	**Independent Variables**				
Equation 1					
VTA	***i***	**E**	**INF**	**W**	**U**
Coefficient	-3628.6766	88129	191.81337	268.09572	-141879
t_c	-1.05	2.38	0.17	**10.18**	**-7.61**
P	0.3048	0.0264	0.8632	<.0001	<.0001
R^2= 0.9375					
F-valor = 65.98					
Prob>F = <.0001					

Table 2 Parameters obtained for the proposed model of total sales of light automobiles in Mexico (VTA)
Source: Elaborada con la salida del Paquete Estadístico

The results of Table 2, for the equation indicated that for a level of significance of 0.1, the F_c = 65.98 was greater than $F_{t,0.1\ (5,\ 22)}$ = 2.66, therefore, Ho is rejected in favor of the Ha hypothesis that indicates that at least one of the parameters is nonzero, that is, the regression was highly significant, which implies a high explanatory power of the estimated model.

On the other hand, the variation of the VTA according to the coefficient of determination (R^2) is explained in 93.75% by the variables included in the equation. The most highly significant were: W_t, the U_t, which showed a reliability value of the order of <0.0001, <0.0001, and the exchange rate (E_t), the interest rate (i) of 0.0264 and 0.3048 respectively and a t value of 10.18> 1, -7.61> 1, 2.38> 1 and -1.05> 1 for each variable, which were significant indicating that these variables fall in the region of non-rejection of the null hypothesis. On the other hand, the INFt with value of t of 0.17 <1 and probability of 0.8632 was not significant.

Economic analysis

This section presents the economic analysis of the coefficients, according to economic theory. At this point, it is important to analyze the coefficients of the parameters in their structural form, since they allowed to appreciate the congruence of some of the estimators in relation to the established in the economic theory.

The estimated model for total light car sales (VTA) was as follows:

$$\widehat{VTA_t} = -858084 - 3628.67658\, i_t + 88129E_t + 191.81337INF_t + 268.09572W_t - 141879\, U_t + \varepsilon_t \quad (2)$$

From equation 2, increasing the exchange rate and the monthly remunerations will result in an increase in the total sales of light cars, in accordance with the economic theory. For the case of the interest rate, the rate of inflation and unemployment was not met. All of the above, based on the information available, as well as the period analyzed in this particular study.

Interpretation of the elasticities of the structural form

The economic results of the elasticities in their structural form for each of the equations, is shown in the following table:

ε_i^{VTA}= -0.0262433962 ε_E^{VTA}= 0.6856100819
ε_{INF}^{VTA}= 0.0034526876 ε_W^{VTA}= 2.1401630619
ε_U^{VTA}= -0.0000259776

Table 3 Elasticities of the structural form
Source: Own elaboration based on the output of the Statistical Analysis System (SAS) package

In the analysis of elasticities, for any model, the concept of ceteris paribus was considered, using it allowed to study a variable isolated from the rest to better observe its changes when the other variables were not modified, that is, all other variables remained constant.

Total sales of light cars (VTA_t)

The elasticity of sales, with respect to the average monthly remuneration and the exchange rate was 2.14 and 0.6856, respectively, that is to say that before an increase of 10.0% of these variables sales increased by 21.4 and 6.85% in average, respectively. The sales with respect to the interest rate and the unemployment rate means that if they increase 10%, sales will decrease by 0.26 and 0.00026% respectively, for the case of the inflation rate did not comply with the sign of the economic theory, according to official data (Table 3).

Discussion

"The increase in inflation and the rise in interest rates have affected the availability of liquidity for consumers, since most of them purchase vehicles on credit, "Rosales said. "Now there are fewer consumers, there is a stability that is expected to remain in the remainder of the year and next." According to AMDA figures, 67.0% of the sale of cars is made through financing (Expansión, 2017).

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According to the results obtained, one of the factors that affected sales in December was the depreciation of the peso against the dollar, which was marketed above 20 pesos, as a result of the tax reform in the United States and its impact on Mexico. December is the most important month in sales, so the data to the downside is added to a total of eight consecutive months of falls in the sector. "December brings the most important sales of the year and, with this, confirmed a negative adjustment trend throughout 2017, more tightly in the second half of the year," the Deputy Director General of AMDA explained that inflation and The rise in interest rates is the impact that has had on the purchasing power of Mexicans.

In December, the Bank of Mexico raised the interest rate to 7.25%, the fifth increase made by the central bank in 2017 driven by the rise in general inflation in Mexico. Year-on-year inflation soared in the first half of December, reaching 6.69%, the second highest in 16 years and above what analysts expected. These indicators, higher interest rates and higher prices, caused a low demand in the automotive industry. With respect to other markets, the fall of sales of 4.6% in 2017 in Mexico contrasts with the increase of 9.4% in Brazil. However, this comparison should be made considering the recovery of the Brazilian market and the boom in sales that occurred in Mexico as of 2013 (HuffPost, 2018)

According to the Secretary of Economy (2012) at a global level, the importance of the automotive industry in national economies and its role as a driver for the development of other sectors of high added value have caused several countries to have as one of their main objectives the development and / or strengthening of this industry. Mexico is not the exception, because the automotive industry has represented a strategic sector for the development of the country. Its participation in exports places it as the most important industry, surpassing even the oil sector.

In 2011, the automotive industry exported 22.5% of the value of total exports, also four out of every five vehicles produced in Mexico were exported, which positions it among the most important nations in the world, occupying 8th place in manufacturing and the 6th among those that export automotive vehicles. Additionally, this has become a precursor of competitiveness in the regions where it has been established, which has translated into more qualified and better paid jobs, as well as in a greater development of human capital. On average, the remunerations of the terminal automotive industry in Mexico are 2.3 times that of the rest of manufactures. Likewise, the sector has generated an important outpouring of technological capabilities that find application in other sectors, such as electrical, electronic and aerospace and which, in turn, have led to the generation of specialized technical teams.

The macroeconomic situation of the automotive industry has established itself as one of the main contributors to economic growth and is one of the main foreign currency generators in the country, as it remains one of the sectors with the largest share of foreign investment flows direct In 2015, in the light vehicle segment, Mexico ranked as the seventh largest producer in the world, and the fourth largest exporter in the world. The production of heavy vehicles places the country as the sixth world producer of this type of vehicle and second in America. Within the automotive industry, close to 90.0% of the employment generated corresponds to the auto parts industry (www.gob.mx).

The automotive industry is one of the most dynamic and competitive in the Mexican export sector. Currently, it represents 3.0% of the Gross Domestic Product (GDP) of Mexico (18.0% of manufacturing GDP), provides around 900 thousand direct jobs (The figure includes the automotive, trucking and auto parts sectors) at the national level and represents around of 27.0% of total Mexican exports (ProMéxico, 2016).

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Derived from Mexico's own competitiveness in terms of costs and geographical location (immediate neighbor of the main consumer of automobiles worldwide, United States), as well as value chains created from the entry into force of the Free Trade Agreement of North America (NAFTA) in 1994, the assembly of automobiles has become a genuinely North American process. Now, as is common in all industrial readjustment derived from a commercial opening, this process of productive integration has caused that automotive companies from all over the world have decided to install some stages of the productive process in Mexico instead of in the United States, with the consequent impacts in terms of employment for that country (CEIGB, 2017).

Conclusions

Based on the results obtained from the model, the following is concluded: For the equation of total sales of light automobiles, the statistically most significant variables were the average monthly remuneration, the unemployment rate and the exchange rate. According to, the elasticities that had the greatest impact on sales were the average monthly remuneration and the exchange rate.

This is consistent with what was stated by the Mexican Association of Automotive Distributors (AMDA) and the Mexican Association of the Automotive Industry (AMIA), detailing that the sale of cars in the country accumulates a decrease of 7.8%. "We have not been able to stabilize the drop in sales," said Guillermo Rosales, deputy general director (AMDA). In the last 17 months, 16 have presented negative rates in car sales. For September, the industry was expected to sell 114,000 units, to close the year at 1.45 million vehicles, which represents a decrease of almost 10.0% compared to the previous year.

It also explains that the drop in domestic sales is due to the loss of purchasing power among Mexicans with average incomes, since 67.0% of the vehicles sold correspond to the compact and subcompact models, which have a value of less than 300,000 pesos. These two categories are those that accumulate the steepest fall in sales with 8.0 and 14.4%, respectively (Forbes Magazine, 2018).

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