Analogue valuation of micro companies belonging to the retail sector in Mexico using key financial indicators

Edgar Mauricio Flores Sánchez*

Mexico
Email: e.mfs@hotmail.com
*Corresponding author

Axel Rodríguez Batres

Business Department,
Universidad Iberoamericana Puebla,
Blvd. del Niño Poblano No. 2901,
Colonia Reserva Territorial Atlixcáyotl,
San Andrés Cholula, Pue. C.P. 72820, Mexico
Email: investigacion_schatzen@hotmail.com

Javier Antonio Flores Delgado

Student of Master in Business Administration,
Universidad Iberoamericana Puebla, Mexico
Email: javier.antonio.fd@gmail.com

Joaquin Bernardo Varela Espidio

Mexico
Email: jbve001@yahoo.com.mx

Abstract: The micro companies are economic units of great importance for the social and economic development of any country or region, specifically in Mexico, the micro companies focused on the retail sector stand out due to the number of units and the jobs they provide. The valuation of companies offers a variety of tools to determine the value of these organisations for various purposes, specifically analogical valuation allows working in environments of scarcity of information in order to provide relevant conclusions about the value of the companies analysed. The multiple linear regression method was used to determine the value of the selected microenterprises as a dependent variable with respect to a series of independent variables obtained from key financial information contained in the financial statements of the companies belonging to the sample. The results allowed us to identify the variables that determine to a greater extent the value of microenterprises in retail trade in Mexico, providing an alternative method which contributes to an improvement in the business decision making of all the interested groups.

Keywords: valuation; linear regression; micro companies; retail.

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Biographical notes: Edgar Mauricio Flores Sánchez is an independent researcher. He holds a degree in Electronics from Benemerita Universidad Autónoma de Puebla, has two specialties in Environmental Valuation and Real Estate Valuation. He holds a Master's degree in Engineering and a Doctorate in Strategic Planning from Universidad Popular Autonoma del Estado de Puebla. He is currently the Vice President of Administration at Comisión Federal de Electricidad International and independent researcher on financial topics.

Axel Rodríguez Batres is graduating from the Bachelor of Business Administration of the Universidad Iberoamericana. He has degrees in three Masters: Administration, Evaluation of Investment Projects and Valuation, and a PhD in Valuation from the Polytechnic University of Valencia, Spain. He is currently working at Comision Federal de Electricidad as the Director of Operations.

Javier Antonio Flores Delgado holds a degree in Mechatronic Engineering from Universidad Iberoamericana Puebla, and a student of the Master in Administration, he works as Planning Engineer in a German company in the automotive industry and researcher of financial topics.

Joaquin Bernardo Varela Espidio is an independent researcher. He holds a Bachelor's degree of Business Management and a Master's degree of Administration and Financial Strategies from Universidad Iberoamericana Puebla. He currently works as an independent trader and researcher of financial topics such as evaluation of investment projects, risk management and asset valuation.

1 Introduction

The production of a country is determined by the amount of goods and services produced, said data is called gross domestic product or GDP and according to the Bank of Mexico is defined as: "the total value of goods and services produced in the territory of a country in a given period, free of duplication. It can be obtained by means of the difference between the gross value of production and the goods and services consumed during the production process itself, at purchaser prices (intermediate consumption)" (Banco de México, 2017). That is why the strengthening and constant growth of this macroeconomic data constitutes one of the main priorities of any government in the world; economic growth is directly related to the level and quality of life of people.

Likewise, companies are those organisations that, through the pursuit of obtaining particular benefits, generate those goods and services that meet the needs of people, while generating jobs necessary to carry out their operations and contribute to public spending through payment of taxes. In this way, the companies are constituted as the economic units that provide the required dynamism to the local, national and international economy to keep in constant improvement and fulfil their economic and social function of generating and distributing the wealth.

In addition to the above, it is important to mention that decision makers within companies face a series of internal and external factors and variables that represent a constant and growing challenge to fulfil their main objective of maximising benefits for all their groups of interest. Regarding this, Adam (2005) explains that companies should be observed as ongoing businesses and that the financial information contained in the financial statements refers only to the past, which does not present precise information of the company and makes it difficult to take decisions for investors and the rest of the users of said information. Due to this, the valuation of companies is consolidated as a very useful tool to provide said decision makers with the greatest amount of truthful and timely information that allows them to effectively comply with said general purpose.

The valuation of companies can be defined as an economic discipline that aims to obtain a specific value or values of a company based on certain assumptions, to meet specific objectives and using the information required for their estimation. For this, the valuation of companies uses three main approaches: accounting, cash flows and market, their use depends on the characteristics of the asset or company to be valued as well as the information available in each case. Each of these general approaches has different methodologies to apply, however, all approaches have the following main characteristics: they bring together concepts that are used to measure the value of the company, reflect that currently it is important to manage the value of the companies for the development of business strategies and maintain that the main objective of these economic entities is to generate value for their shareholders and the other agents involved.

The valuation of companies exists in the first place due to the inexistence of a market of companies that presents the conditions that a market of perfect competition requires. This means that the market of companies does not present the characteristic of homogeneity, which is reflected in the fact that companies with similar conditions of size and sector present different values in terms of their results. Additionally, the market of companies does not present the characteristic of concurrency, which implies that there is not a sufficient enough number of plaintiffs and suppliers. When not having both mentioned characteristics, it can be concluded that the market of companies presents a reduced number of sale-purchase transactions comparable to each other, which constitutes opacity that avoids obtaining precise results. In the absence of a market price or comparable value, the practice of valuation of companies will have as a reason to be a discipline to determine the value of a company through certain assumptions and in relation to specific objectives.

In practice, the valuation of companies is related to the valuation of other assets and economic goods, using different methodologies, criteria and elements originally used for the valuation of traditional goods but suitable for determining the value of companies. Likewise, the various methodologies under the above-mentioned approaches are based on the application of sciences such as economics and disciplines such as financial mathematics and statistics. Specifically Caballer Mellado and Herrerías Pleguezuelo (2007) explain that in an insufficient information management environment, various statistical tools are used; what allows the emergence of the so-called analogical valuation, which attends to said scarcity of sources through the use of analogue methodologies that use econometric estimations.

On the other hand, according to the results obtained by the National Institute of Statistics and Geography (INEGI) and the National Institute of the Entrepreneur (INADEM), the National Bank of Foreign Trade (BANCOMEXT), micro enterprises are the economic units that contribute in the greater proportion, both in the personnel they

occupy and in the number of economic units, with 75.4% and 97.6%, respectively (INEGI, 2014a). Additionally, according to INEGI. Economic Censuses 2014 (INEGI, 2014b), the commercial sector in Mexico contributes with the largest number of economic units with 48.28% of the total in the country; what will allow to provide the greatest applicability to the results obtained.

Applying the principles of analogical valuation, since there is no market for commercial microbusiness transactions and considering the importance of these economic units for the generation of employment and therefore the level and quality of life of the population, considers it appropriate to use alternative methodologies to determine how to assign value to these companies.

Due to all the aforementioned, this research aims to use the method of analogue stock market valuation to determine the value of a group of micro companies belonging to the commercial sector in Mexico, due to its economic importance for Mexico, with the objective of favouring to an improvement in the quality of information provided to business decision makers that allows them to contribute to the sustained growth of the country.

2 Literature review

As mentioned in the previous introduction, the valuation approach of comparison with market values and specifically the analogical methodology, stands out for its application in environments of scarce information, such as the one corresponding to the present study on the micro-enterprises of the commercial sector in Mexico. The general methodology of using multiple linear regression to determine relevant business variables has been used in several national and international investigations; this basically consists of selecting a series of independent variables to construct an econometric model whose objective is to determine the value of a relevant dependent variable with the greatest possible precision. The nature of said dependent variable varies according to the research proposed and the objectives formulated in each, so although the general methodology has already been widely used, it is possible to identify important differences with respect to the present research work. Below are some of the most relevant works recently developed.

In the study carried out by Muñoz and Miguel (2014) focused on determining the economic-financial characteristics on the stock market value of a sample of banks in Europe, various econometric models were used by means of variables considered relevant. The conclusions of the study showed a positive impact on the variables of good asset quality, operational efficiency, adequate capital structure, good corporate governance and liquidity.

The work focused on analysing the external and internal factors that affect the price of the shares in the Chilean stock market carried out by Gajardo and Quaassdorff (2014), used an APT model with multifactors that included financial ratios of the companies in order to determine whether the main values of market shares in Chile move by macroeconomic variables in addition to their quarterly results. The conclusions show that although the variables tend to fit well as a whole, it was not possible to identify common patterns in the independent variables of the model; Due to this, it is preferable to use other models in the case of Chile due to the low significance of the macroeconomic variables when using a multi-factor APT.

The investigation of Morales and Abreu (2015) on the main determinants in the stock price of the construction sector of the Mexican Stock Exchange carried out by, used financial reasons in the areas of: coverage, short-term operating activity, leverage, working capital, return on investment and return on income, used by the financial information standards; using a multivariate regression with the objective of identifying which main variables impact on the determination of the stock price in said sector. The final results showed that only 12 reasons proved to be statistically significant to explain the value of the shares.

In the research carried out by Noblecilla (2015) focused on the analysis of the macroeconomic factors that determine the profitability of the Lima Stock Exchange, an econometric model was formulated using the independent variables: consumer price index, money supply, GDP growth and average passive market interest rates in Peru. Through different statistical tests it was determined that the money supply variable does not meet the economic-statistical criteria that define the validity of the model. The final conclusions showed that the events that occurred in the past impact the behaviour of stock market profitability in the present.

The work on the determinants of the capital structure of companies in Spain prepared by Cabrer & Rico (2015), used an econometric model which considered that the level of indebtedness is determined by the economic and financial characteristics of the companies. The conclusions obtained allowed to determine that the debt increases with the size of the companies and decreases with the cost of the debt, in addition it was established that the companies with the highest indebtedness will be those that have a higher growth, with a lower proportion of fixed assets and with a lower level of credit rating.

The research focused on determining the variables of competitive success in the mipyme, carried out by Rocca et al. (2016) with information from Peruvian companies, the authors used variables related to competitive success from a sample of 94 companies, the variables were analysed from the perspective of the theory of resources and capabilities of companies. The final conclusions made it possible to identify that as MSMEs apply efficient human resource management practices and have more developed control and management systems, the probability of achieving competitive success in the market will be greater.

The research dedicated to determining the factors with the greatest impact on the sustainable companies of the Mexican Stock Exchange, carried out by Morales (2016); focused on testing the hypothesis that establishes that the fundamental variables affect in greater magnitude than the macroeconomic variables in the construction of the price of the shares of the companies analysed. The final results proved that only in three companies are the fundamental factors that most affect the value of the share prices and in the rest of the organisations are mostly the macroeconomic factors.

In a study of similar features on the analysis of the variables that determine the dynamism of small and medium-sized Colombian companies carried out by Franco-Ángel and Urbano (2016), we sought to identify these variables under the approach of institutional theory and the theory of the resources and capabilities. The findings reached allowed to conclude that the main variables are: the skills of entrepreneurs to solve conflicts, their business education and flexibility, the bargaining power, the capacities of the administrative area, acceptance and support to the community, technology, Brand positioning and the support of friends.

On the other hand, the research carried out by Delgado (2016) on the econometric analysis of the profitability of the investors belonging to the bakery and pasta industry in Colombia, allowed to determine by means of its regression model that the profitability of the patrimony reflects a reduction progressive during the evaluation period caused to an important extent by the changes in the profitability of its assets and in the gross margin. Similarly, the substantial reduction in the consumption of bread per capita and the increase in sales prices adjusted for inflation showed a low performance of its fixed assets and income.

The econometric model of successful management for the family business in Colombia prepared by Rueda and Rueda (2017), with the objective of determining the most representative variables associated with the business success of the family organisations belonging to the selected sample, allowed concluding that the variables of: strategic planning, innovation and quality present the greatest impact as factors of business competitiveness.

In the investigation on the impact of the rights delivered on released shares and cash dividends on the price of capital shares of the mining sector in Peru, carried out by Mamani (2017); it was concluded that the determining factors of said stock value of the capital shares are: the rights delivered by cash dividends and released shares that the companies grant, because of both factors the profitability of the shares shows positive results.

The research on retail credit risk in Mexico by means of a selection of econometric variables considering a credit behaviour model based on the characteristics of the borrowers carried out by Trejo and Miguel (2017), made it possible to identify a proposal that minimises the expected loss at the same time that ROA increases by financial entity in the country by 2.2%, with respect to the methodology commonly used in the matter of provisions.

Subsequently, the study carried out by Sansores and Navarrete (2018), on the determinants of the growth of MSMEs in Mexico, used a correlation-type investigation and a multiple regression model with factor analysis that allowed concluding that the most relevant variables are: the characteristics of the company and the employer, the environment and mainly the growth of legal provisions and economic incentives made by the government.

As it has been possible to identify, there is an important variety of studies on the identification of variables of interest belonging to companies using multiple linear regression; however, the characteristics of the independent and dependent variables vary depending on the available information, the region analysed and the objectives particular of each investigation. In this way, it can be concluded that the present work is carried out in an unexplored area: the obtaining of the value of micro enterprises from the commercial sector in Mexico using qualitative variables belonging to the main Financial Statements in order to improve the quantity and quality of financial resources. received.

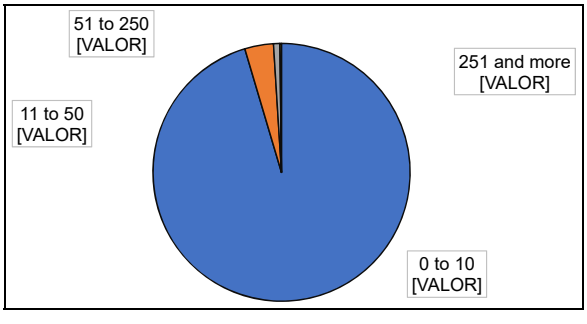
3 Contextual framework

Micro, small and medium enterprises represent a large percentage of companies worldwide, specifically in developing countries such as Mexico where 98% of companies belong to that classification. Based on the most recent economic censuses, the number of

business units and the corresponding total employed personnel in Mexico is distributed in the manner shown in Figures 1 and 2 (INEGI, 2015).

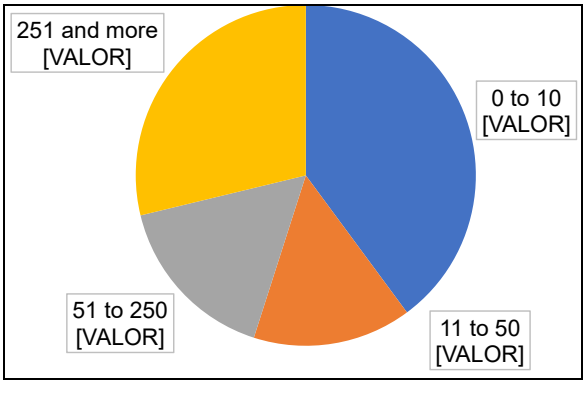
As can be seen in Figures 1 and 2, the number of large companies in Mexico is 0.2%, however they represent only 28.8% of employed personnel, compared with 71.2% of the workforce used by micro, small and medium businesses. Additionally, Figure 3 shows that the distribution proportions of personnel employed by company size have not had major changes during the analysed period (INEGI, 2015).

Figure 1 Private and parastatal sector: economic units (see online version for colours)



Source: Own elaboration based on INEGI (2015)

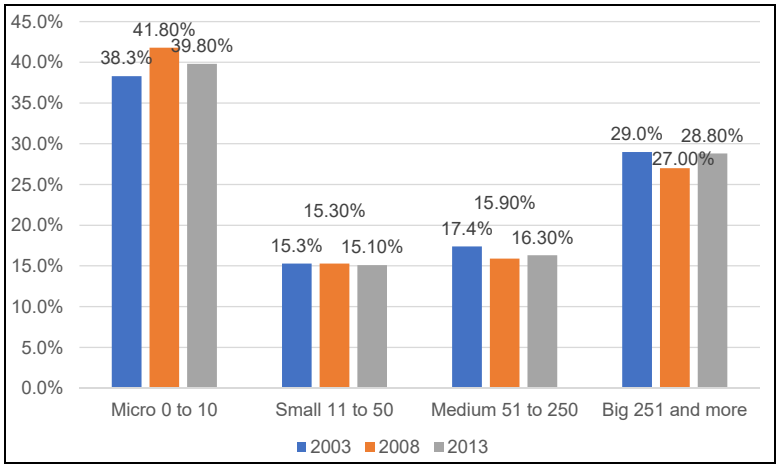
Figure 2 Private and parastatal sector: total employed personnel (see online version for colours)



Source: Own elaboration based on INEGI (2015)

It is important to mention that taking into consideration that this study focuses on the analysis of micro companies in Mexico, it is presented Table 1 which shows the classification of companies according to the number of workers based on the Diario Oficial de la Federación in Mexico (DOF, 2002).

Figure 3 Private and parastatal sector: total employed personnel according to stratum of the economic unit for the years shown (see online version for colours)



Source: Own elaboration based on INEGI (2015)

Table 1 Stratification of companies published by the Diario Oficial de la Federación

Size	*Sector*		
	Classification according to the number of employees		
	Industry	*Commerce*	*Services*
Micro	From 0 to 10	From 0 to 10	From 0 to 10
Small	From 11 to 50	From 11 to 30	From 11 to 50
Medium	From 51 to 250	From 31 to 100	From 51 to 100

Source: Own elaboration based on DOF (2002)

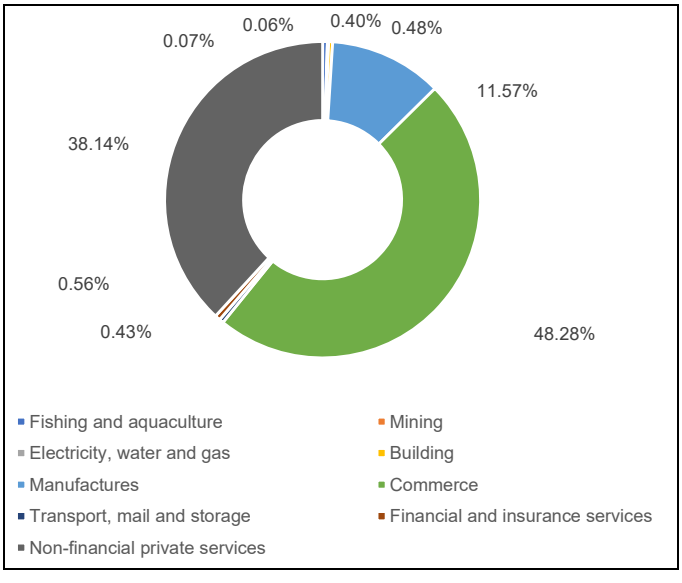
Parallel to the figures presented above, Figure 4 shows the weight of the commercial sector for the economy in Mexico, according to INEGI (2014a, 2014b).

As can be seen in Figure 4, it is the commercial sector that contributes with the most economic units in Mexico with 48.28% of the national total. Because of this, it is the commercial companies that offer the greatest amount and variety of businesses to study, also serving as an important contrast to the total national economy.

Based on the selection of micro companies belonging to the commercial sector in Mexico made in the introduction to this study, it is important to point out that based on the North American Industrial Classification System (SCIAN), the commercial sector is divided into the subsectors of wholesale and retail trade, according to the amounts of products and quantity of sales produced by the trading companies.

Also, based on INEGI Annual Survey of Commerce 2014 (INEGI, 2014b), the number of companies in Mexico engaged in retail trade is 94.91% of the total commercial sector in the country, so it is relevant to focus this research in this economic subsector; attending also to the fact that retail trade is carried out precisely by micro companies with a 97.1% share of the entire commercial sector (INEGI, 2009). According to SCIAN, retail trade contains: focused economic units, mainly to the sale of final consumer goods, with the aim of selling them to individuals and households, as well as to economic units aimed exclusively at a part of said sale process (INEGI, 2013).

Figure 4 Structure of sectors in Mexico by percentages (see online version for colours)



Source: Own elaboration based on INEGI (2014a)

More specifically, SCIAN proposes the branches indicated in Table 2 for retail trade (INEGI, 2014a, 2014b).

Table 2 Classification of subsectors pertaining to retail trade proposed by SCIAN

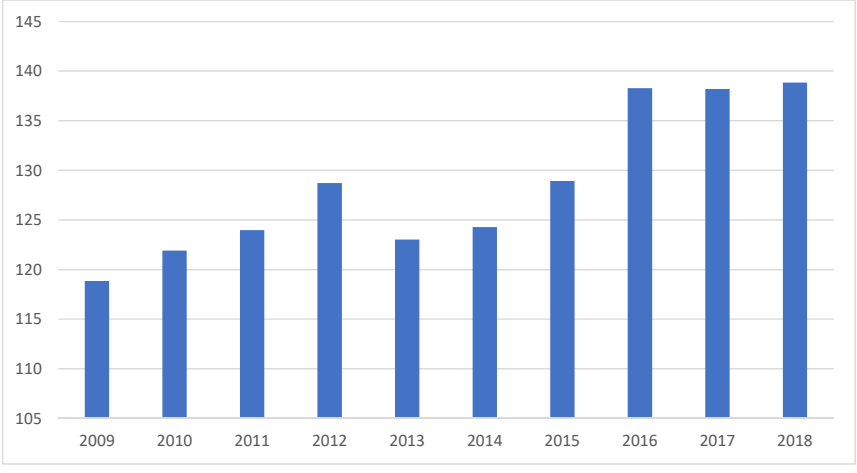
SCIAN category	*Description*
46	Retail trade
461	Groceries, food, drinks, ice and tobacco
462	Self-service and department stores
463	Textile products, jewellery, clothing accessories and footwear
464	Health care items
465	Stationery, leisure and other personal items
466	Household goods., comput., interior decoration items and used items
467	Hardware and glassware
468	Motor vehicles, spare parts, fuels and lubricants
469	Exclusively through the Internet, and printed catalogues, television and the likes

Source: Own elaboration based on INEGI (2014b)

In this way, the companies analysed in this investigation belong to these branches of retail trade in Mexico, so the results obtained will have greater validity and applicability for similar economic units.

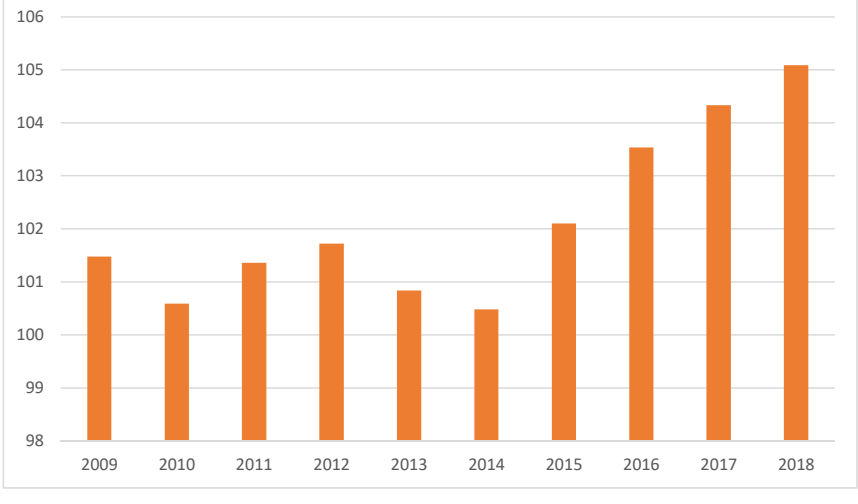
Finally, Figures 5, 6 and 7 show an overview of figures for retail trade in Mexico for the years indicated (BIE, 2019).

Figure 5 General index of total remuneration of retail trade in Mexico (see online version for colours)



Source: Own elaboration based on BIE (2019)

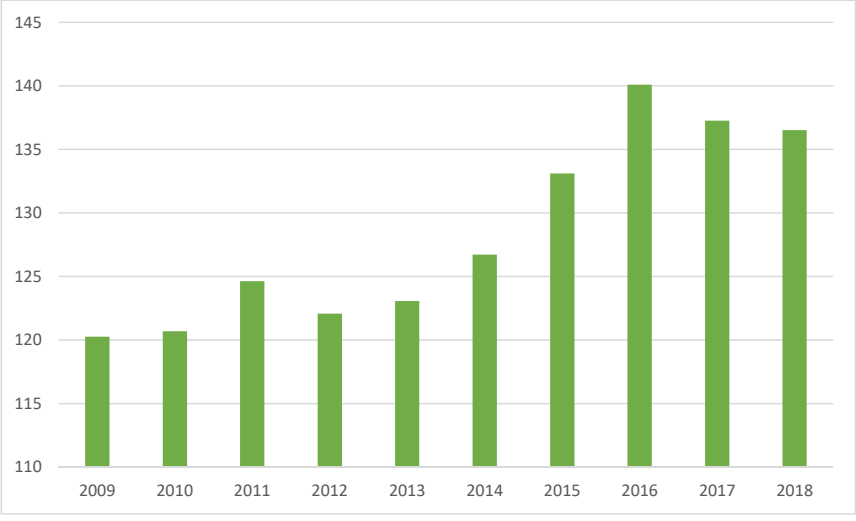
Figure 6 General index of personnel employed in retail trade in Mexico (see online version for colours)



Source: Own elaboration based on BIE (2019)

As can be seen in Figures 5, 6 and 7, the data corresponding to total remuneration, employed personnel and total income of retail trade in Mexico show that there has been a sustained increase during the last ten years, which demonstrates the importance of said subsector for the growth and economic development of the country. All of the above serves as sustenance to focus this research on companies dedicated to retail trade in Mexico.

Figure 7 General index of total income corresponding to retail trade in Mexico (see online version for colours)



Source: Own elaboration based on BIE (2019)

4 Methodology

Based on García and Moya (2009), the analogical valuation model has as a main hypothesis that the stock market capitalisation value of a company is a variable comparable to its market value and that it can be considered as an endogenous variable. The above implies that the analogue value of a company that is not listed on the stock exchange will be the value assigned to that entity by comparison with similar ones that do quote based on certain exogenous variables that affect the value to be determined.

Additionally, according to Caballer Mellado and Herrerías Pleguezuelo (2007), the use of this methodology requires three necessary conditions: existence of a minimum data base for both the dependent variable and for the independent variables considered in the linear regression, presence of some relationship that justify the proposal of the analogy between the value to be determined and the market value and a group of variables selected from among different factors. It is important to highlight that in the present research work the three necessary conditions are met, so the relevance of its application is verified.

Regardless of the companies listed or not in any stock exchange, the importance of using this methodology is that it implies a very useful alternative to use information of market values with respect to companies that do have relevant information. From this, make inferences about the value of companies for which there is no available information when making the analogy of values.

Table 3 Proposed independent variables to determine the market value of retail microenterprises in Mexico

Variable	*Code*	*Definition*
Market value	VM	Average real market value obtained from transactions certified by professionals in corporate valuation during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Total assets	TA	Sum of current assets, fixed and deferred annual average of the company during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Net working capital	CTN	Average net difference between annual current assets and annual short-term liabilities during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Total liabilities	TP	Sum of the short and long-term annual average liabilities of the company during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Total capital	TC	Sum of the average annual contributed capital and generated capital during 2013, 2014, 2015, 2016 and 2017, in Mexican pesos.
Sales	V	Average annual sales revenue of the company during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Sales cost	CV	Average annual variable costs of the company during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Gross profit	RB	Average difference between total annual sales revenue and annual variable costs during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Operating expenses	GO	Average annual fixed expenses incurred by the company during 2013, 2014, 2015, 2016 and 2017 in Cost of sales Mexican pesos.
Operating income	RO	Average difference between the annual gross profit and the annual operating expenses during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Financing cost	CIF	Average net difference between the annual financial earnings and costs during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Earnings before taxes	RAI	Average difference between the annual operating result and the financing cost during 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Taxes	IMP	Annual average taxes paid by the company in 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.
Net profit	RN	Average annual net profits of the company in 2013, 2014, 2015, 2016 and 2017 in Mexican pesos.

Source: Own elaboration based on the study carried out

Due to the nature of the study, it can be considered as a correlational investigation, taking into account that the objective is to determine the relationships between the selected explanatory variables and the variable that represents their market value. Regarding the sources used, it is important to mention that the information on the variables used was obtained through primary sources through a collaboration agreement with a business consulting firm in the City of Puebla, which will be omitted. Name for compliance with

the corresponding confidentiality contract. According to the type of sampling used, the present investigation can be considered with a type of non-probabilistic sampling with the characteristics of a selective or intentional sampling (Bonilla-Castro and Rodríguez, 2005); because since the beginning of the work and had the information required to do it. A number of 30 sample observations has been determined, with the objective that the variables analysed resemble at least minimally with a normal distribution, based on the central limit theorem (Johnson and Kuby, 2004).

Specifically, the dependent variable or market value is represented by securities corresponding to duly certified transactions of purchase and sale of companies actually paid, which will represent the dependent variable based on key financial accounts; constituting the variables required for the analogical valuation. Additionally, a valuation horizon for the five-year research was determined, using information from the dependent variable and from the independent variables belonging to the years: 2013, 2014, 2015, 2016 and 2017 corresponding to the 30 companies in the sample.

The proposed valuation model will consist in using this information to elaborate a model that has as objective to determine, by means of multiple linear regression, the market value of micro companies dedicated to the retail sector in Mexico, as a dependent variable with respect to a series of financial indicators considered as predictor or independent variables, which are contained in the main Financial Statements of those business units. Said model, when considering representative and significant variables of the specific economic subsector, will allow to offer a valid and objective market value that is useful for the corresponding decision makers.

Once the annual financial information required for the preparation of the model is available, we proceed to construct the corresponding database when selecting the variables considered key. From the Balance sheet and the results state of the 30 micro enterprises of the retail trade sub-sector, the 12 independent variables shown in Table 3 were established.

It is relevant to clarify that all the values of the variables correspond to the annual average of each data for the five years indicated, those periods have been considered because they are the most recent years from which he was able to obtain the necessary information from the 30 companies that make up the sample.

5 Results

The first analysis of the variables consists of determining their main corresponding descriptive statistics. Table 4 shows the statistical summary of the variables considered as independent.

The importance of the information contained in Table 4 lies in the fact that the greater validity and precision of the final results will be achieved insofar as the values used by the decision makers when using the resulting model are within ranges similar to those presented in the descriptive statistics of the variables originally used in the development of the model.

The chosen linear regression methodology selects the independent variables that show the highest linear correlation with the variable selected as dependent, eliminating those that do not meet the requirements of the model. In order to verify if the variables used provide the greatest degree of explanation based on the natural state of their value, as mentioned (Arango et al., 2009), these variables were transformed into exponents and

logarithms to determine what variant of data would have the greatest statistical significance. For this, the normal probability graphs corresponding to each variable were estimated for their natural, logarithmic and exponential state and it could be concluded that the highest compliance with statistical normality was met with the natural state of the data, so it was not required use the transformed value of the variables for the rest of the study.

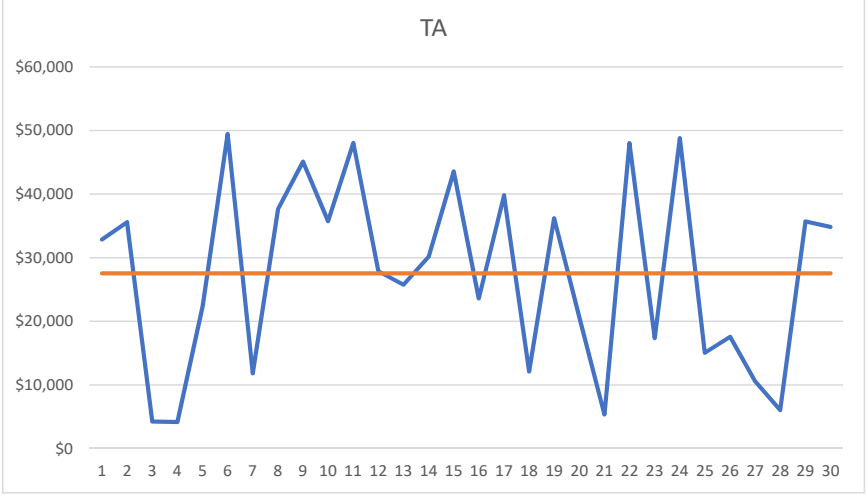
Subsequently, Figures 8 to 20 and Tables 5 to 17 detail the descriptive statistics of the sample of companies analysed for each of the variables used in this study.

Table 4 Summary of the descriptive statistics of the independent variables, expressed in Mexican pesos

	N	*Minimum*	*Maximum*	*Mean*	*Standard deviation*
TA	30	$4,163.00	$49,451.00	$27,534.7333	$14,643.95058
CTN	30	$1,373.87	$19,525.34	$8,350.6873	$5,164.17984
TP	30	$2,539.58	$33,193.08	$17,828.5787	$9,554.55070
TC	30	$1,486.00	$19,212.00	$9,706.1667	$5,255.72524
V	30	$2,610.35	$41,393.73	$16,908.3997	$10,600.87632
CV	30	$809.00	$15,316.00	$5,689.0333	$3,716.72238
RB	30	$1,801.00	$26,078.00	$11,219.4333	$6,927.17307
GO	30	$1,070.00	$15,730.00	$6,526.2000	$4,222.72209
RO	30	$731.00	$10,375.00	$4,693.2333	$2,776.75545
CIF	30	$278.00	$4,553.00	$1,870.5333	$1,125.76232
RAI	30	$365.00	$6,670.00	$2,822.6000	$1,772.00466
IMP	30	$128.00	$2,334.00	$987.9000	$620.17441
RN	30	$238.00	$4,335.00	$1,834.7000	$1,151.80153

Source: Own elaboration based on the study carried out

Figure 8 Total assets of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 5 Descriptive statistics of the Total Assets variable.

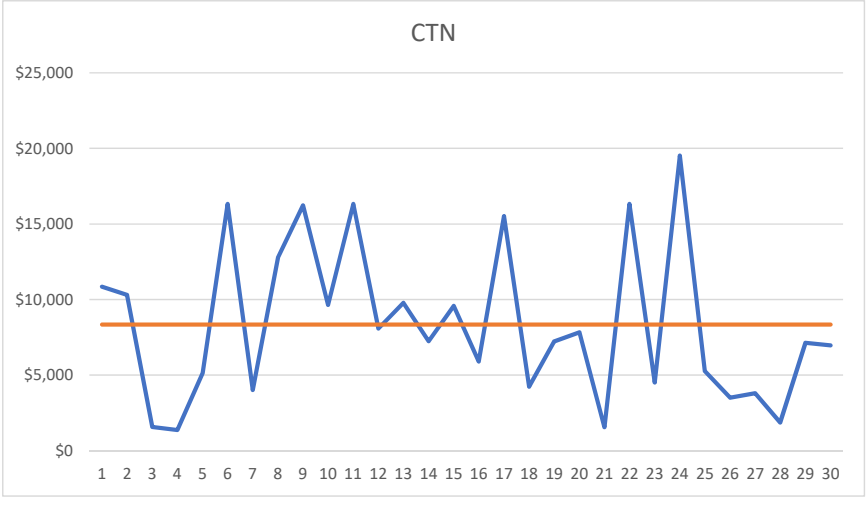
	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
TA	30	$4,163.00	$49,451.00	$27,534.7333	$14,643.95058	214,445,288.547

Source: Own elaboration based on the study carried out

It can be seen in Table 5 some of the most relevant descriptive statistics of the dependent variable TA (total assets), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the commercial value variable belonging to companies to determine its value, are within the ranges:

- Minimum value = $4,163.00
- Maximum value = $49,451.00
- Average value = $27,534.7333
- Standard deviation = $14,643.95058

Figure 9 Net working capital of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 6 Descriptive statistics of the net working capital variable

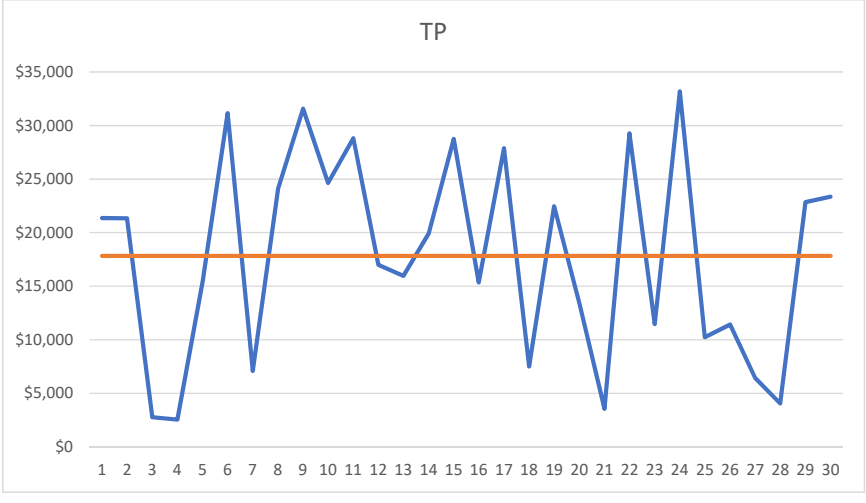
	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
CTN	30	$1,373.87	$19,525.34	$8,350.6873	$5,164.17984	26,668,753.419

Source: Own elaboration based on the study carried out

It can be seen in Table 6 some of the most relevant descriptive statistics of the dependent variable CTN (net working capital), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the commercial value variable belonging to companies to determine its value, are within the ranges:

- Minimum value = $1,373.87
- Maximum value = $19,525.34
- Average value = $8,350.6873
- Standard deviation = $5,164.17984.

Figure 10 Total liabilities of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 7 Descriptive statistics of the total liabilities variable

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
TP	30	$2,539.58	$33,193.08	$17,828.5787	$9,554.55070	91,289,439.137

Source: Own elaboration based on the study carried out

It can be seen in Table 7 some of the most relevant descriptive statistics of the dependent variable TP (total liabilities), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the variable commercial value belonging to companies to determine its value, are within the ranges:

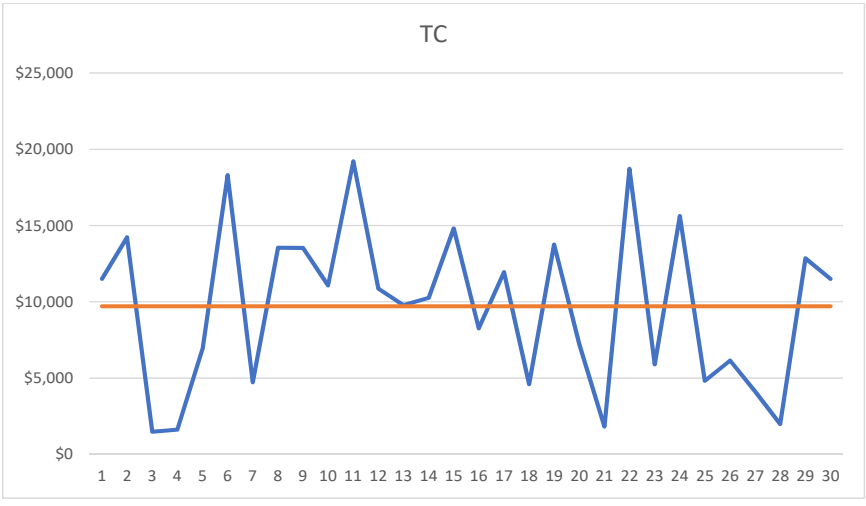
- Minimum value = $2,539.58
- Maximum value = $33,193.08
- Average value = $17,828.5787
- Standard deviation = $9,554.55070.

Table 8 Descriptive statistics of the total capital variable

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
TC	30	$1,486.00	$19,212.00	$9,706.1667	$5,255.72524	27,622,647.799

Source: Own elaboration based on the study carried out

Figure 11 Total capital of the companies analysed (see online version for colours)

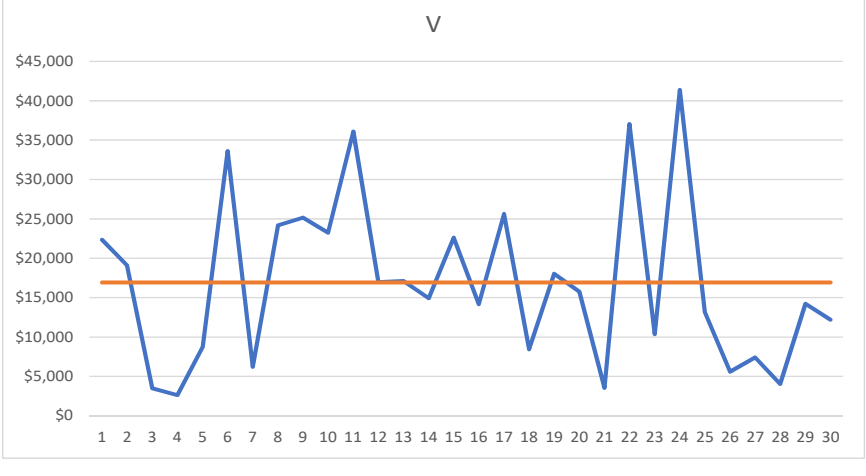


Source: Own elaboration based on the study carried out

It can be seen in Table 8 some of the most relevant descriptive statistics of the dependent variable TC (total capital), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the variable commercial value belonging to companies to determine its value, are within the ranges:

- Minimum value = $1,486.00
- Maximum value = $19,212.00
- Average value = $9,706.1667
- Standard deviation = $5,255.72524.

Figure 12 Sales of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 9 Descriptive statistics of the sales variable

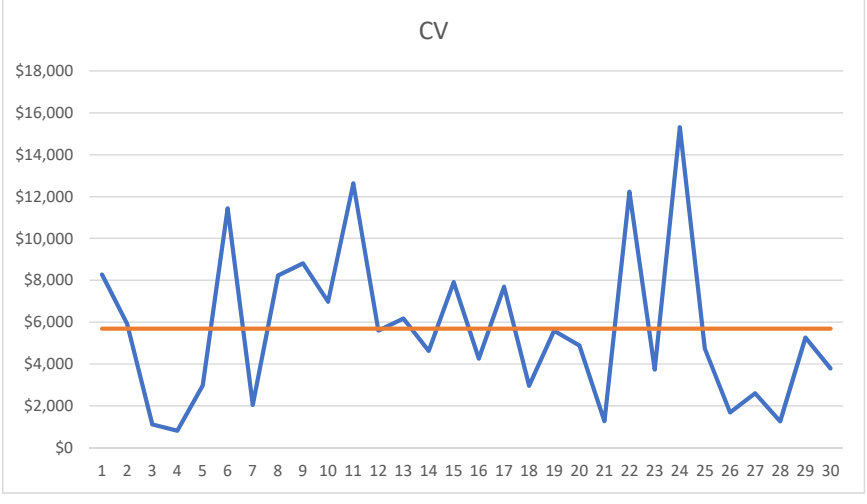
	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
V	30	$2,610.35	$41,393.73	$16,908.3997	$10,600.87632	112,378,578.712

Source: Own elaboration based on the study carried out

It can be seen in Table 9 some of the most relevant descriptive statistics of the dependent variable V (sales), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the commercial value variable belonging to companies to determine their value, are within the ranges:

- Minimum value = $2,610.35
- Maximum value = $41,393.73
- Average value = $16,908.3997
- Standard deviation = $10,600.87632.

Figure 13 Sales cost of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 10 Descriptive statistics of the sales cost variable

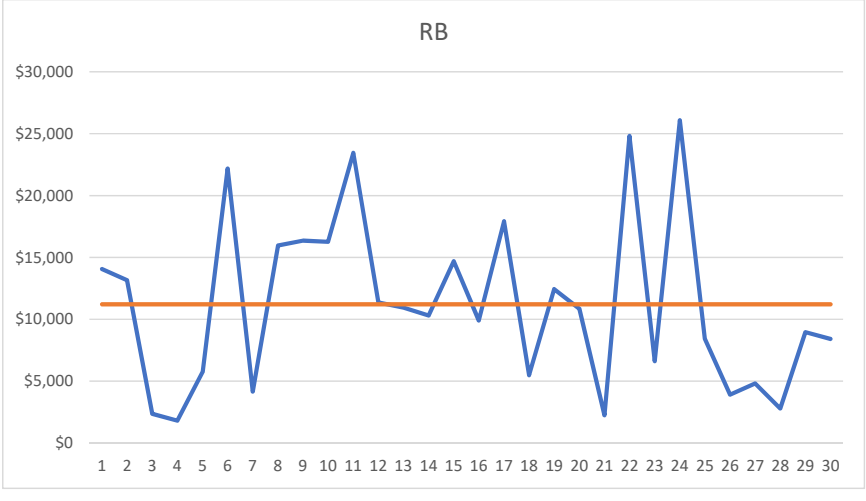
	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
CV	30	$809.00	$15,316.00	$5,689.0333	$3,716.72238	13,814,025.275

Source: Own elaboration based on the study carried out

It can be seen in Table 10 some of the most relevant descriptive statistics of the dependent variable CV (sales cost), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the variable commercial value belonging to companies to determine its value, are within the ranges:

- Minimum value = $809.00
- Maximum value = $15,316.00
- Average value = $5,689.0333
- Standard deviation = $3,716.72238.

Figure 14 Gross profit of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 11 Descriptive statistics of the gross profit variable

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
RB	30	$1,801.00	$26,078.00	$11,219.4333	$6,927.17307	47,985,726.737

Source: Own elaboration based on the study carried out

It can be seen in Table 11 some of the most relevant descriptive statistics of the dependent variable RB (gross profit), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the value variable commercial belonging to companies to determine their value, are within the ranges:

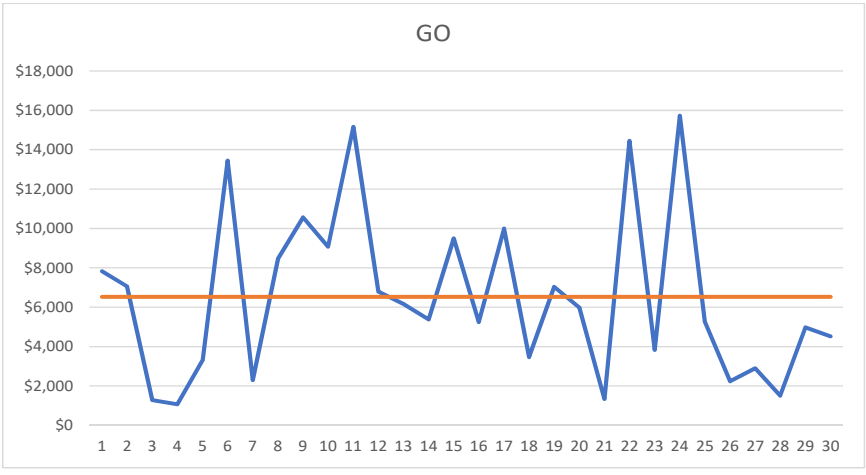
- Minimum value = $1,801.00
- Maximum value = $26,078.00
- Average value = $11,219.4333
- Standard deviation = $6,927.17307.

Table 12 Descriptive statistics of the variable operating expenses

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
GO	30	$1,070.00	$15,730.00	$6,526.2000	$4,222.72209	17,831,381.821

Source: Own elaboration based on the study carried out

Figure 15 Operating expenses of the companies analysed (see online version for colours)

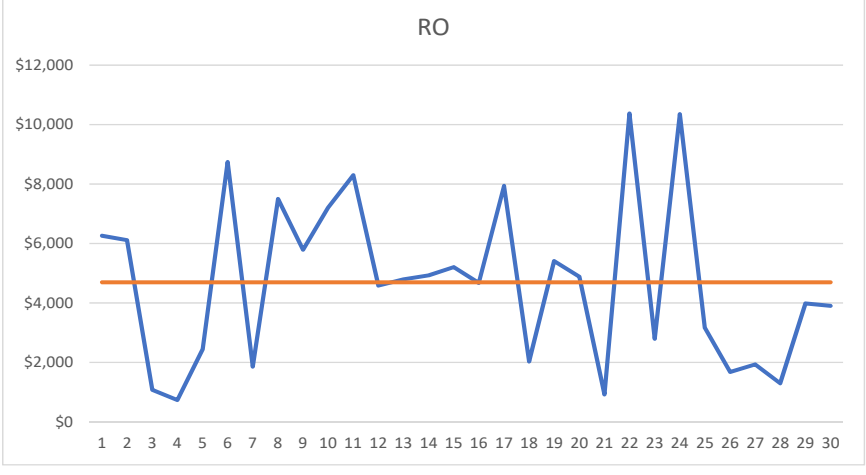


Source: Own elaboration based on the study carried out

It can be seen in Table 12 some of the most relevant descriptive statistics of the dependent variable GO (operating expenses), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the variable commercial value belonging to companies to determine its value, are within the ranges:

- Minimum value = $1,070.00
- Maximum value = $15,730.00
- Average value = $6,526.2000
- Standard deviation = $4,222.72209.

Figure 16 Operating income of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 13 Descriptive statistics of the variable operating income

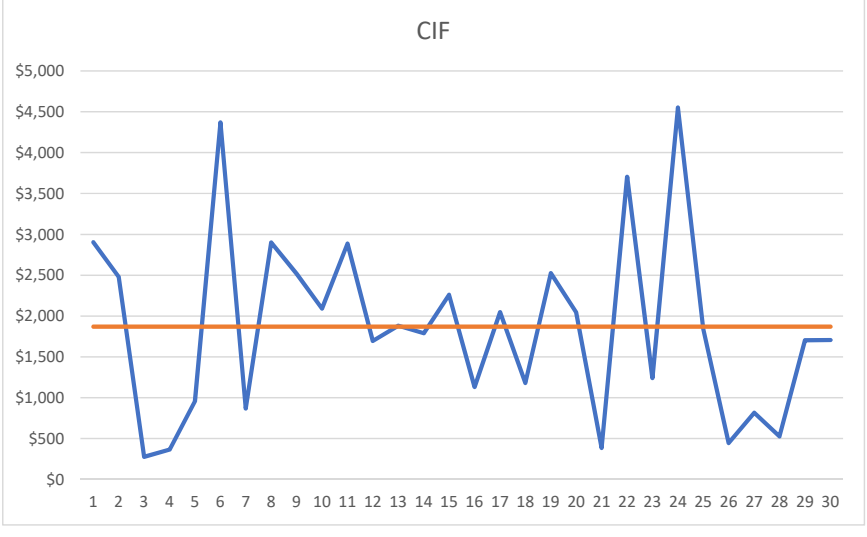
	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
RO	30	$731.00	$10,375.00	$4,693.2333	$2,776.75545	7,710,370.806

Source: Own elaboration based on the study carried out

It can be seen in Table 13 some of the most relevant descriptive statistics of the dependent variable RO (operating income), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the variable value commercial belonging to companies to determine its value, are within the ranges:

- Minimum value = $731.00
- Maximum value = $10,375.00
- Average value = $4,693.2333
- Standard deviation = $2,776.75545.

Figure 17 Financing cost the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 14 Descriptive statistics of the financing cost variable

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
CIF	30	$278.00	$4,553.00	$1,870.5333	$1,125.76232	1,267,340.809

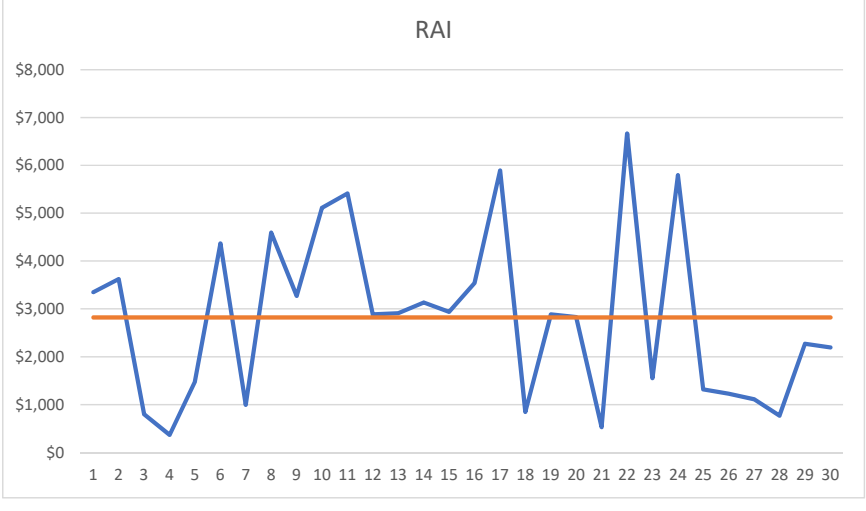
Source: Own elaboration based on the study carried out

It can be seen in Table 14 some of the most relevant descriptive statistics of the dependent variable CIF (financing cost), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values

of the commercial value variable belonging to companies to determine its value, are within the ranges:

- Minimum value = $278.00
- Maximum value = $4,553.00
- Average value = $1,870.5333
- Standard deviation = $1,125.76232.

Figure 18 Earnings before taxes of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 15 Descriptive statistics of the earnings before taxes variable

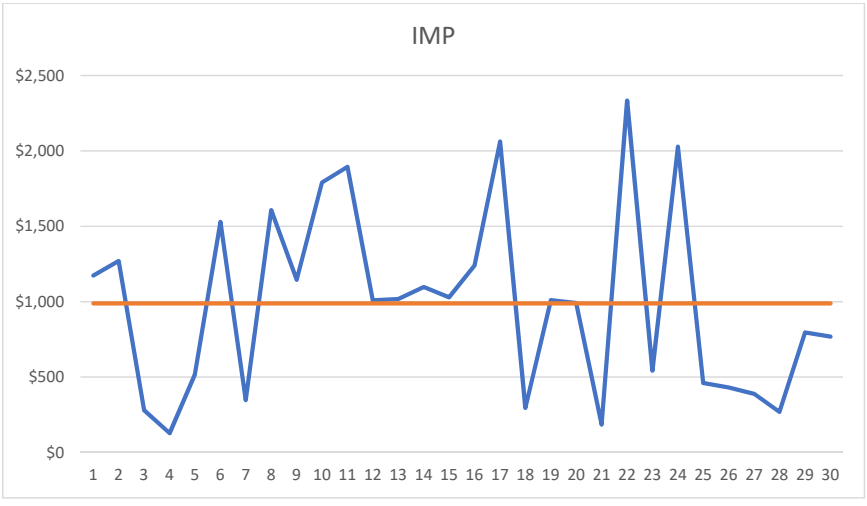
	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
RAI	30	$365.00	$6,670.00	$2,822.6000	$1,772.00466	3,140,000.524

Source: Own elaboration based on the study carried out

It can be seen in Table 15 some of the most relevant descriptive statistics of the dependent variable RAI (earnings before taxes), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the commercial value variable belonging to companies to determine its value, are within the ranges:

- Minimum value = $365.00
- Maximum value = $6,670.00
- Average value = $2,822.6000
- Standard deviation = $1,772.00466.

Figure 19 Taxes of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

Table 16 Descriptive statistics of the taxes variable

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
IMP	30	$128.00	$2,334.00	$987.9000	$620.17441	384,616.300

Source: Own elaboration based on the study carried out

It can be seen in Table 16 some of the most relevant descriptive statistics of the IMP dependent variable IMP (taxes), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the commercial value variable belonging to companies to determine their value, are within the ranges:

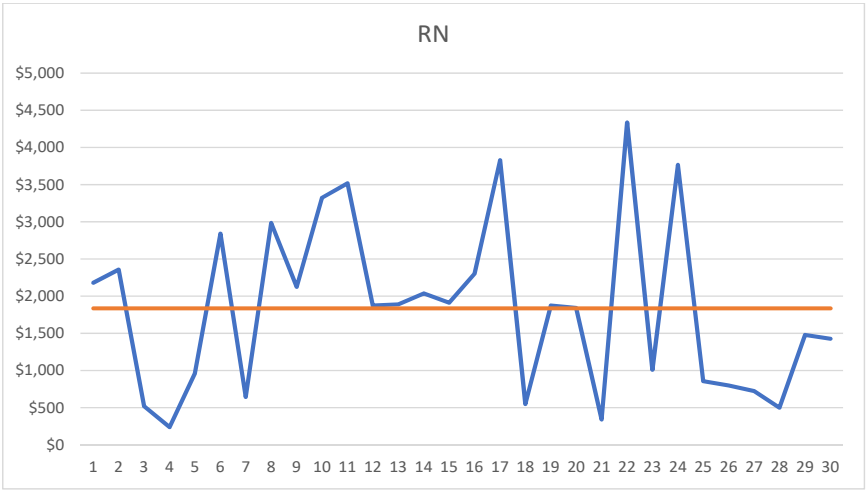
- Minimum value = $128.00
- Maximum value = $2,334.00
- Average value = $987.9000
- Standard deviation = $620.17441.

Table 17 Descriptive statistics of the net profit variable

	N	*Minimum*	*Maximum*	*Average*	*Standard deviation*	*Variance*
RN	30	$238.00	$4,335.00	$1,834.7000	$1,151.80153	1,326,646.769

Source: Own elaboration based on the study carried out

Figure 20 Net profit of the companies analysed (see online version for colours)



Source: Own elaboration based on the study carried out

It can be seen in Table 17 some of the most relevant descriptive statistics of the dependent variable RN (net profit), it is important to mention that the highest predictive precision of the final resulting model will be given to the extent that the values of the value variable commercial belonging to companies to determine its value, are within the ranges:

- Minimum value = $238.00
- Maximum value = $4,335.00
- Average value = $1,834.7000
- Standard deviation = $1,151.80153.

From these data, the next step is to determine the first linear regression model for the determination of the value of retail microenterprises in Mexico (Table 18).

Table 18 Correlation indicators of the first model

Model summary				
Model	*R*	*R squared*	*Adjusted R squared*	*Standard error of the estimate*
1	0.998	0.996	0.995	$3,027.80212

Source: Own elaboration based on the study carried out

Table 18 presents the summary of the model showing the main correlation indicators of the first model, representing the degree of general variability of the dependent variable and which can be explained by a linear regression. Taking into consideration that the values resulting from the R and R^2 indicators are significantly close to 1, it is possible to determine that the first model has the capacity to explain in a relevant way the total variability corresponding to the dependent variable VM; because this closeness to the unit allows concluding a significant linear correlation in the model (Triola, 2004).

For its part, Table 19 shows the coefficients referring to the relationship between the value of the constant of the linear regression equation (omitted in this case) and the value of their respective coefficients. For the present investigation, the column that is relevant is that titled Sig or value of significance of each coefficient; it is considered that said value should be equal to or less than 0.05 in order to be useful in the present study (InnovaMIDE, 2010).

Table 19 Coefficients obtained from the first regression model

Coefficients						
Model		*Non-standardised coefficients*		*Standardised coefficients*	*t*	*Sig.*
		B	*Standard error*	*Beta*		
1	CTN	–1.520	0.505	–0.336	–3.007	0.006
	TP	1.492	0.225	0.680	6.633	0.000
	TC	1.776	0.401	0.441	4.424	0.000
	CV	–0.502	1.181	–0.077	–0.425	0.675
	GO	1.604	0.997	0.281	1.609	0.121
	CIF	–1.284	1.675	–0.063	–0.767	0.451
	RN	1.467	1.288	0.072	1.139	0.266

Source: Own elaboration based on the study carried out

As can be seen in Table 19, there are several coefficients of independent variables that have levels of significance greater than 0.05, so it was decided to discard the first model and perform the linear regression again with the same data but using the method of regression called successive steps. When using the aforementioned regression method, the statistical software selects each exogenous variable according to its level of correlation with the endogenous variable, introducing and discarding variables in each step based on compliance with the entrance and exit tests to the model, without considering the choices you have made in previous steps. The summary of the corresponding model is presented in Table 20.

Table 20 Indicators of correlation of the model through successive steps

Model summary				
Model	*R*	*R squared*	*Adjusted R squared*	*Standard error of the estimate*
1	0.997	0.994	0.993	$3,608.80240
2	0.997	0.995	0.994	$3,314.07503
3	0.998	0.996	0.995	$3,012.78095

Source: Own elaboration based on the study carried out

As shown in Table 20, the correlation indicators R and R^2 were increasing their value from the first step to the third, concluding in a high level of linear correlation corresponding to the variables used in the model and which are the same as those obtained in the first model. Similarly, the correlation coefficients obtained through the regression are presented in Table 21 by means of successive steps, including their degrees of significance corresponding to the three calculated steps.

The levels of significance shown in Table 21 corresponding to the coefficients obtained from the linear regression by the method of successive steps have values lower than 0.05 for the three variables resulting in the last estimated step, so it is considered that the model is valid. In this way, the obtained coefficients allow to assemble the equation that allows to determine the value of a micro company in the retail sector in Mexico as shown in equation (1).

$$\text{Value of a microbusiness retail trade in Mexico} = \text{TA}(1.566) - \text{CTN}(1.677) + \text{RB}(0.892) \tag{1}$$

Source: Own elaboration based on the study carried out

Table 21 Coefficients obtained from the regression model by successive steps

Coefficients						
Model		*Non-standardised coefficients*		*Standardised coefficients*	*t*	*Sig.*
		B	*Standard error*	*Beta*		
1	TA	1.419	0.021	0.997	66.904	0.000
2	TA	1.648	0.093	1.158	17.748	0.000
	CTN	–0.746	0.295	–0.165	–2.527	0.017
3	TA	1.566	0.090	1.100	17.374	0.000
	CTN	–1.677	0.445	–0.371	–3.769	0.001
	RB	0.892	0.340	0.265	2.623	0.014

Source: Own elaboration based on the study carried out

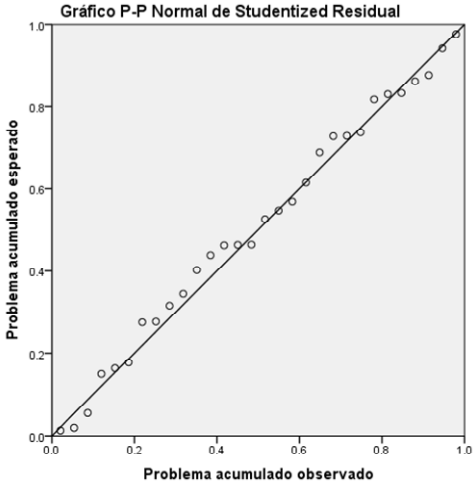
In this way, the estimated market value would be given based on three variables of the company: total assets, net working capital, and gross profitability; in the proportions and sense indicated by the equation. In order to evaluate the model obtained through linear regression, it is necessary to perform various tests that prove the relevance of its practical application. The first test consists of evaluating its statistical normality (Salafranca et al., 2005), one of the underlying assumptions of the regression, for which the estimated values are used through the model itself and their differences are determined with respect to the real values, that is, the corresponding residues are estimated. Figure 21 presents the analysis of the normal probability of residues based on the Student's T.

In Figure 21, it can be seen that the values of the estimated residuals are placed regularly along the diagonal of the normal distribution without moving away significantly, so it is possible to conclude that the residuals have a normal statistical distribution. According to this analysis, it is determined that the error of the model with respect to the theoretical value is statistically acceptable and therefore the results obtained are valid.

The second test to evaluate the model is to estimate the so-called typed residuals, which are those that have a standard deviation of one and an average of zero, presenting a normal distribution. Subsequently, the value of each residue observed below the normal distribution curve, that is, its z value, is estimated. The above allows to identify the proportion of the z values corresponding to the typed residues along the normal distribution curve, the final results are presented in Table 8.

The results shown in Table 22 indicate that the percentage of the typified residues that are less than 1 standard deviation from their average is 70.00%, which almost accurately approximates the value of 68.2% of the normal distribution. On the other hand, the values of the residues located between 1 and 2 standard deviations of their average represent 20.00%, which is similar to the 27.2% dictated by statistical normality. Finally, the percentage of waste whose values are more than 2 standard deviations from its average is 10.00%, which is slightly higher than the 4.6% established by the normal distribution. In this way, it can be established that this second test of the model also indicates the validity in its application.

Figure 21 Normal probability of residues based on the Student's T



Source: Own elaboration based on the study carried out

Table 22 Normal probability distribution of calculated residuals

Position below the normal probability distribution curve	*Percentage of z-values corresponding to the typified waste*
More than 2 standard deviations from the mean	10.00%
Between 1 and 2 standard deviations from the mean	20.00%
Less than 1 standard deviation from the mean	70.00%

Source: Own elaboration based on the study carried out

The last test to be carried out is of the qualitative type and consists of analysing the coefficients obtained from the final resulting equation in such a way that its logical economic coherence can be verified. The above implies analysing whether the variables obtained present with relevance from the practical point of view and according to business experience and professional valuatory. The model indicates that the value of a micro company dedicated to the retail sector in Mexico is given in the first place by:

1 The value of its total assets, in such a way that the higher the amount of total assets, the market value of the micro company will be equally greater. The foregoing presents economic logic because it is considered that a company with a greater

amount of assets has obtained sufficient sources of financing either through liability or capital to have a greater value in the market.

2 The value of its net working capital, in this case the model reflects that the smaller amount of net working capital will increase the market value of the micro retailing company; this can be explained if it is considered that fixed assets are those that generally generate operating profits, so that a decrease in the proportion of current assets with respect to total assets increases the profitability of the business. In addition, a greater proportion of fixed assets is generally rewarded by financial institutions with respect to the granting of credits and their respective conditions.

3 The value of its gross profitability in such a way that a greater amount in the gross profits, the market value of the company will increase; This indicates that after subtracting the cost of sales from sales for the period, the market values that the company maintains healthy gross margins, regardless of the fixed expenses it may have. The foregoing indicates that the value of the company will be greater if the decision makers focus on reducing their variable costs, which represent an important part of the expenditures for commercial companies.

6 Conclusions

Companies are the organisations that contribute most to the economic growth of any country, while the valuation of companies focuses on providing new and better ways to determine the value of these entities in such a way that they adapt to the information needs of the different decision makers. Microenterprises in Mexico, as in the rest of the world, represent the largest number of economic units and provide the largest number of employed personnel, specifically the retail sector in Mexico.

The literature reviewed on linear regression methods for the valuation of companies, showed a wide variety of works in this regard; however, it was considered that there are very few which focus on the valuation of micro companies, specifically on commercial companies through the use of quantitative variables represented by relevant financial indicators and with the objective of constituting an alternative tool for obtaining financial resources.

The present investigation focused on the use of the analogical valuation methodology, relevant in environments with little information such as that of micro-enterprises, using a case study consisting of a sample of 30 micro businesses in the retail sector in Mexico; in order to determine the independent variables that give them value to a greater extent. We used 13 quantitative variables from the main financial statements of the companies and provided by a consulting company.

Several linear regression models were performed, and a resulting equation with statistical significance was obtained through the method of entering data by successive steps. The obtained coefficients indicate that the value of retail microenterprises in Mexico is given by three variables, mainly: total network capital of assets, gross result; in that same order of importance. The coefficients of total assets and gross result presented a positive sign, so they have a direct relationship with the value of the company; the coefficient of net working capital showed to have a negative sign, reason why it is considered that it has an inverse relation with the commercial value of the micro company.

Several tests were carried out to determine the validity of these results: graphic analysis of the residues based on the Student's T to verify their similarity with the normal distribution, analysis of the typed residues to determine their similarity with the standard deviations of the normal distribution curve and logical economic coherence analysis. The three validity tests showed that the results obtained by the model are applicable to determine the value of a retail microenterprise in Mexico, with the objective of constituting a valuation alternative for obtaining financial resources for the growth of the same

The findings reached will allow business decision makers to identify the financial items that the market considers to a greater extent to determine the value of retail microenterprises in Mexico, constituting an important tool for them to focus their efforts and resources. Efficient way subsequent investigations could add more quantitative variables or even consider qualitative variables. Additionally, it is possible to consider analysing other subsectors and economic branches of importance for economic growth and development.

The present study aims to contribute to the greater use of existing valuation methodologies for companies, specifically in environments with scarcity of information and with the objective of providing micro-enterprises with greater growth opportunities for the benefit of the whole society.

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