Risk assessment for micro companies belonging to selected branches of the non-financial private services sector in Mexico through the Beta coefficient.

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Abstract.

The social and economic development of any country or region is closely linked to the performance of its economic units, specifically the micro-enterprises of the private non-financial services sector that provide the largest number of jobs in Mexico. The discipline of the valuation of companies allows to determine the value and the risks associated to any type of economic entity through the use of diverse financial tools; Specifically, the Capital Assets Valuation Model CAPM stands out. However, this model has several limitations that prevent the risk betas estimated in a general way from being useful for all types of companies. The present investigation was responsible for building an own index of microenterprises in Mexico to determine the respective beta risk coefficient for five branches belonging to the sector of temporary accommodation services and food and beverage preparation, which stands out for its number of establishments at the national level. The results generated allowed obtaining the five beta coefficients for each one of the selected branches, in such a way that said factors can be applied in a valid and effective way for the determination of the value and risks of companies belonging to these economic branches, constituting an alternative of valuation to obtain more and better financial resources.

Resumen.

El desarrollo social y económico de cualquier país o región está estrechamente ligado con el desempeño de sus unidades económicas, de manera concreta son las micro empresas del sector servicios privados no financieros las que aportan la mayor cantidad de puestos de trabajo México. La disciplina de la valuación de empresas permite determinar el valor y los riesgos asociados a cualquier tipo de entidad económica a través del uso de diversas herramientas financieras; específicamente destaca el Modelo de Valuación de Activos de Capital CAPM. Sin embargo, dicho modelo presenta diversas limitantes que evitan que las betas de riesgo estimadas de manera general sean útiles para todo tipo de empresas. La

presente investigación se ocupo de construir un índice propio de micro empresas en México para determinar el coeficiente de riesgo beta respectivo para cinco ramas pertenecientes al sector de servicios de alojamiento temporal y de preparación de alimentos y bebidas, el cual destaca por su número de establecimientos a nivel nacional. Los resultados generados permitieron obtener los cinco coeficientes beta para cada una de las ramas seleccionadas, de tal manera que dichos factores pueden ser aplicados de manera válida y efectiva para la determinación del valor y riesgos de empresas pertenecientes a dichas ramas económicas, constituyendo una alternativa de valuación para la obtención de más y mejores recursos financieros.

Clasificación JEL. G11, G12, L83.

Keywords: valuation, risk betas, micro companies, private non-financial services.

Palabras clave: valuación, betas de riesgo, micro empresas, servicios privados no financieros.

Introduction.

Companies are organizations that through the use of various types of resources at their disposal, generate the goods and services that society demands; However, for these economic units to be able to carry out their operations, they require a sufficient amount of financing to enable them to fulfill their role in the national economy. In the current reality, this financing is concentrated in a small group of large companies that have the ownership of a significant amount of technological, organizational and financial resources that allow them to be attractive for investment and subject to credit under the most optimal conditions. market.

By contrast, the micro companies are the ones that contribute with the largest amount of both number of economic units 97.6% and staff occupied 75.4%, according to figures from (INEGI, 2016). The companies are considered as the main generators of the economic growth of a country or region, this is because these organizations offer direct and indirect jobs, contribute with the payment of taxes to public expenditure and satisfy the market consumption requirements; and all this is achieved by seeking the satisfaction of their particular benefits. Additionally, according to INEGI. Economic Censuses 2014. (2014), the private non-financial services sector is the one that contributes the most jobs with 35.75% of the total in Mexico; Therefore, it is possible to conclude the importance of this economic sector for the generation of jobs in the country, which reflects the relevance of focusing research in that area.

In this way, the aggregate production of all economic agents of a country is defined as Gross Domestic Product or GDP and based on the Bank of Mexico refers to: "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).

In spite of the important place that the micro companies have for the contribution to the sustained growth of this macroeconomic indicator of great relevance, the financial institutions demand from these economic units the presentation of diverse

data and information with which they hardly count in the real world; the foregoing with the purpose of optimizing the relationship between risk and yield of said financing institutions. Even taking into consideration the studies carried out by professionals in finance, it is important to highlight that most of them focus on determining the value and risk of large companies, so it is possible to affirm that the valuation whose purpose is micro businesses it is still a relatively poorly researched area, mainly due to the difficulties of obtaining the information required by the methodologies mainly used.

Additionally, as commented by Saavedra et al. (2013), there are several reasons why a company needs to know its value, among which stand out: generally identify the company, determine its way of making decisions and investment planning, incorporation and divestiture of business units, reorganization and transformation of the entity.

That is why it is pertinent to apply alternative valuation methodologies, which allow them to be implemented in environments with a scarce amount of relevant information, and which are useful for business decision makers; whether customers, suppliers, workers, investors and society in general.

Considering the professional valuatory practice, it is considered that the so-called Capital Asset Valuation Model[1] initially presented by Markowitz (1959) is the most appropriate in general terms to determine the risk of the selected micro companies. This model is basically focused on identifying the financial risk of an asset with respect to the market in which it operates, through the indicator called Beta risk coefficient, which in turn is essential to determine the value of a company under the capitalization approach of rents, because it is used as one of the data included in the discount rate that will allow determining the corresponding net present value.

As one of the main promoters of this methodology for determining risk, one can cite the renowned author Damodaran (2018), which has used the CAPM bases to generate a series of beta coefficients to identify the risk of a wide variety of large companies belonging to diverse industries mainly in the United States; therefore, these results are mainly applicable to comparable companies. However, as

[1] Known as CAPM by its acronym.

mentioned above, obtaining these coefficients that are comparable to micro companies and companies from other countries has been little explored in the literature.

Regarding the need to adjust the estimates of the beta risk coefficient for each case analyzed, Argueta & Martínez (2016) explain that it is necessary to contextualize the financial information used in the calculation of the coefficient, taking into consideration the beta of the selected industry belonging to international markets and then apply some type of risk adjustment factor. Likewise, the research carried out by Vidaurre (2016) concludes that the optimal use of the CAPM method requires taking into account its limitations and implications, such as the fact that the data used for the beta coefficient are easily accessible in mature stock markets belonging to developed countries, but not for developing countries where the contributing companies do not have the sufficient variety and quantity required to obtain valid results.

Taking into account everything previously written, this research aims to use the methodology of the CAPM to estimate a coefficient of own beta risk for micro enterprises of various subsectors belonging to the service sector in Mexico, due to its relevant contribution to the Mexican economy, with the objective of providing tools for the effective decision making of the various economic agents involved; among which the financial institutions stand out for the granting of credits that allow companies to have a sustained growth.

Literature review.

As described in the previous introduction, the CAPM methodology is a widely used tool to estimate the risk of an asset or company through its Beta coefficient; However, most of the studies carried out focus on analyzing information on the performance of large companies in specific countries. That is why the need arises to adjust the data used in such a way that the results obtained are representative to effectively measure the risk of a specific group of companies, generating valid conclusions for the decision making of the different stakeholders involved. At present, different

investigations have been carried out that approach this approach in an approximate way, presenting some differences depending on the nature and objectives of each specific study. Some of the most recent research is mentioned in a descriptive way. The research carried out by López et al. (2013), on the systematic risk of issuing banks of securities in Spain during 1993 and 2010, applying an econometric methodology of the study of events and taking into consideration the possibility of variations in the systematic risk within the windows of the event. The main conclusions obtained indicate that the systematic risk increases from the beginning to the end of the period of time for the issuance and registration dates, and improves the diversification of the issuer's portfolio; likewise, they prove that the systematic risk prior to issuance for large entities is much higher than that of small and medium-sized banks, and that the issuance is an event of greater relevance for the latter entities due to the greater impact of this effect.

The research focused on calculating the betas of a sample of listed companies in the Argentine Stock Exchange between 2010 and 2012 by means of 4 different methods in order to identify the one that can be taken as a reference to estimate the betas of SMEs that do not quoted on the Stock Exchange, prepared by Martínez et al. (2014), concluded that to estimate and interpret the risk of each company it is necessary to analyze technically the analyzed method and the variability of the time series used, as well as to know the future prospects of both the sector and the company analyzed.

According to the work dedicated to demonstrate how risk management models can create value through the reduction of the discount rate of the valuation flows of the underlying asset, performed by Vargas & Cruz (2015); It proposed three models of real derivatives with the objective of maximizing the value of the asset by means of systematic risk reduction strategies measured through the beta. The main finding found is that the coverage of EBIT eliminates the unexpected changes in demand, which causes it to become an EBIT with zero variability, implying that the systematic risk of the asset (beta) becomes 0 or a risk-free rate; minimizing the discount rate and maximizing the value of the company.

The work done by Wong & Chirinos (2016) on the relevance of the CAPM model to value family businesses when calculating cash flows through this discount rate, which includes the total risk and opportunity costs; They concluded that the model tends to underestimate ventures, even those considered acceptable. They also determined that if they also included other modifications such as the discount for country risk or liquidity, the results would discourage family businesses even more.

On the other hand, the study carried out by Vidaurre (2016), on the identification of a model of approximation of the beta coefficient in its risk-return measurement applicable to the Financial System of Bolivia, proposing a practical approximation of the alternative models as well as its correlation with the traditional model, allowing to qualify the risk-return of a bank in Bolivia. The main conclusions indicate that the effectiveness of the accounting betas is affected by the number of observations, while the qualitative betas involve a high degree of subjectivity on the part of the evaluator; even so, the proposed model confirms its methodological usefulness and can be used by all types of valuation and financial specialists when making their estimates regarding the value of the companies.

Finally, in the study carried out by Muñoz & Cuadros (2017), on the comparison of risk management models and their implementation in SMEs, the impossibility of its application could be verified due to the high cost involved, the excessive time it takes apply robust methodologies and the approach of these methodologies towards large projects. Specifically mention that SMEs are unable to manage risk adequately due to lack of personnel, resources and knowledge, which are reflected in the lack of: systematization of lessons learned to apply in future projects, change management and of the risks associated with the uncertainty and risk managers required.

As it has been observed, there are several studies on the risk assessment for companies that seek to adjust the data used with the aim of guiding the results and their application to a certain group of companies; varying its size, turn and geographical location; However, no studies focused on the field of the present study were found, that is: the determination of the beta risk coefficient for microenterprises in the service sector in Mexico by comparing it with an own elaboration index corresponding to the countries' microenterprise market.

Methodology.

As presented in the introduction and review of the literature, the way in which the beta coefficient is traditionally estimated is through the use of information pertaining to an economic sector and the determination of its variation with respect to the entire market, which is represented by a stock index. Taking into consideration that this process generates very general results which are not applicable for companies of different sizes and sectors, the proposed methodology consists of assembling an own index by means of the analysis of a sample of micro companies in Mexico; whose results are reliable and valid, reflecting in a reliable way the reality of said economic units.

The first step of the proposed methodology is to obtain information from companies that have comparable characteristics regarding their size according to the number of workers, in such a way that the results obtained are genuinely applicable to companies with similar characteristics, in this case service sector in Mexico considering its importance for the national economy. It is important to mention that all the information used in the present investigation was obtained through primary sources through a business consultancy company of the City of Puebla, from which its name will be omitted in accordance with the respective confidentiality contract.

Specifically, the proposal consists of using selected financial information from 200 companies that meet two essential requirements:

1. Created in Mexico, including companies from all economic sectors.
2. That you remember your number of workers could be classified within the category of micro companies (1 - 10 people)[2].

Once the 200 companies required to set up the microenterprise index in Mexico have been selected, it is required to obtain their corresponding financial information for different years, the time horizon selected for the case of this study includes the period of the years: 2012, 2013, 2014, 2015 and 2016. Specifically, the calculation of the beta risk coefficient requires obtaining the profitability of these companies for

[2] Classification corresponding to companies in Mexico and presented by Cuéntame (INEGI, 2009).

the aforementioned period of time, for which the financial performance indicator has been used. investment or Return on Investment (ROI) for its acronym in English.

The second step of the proposed methodology is to determine the same profitability measured through the ROI of a sample of micro-enterprises in a given sector, in this case private non-financial services. In this way, the variability of the profitability of said sector sample can be obtained with respect to the entire market for micro-enterprises in Mexico, thus obtaining the desired beta risk coefficient. According to INEGI. Industrial Classification System of North America (2013), the branches belonging to the subsector of private financial services are presented in Table 1, including the number of establishments that each one has based on information from the Annual Survey of Private Services Non-Financial (INEGI, 2013).

Table 1 Sectors corresponding to private non-financial services by number of establishments in Mexico.

SCIAN Code	Sector	No. of establishments
51	Information in mass media	200,085
53	Services and rental of personal and intangible assets	45,567
54	Services professionals, scientists and technicals	479,973
56	Business support services and waste management and remediation services	1,023,459
61	Educational services	415,989
62	Health and social assistance services	318,215
71	Cultural and sports entertainment services and other recreational services	65,381
72	Temporary accommodation and food and beverage preparation services	1,798,122

Source: own elaboration based on (INEGI, 2013).

As can be seen in Table 1, the sector according to the SCIAN classification that has the largest number of establishments is the temporary accommodation and food and drink preparation services, so the present investigation will focus on this sector. Likewise, the branches corresponding to the aforementioned sector and their establishment figures are presented in Table 2.

According to what is presented in Table 2 it is possible to conclude that the five branches that group the largest number of establishments in Mexico with 97.45% of the total are: self-service restaurants, take-away food and other restaurants with

limited service; restaurants with full service, hotels and other integrated services, motels and similar hotels and bars canteens and the like. With the objective that the results are useful for the largest number of micro companies, this study will focus on determining the beta risk coefficient for companies in these five branches belonging to the service sector in Mexico.

Table 2 Branches corresponding to the sector of temporary accommodation services and preparation of food and beverages by number of establishments and percentage in Mexico.

SCIAN Code	Branch	No. of establishments	Percentage
7222	Self-service restaurants, takeaways and other restaurants with limited service	1,095,624	60.93%
7221	Restaurants with full service	254,623	14.16%
721111	Hotels with other integrated services	250,736	13.94%
7211	Hotels motels and similar	78,956	4.39%
722412	Bars, canteens and similar	72,349	4.02%
	Total		97.45%

Source: own elaboration based on (INEGI, 2013).

In accordance with the above, the methodological proposal consists of using selected financial information from a sample of companies that cover three essential requirements:

1. Dedicated to the private non-financial services sector in Mexico.
2. That according to their number of workers could be classified as micro enterprises (1 - 10 people)[3].
3. Pertaining to the branches of services of temporary accommodation and food and drink preparation described in Table 2.

The total sample consists of 150 micro companies belonging to non-financial services in Mexico, it is important to mention that said sample size was obtained when considering each branch as a case study of 30 companies. This is due to the fact that 30 observed economic units make it possible to ensure that the analyzed variable complies with the characteristics of the behavior of a normal distribution, based on the central limit theorem (Johnson & Kuby, 2004). Like the information

[3] Classification applicable to service companies in Mexico determined by Cuéntame (INEGI, 2017).

from the 200 economic units that make up the general index of micro-enterprises, the financial data required for the 150 micro-enterprises in the services sector was obtained from the agreement with the business consulting company mentioned above. According to this, the type of research carried out corresponds to a non-probabilistic sampling with the characteristics of a selective or intentional sampling (Bonilla-Castro & Rodríguez, 2005), considering that the information required for the investigation was available from the beginning of the same.

Once the databases have been formed considering information within the time horizon of the analysis years: 2012, 2013, 2014, 2015 and 2016 corresponding to the financial indicator ROI of the 200 micro companies of the index and the respective one to the 150 micro service companies of the selected branches, the next step of the methodology involves calculating the variances and covariances required to estimate the respective beta risk coefficients. When calculating the coefficients in this way, the final results will reflect the specific risk of each of the branches with respect to the total market of micro enterprises in the country, the estimates to be made are detailed in the results chapter.

Results.

Based on the proposed methodology consisting of the preparation of an index of own microenterprises in Mexico and the consequent obtainment of beta risk coefficients for the economic branches of the chosen services sector, we proceed to make the estimates required by the CAPM model. As mentioned previously, the evaluation horizon of the present investigation was determined according to the information required by the model and the availability of the data obtained through the agreement with the consulting firm. The data used correspond to the years 2012, 2013, 2014, 2015 and 2016 and are:

1. Average annual net income of each company during the analysis period.
2. Capital invested by the average annual investors of each company corresponding to the period of analysis.

According to this information, the average annual return measured through the financial indicator Return on Investment (ROI) can be estimated, which was estimated both for the general index of 200 Mexican micro-enterprises and for the sample of 150 micro-enterprises in the service sector. the selected branches.

1.1. Performance of the micro business market.

Table 3 shows the results corresponding to the average ROI of the 200 micro companies in Mexico, according to the data collected in the study.

Table 3 Average annual ROI of the 200 micro companies in Mexico analyzed for the periods indicated.

Years of observation				
2012	**2013**	**2014**	**2015**	**2016**
41%	44%	49%	38%	54%

Source: own elaboration based on the study carried out.

1.2. Performance of the branches of the selected services sector.

Likewise, Table 4 shows the data of the average annual profitability measured through the ROI for the branches of the service sector indicated and for the same evaluation period.

Table 4 Average annual ROI of the 150 micro companies in the branches of the service sector in Mexico selected for the periods shown.

Temporary accommodation and food and beverage preparation services sector	Average Return on Investment				
	2012	**2013**	**2014**	**2015**	**2016**
Self-service restaurants, takeaways and other restaurants with limited service	63%	100%	110%	54%	71%
Restaurants with full service	52%	123%	117%	59%	67%
Hotels with other integrated services	47%	96%	57%	57%	89%
Hotels motels and similar	48%	108%	70%	50%	80%
Bars, canteens and similar	72%	88%	98%	64%	90%

Source: own elaboration based on the study carried out.

Once the information shown in Tables 3 and 4 is available, the necessary calculations are carried out to determine the beta risk coefficient for each of the

branches referring to the entire Mexican microenterprise market. It is important to clarify that for purposes of efficiency in the presentation of the results of the present investigation, only the estimates corresponding to the branch of self-service restaurants, take-away food and other restaurants with limited service will be detailed, taking into account that the calculations for the rest of the branches they were made using exactly the same steps.

1.3. Analysis of the performance of the selected branches of the service sector in Mexico by period.

Using the data of the calculated yields, the difference between the values of the yield of each period is estimated, as well as the average of said values analyzed, as it is exposed in Equation 1.

$$\text{Analysis of the branch selected by period} = \text{Branch yield per period} - \text{Average yields of the branc} \quad (1)$$

Source: own elaboration based on the study carried out.

By making all the corresponding estimates for each of the five years of evaluation, it is possible to obtain the data shown in Table 5.

Table 5. Analysis of the performance of companies in the self-service restaurant, take-away and other restaurants with limited service industries.

Year	Average performance of companies in the branches	Average performance of companies in the branches
2012	62.91%	-16.61%
2013	99.56%	20.05%
2014	109.66%	30.15%
2015	54.44%	-25.08%
2016	71.02%	-8.50%
Average	79.52%	

Source: own elaboration based on the study carried out.

The calculations described for the self-service restaurant industry are carried out equally for the rest of the service branches chosen. The results obtained are used

to determine the variance between the performance of the service branches and the performance of the total market of micro enterprises.

1.4. Analysis of the performance of the micro business market in Mexico corresponding to each analysis period.

Similarly, to the respective analysis of the branches, it is necessary to estimate what is indicated by Equation 2 regarding the returns of the Mexican microenterprise market.

$$\text{Analysis of the performance of the micro} - \text{enterprise market by period} = \text{Performance of the micro} - \text{enterprise market of the period} - \text{Average performance of the micro} - \text{enterprise market} \quad (2)$$

Source: own elaboration based on the study carried out.

The results corresponding to each year analyzed are shown in Table 6.

Table 6. Analysis of the performance of the micro-enterprise market in Mexico.

Year	Performance of the micro business market	Performance of the micro business market - average performance
2012	41.08%	-4.11%
2013	44.16%	-1.04%
2014	48.71%	3.51%
2015	37.72%	-7.47%
2016	54.31%	9.11%
Average	45.20%	

Source: own elaboration based on the study carried out.

The information presented in Table 6 represents the totality of microenterprises in Mexico for the periods analyzed, which is why it is considered as the base comparison index from which its covariance will be estimated with respect to the yields of each of the branches of selected services.

1.5. Covariance.

According to the analysis of the returns of 1) the index of the market of micro companies and 2) the chosen branches of the service sector, it is possible to estimate the covariance between both for each year analyzed. This calculation is presented in Equation 3 and involves multiplying each of the calculated returns of the branches by the estimated returns corresponding to the total market for the same period; The last step is to add these data to obtain the covariance of the entire model.

$$Covariance = Analysis\ of\ yields\ of\ branch\ X\ Analysis\ of\ total\ market\ returns \quad (3)$$

Source: own elaboration based on the study carried out.

The respective results for each evaluation period appear in Table 7.

Table 7. Covariance between the analysis of the performance of the micro-enterprises of self-service restaurants, take-away and other restaurants with limited service and the analysis of the performance of the micro-enterprise market in Mexico.

Year	Performance self-service restaurants, takeaways and other restaurants with limited service - average performance	Market performance - average performance	Covariance
2012	-16.61%	-4.11%	0.006829
2013	20.05%	-1.04%	-0.002086
2014	30.15%	3.51%	0.010589
2015	-25.08%	-7.47%	0.018744
2016	-8.50%	9.11%	-0.007746
Average		Suma	0.026330

Source: own elaboration based on the study carried out.

The calculations described in Table 7 are estimated similarly for the rest of the service branches selected, the results of the covariances will be used to determine the beta risk coefficients.

1.6. Variance.

The methodology for calculating the risk beta also involves estimating the respective variance to the market returns for the evaluation period. In this way, the calculated

data of the market performance is used for each year and its average is subtracted to finally square each result, as detailed in Equation 4.

$$Variance = (Analysis\ of\ yields\ of\ the\ market\ of\ micro\ companies)^2 \quad (4)$$

Source: own elaboration based on the study carried out.

Subsequently, the sum of these results is done as shown in Table 8.

Table 8. Variance of the performance of the micro business market in Mexico.

Year	Performance of the micro business market - average performance	Variance
2012	-4.11%	0.0016905036
2013	-1.04%	0.0001083270
2014	3.51%	0.0012339247
2015	-7.47%	0.0055847929
2016	9.11%	0.0083043067
Summatory		0.016922

Source: own elaboration based on the study carried out.

In this way, the result of the total sum of the variances will be used to estimate the beta risk coefficients for each of the chosen branches; considering that this result represents the entire market for micro companies in Mexico.

By having the required information on the covariances with respect to the performance of the service branches and of the variances related to the total market returns, we proceed to estimate the corresponding risk coefficients.

1.7. Calculation of the beta risk coefficients for the branches of the selected services sector.

Based on the previously obtained covariance and variance estimates, Equation 5 is used to determine the beta coefficient for self-service restaurants, take-out, and other restaurants with limited service.

$$Beta\ \beta = \frac{Covariance\ (\text{Self–service restaurants}'return,\ \ Micro\ business'return)}{Variance\ (\ Micro\ business'return)} \quad (5)$$

Source: own elaboration based on the study carried out.

By replacing the variables with the respective values, Equation 6 is obtained.

$$Beta\ \beta = \frac{0.026330}{0.016922} = 1.556 \qquad (6)$$

Source: own elaboration based on the study carried out.

Based on the result obtained, it is possible to conclude that the beta risk coefficient for micro-enterprises in Mexico focused on the branch of self-service restaurants, take-away food and other restaurants with limited service regarding the total number of micro-enterprises in the country, it is 1,556. Similarly, the respective calculations are performed for the rest of the branches of the services sector, resulting in the data presented in Table 9.

The final results expressed in Table 9 show the beta coefficients for the branches of the services sector, which range from 1,416 for restaurants with full service, to 1,785 for bars, canteens and the like. It is in this way that it can be concluded that for every 1.00% that the profitability of the microenterprise market in Mexico is increased, the branches of: restaurants with full service in 1,416%, self-service restaurants, food for carry and other restaurants with limited service in a 1.556%, hotels with other integrated services in a 1.687%, hotels, motels and similar in a 1.737% and bars, canteens and similar in a 1.785%.

Table 9 Beta risk coefficients for micro-enterprises belonging to the branches of the temporary accommodation services and food and beverage preparation sector in Mexico

Temporary accommodation and food and beverage preparation services sector	No. of companies	Beta Coefficient
Self-service restaurants, takeaways and other restaurants with limited service	30	1.556
Restaurants with full service	30	1.416
Hotels with other integrated services	30	1.687
Hotels motels and similar	30	1.737
Bars, canteens and similar	30	1.785

Source: own elaboration based on the study carried out.

It is important to mention that all the beta risk coefficients obtained have positive values and greater than 1, so it is considered that all the chosen branches belonging

to the services have greater volatility or sensitivity than the micro-enterprise market in general and that they move in the same direction as the total market, resulting in an average of 1,636% considering the five factors calculated. According to the theory corresponding to the coefficient of beta rank, the foregoing indicates that the investment in companies belonging to these branches will be relevant in times of economic growth and not advisable in times of high uncertainty.

Conclusions.

The growth and development of the economy in any country or region is determined by the competitiveness of its companies, which generate the goods and services that society requires the same time that provide a large number of direct and indirect jobs along the productive chain. Micro enterprises are particularly important economic units because of the amount they represent as well as the staff they occupy. At the same time, the services sector contributes a significant amount of jobs in Mexico, concluding the importance of micro-enterprises focused on services in the country.

In order for any company to fully comply with this economic and social role, it is of great importance that it has the financing required to maintain a constant growth that effectively affects the improvement of the level and quality of life of the population. However, the scarcity characteristics of solid financial information typical of micro-enterprises, generally do not allow them to access the best conditions for obtaining productive credits. On the other hand, the valuation of companies is currently consolidated as a tool of great importance for the improvement in business decision making.

The Capital Assets Valuation Model has represented, from its formulation, a very useful way of measuring the risk of an asset or company with respect to the market in which it operates, being able to clearly identify and separate the so-called systemic risk and non-systemic risk. However, the review of the literature confirms that most studies and applications of this model have been made using information from large companies, so that their results are only adjusted to organizations with similar

characteristics; excluding micro businesses from the opportunity to employ such a model effectively.

The present investigation focused on proposing an alternative application of the CAPM and its beta risk coefficients, through the creation of an own index of microenterprises in Mexico and estimating the variability corresponding to five selected branches of the service sector in the country, to its importance by the number of establishments nationwide and based on the North American Industrial Classification System. The main index was composed by 200 micro companies in Mexico and the risk beta was estimated based on 30 companies from each of the five chosen branches. The evaluation horizon included the years: 2012, 2013, 2014, 2015 and 2016; The information of the returns measured by the ROI was provided by a business consulting company.

The results obtained when performing the respective calculations of variances and covariances to determine the risk of each branch with respect to the total microenterprise market, showed positive signs for all coefficients and values from 1,416 to 1,785, with an average of 1,636% for all branches of selected non-financial private services. In this way it can be concluded that the chosen branches of the temporary accommodation and food preparation and beverage services sector move in the same direction as the market and that they present a higher volatility or sensitivity than the total market, being the least risky the branch of restaurants with full service and the most variable branch of bars, canteens and the like.

According to the above, the analyzed branches can be considered as volatile and with greater risk than the market, reflected in changes in their profitability both upwards and downwards with a higher proportion or sensitivity than the total market of micro companies. This is due to the non-diversifiable or systemic risk that the decision makers in the companies cannot control, for which it is advisable to take into consideration the present conclusions with respect to the allocation of capital in the investments or disinvestments in said branches and at different times. of economic cycles.

The main contribution of this work lies in the contribution of a tool for the contextualized estimation of risks for micro-enterprises in the selected branches of

services, contributing to obtaining timely conclusions that allow access to more and better financing options with the objective that these economic units can maintain the growth required to effectively fulfill their role in the country's economy.

Subsequent investigations that continue with the risk estimation line using the beta coefficient, could use information belonging to other sectors, sub-sectors and branches of the economy, as well as taking into consideration economic units with different size and region characteristics; in such a way that the creation of a complete and contextualized database is possible. In this way, valid and pertinent information will be generated for the business decision-making of all the relevant interest groups, allowing micro-enterprises to have greater growth opportunities for the benefit of the whole society.

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