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FACTORS THAT INFLUENCE MEXICAN YOUTH TO UNDERTAKE AN AGRIBUSINESS

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ABSTRACT

Presently, entrepreneurship has great importance, both for entrepreneurs and for public and private institutions. In Mexico, there are few studies about the decision that young people make to undertake an agribusiness. The objective of this study is to analyze the impact of individual and socioeconomic characteristics on the probability of young people deciding to undertake –specifically– an agribusiness. The study was developed in the Mexican national territory with 3213 young people. The information necessary was gathered through a questionnaire and the support from fourteen academic groups from different universities of the country; two groups were formed that are different, with young people from the North and from the South. Applying a logit type discrete binary selection model, the study concludes that men are more determined to undertake an agribusiness than women, in the national and regional scope. The North region of Mexico contrasts clearly with the South region in the decision of implementing an agribusiness project. Young people from the South have 40% more probability of starting a business of this type than young people from the North. The implications of this study serve for those interested in the promotion of entrepreneurship in the agriculture and livestock sector, government and researchers, as well as future entrepreneurs in this business model.

Keywords: agribusiness, North and South region in Mexico, logit model.

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INTRODUCTION

Presently the theme of entrepreneurship is taking on quite peculiar importance and interest in different political, economic, social and intellectual spheres. Sigalia and Carney (2012) establishes that entrepreneurship can be considered as an instrument to combat poverty. For their part, Baptista, Karaöz and Mendonça (2014) and Texis, Ramírez and Aguilar (2016) point out that the execution or action of entrepreneurship helps to fight against delinquency and migration in the countries, since people who decide to undertake a business invest their time in productive and economic activities instead of getting involved in crime or migrating.

Undertaking a business in any economic sector is not an easy task, regardless of the age, profile or profession of the person. Guzmán and Trujillo (2008) maintain that people who have decided to undertake must choose what type of entrepreneurship they will conduct: social or business. The first has the objective of creating sustainable social value, while the second refers to those innovating activities that create economic incentives for the entrepreneur.

Without a doubt, entrepreneurship with an managerial or business approach in Mexico is one of the main types of enterprising that are selected, and these favor economic growth and the creation of employment in the country, although for Acs (2006) this type of undertakings do not influence the economic growth of a country, but the sum of all of these have a significant impact on the Gross Domestic Product (GDP). It is sufficient to

point out the data from the National Statistics and Geography Institute (*Instituto Nacional de Estadística y Geografía*, INEGI, 2012) which shows that that there are around 4 million 15 thousand economic units, of which 98% are micro, small and medium enterprises (MIPYMES, based on the Spanish acronym) that as a whole generate 52% of the GDP and 72% of employment in the country. The MIPYMES constitute the backbone of the Mexican economy due to all the entrepreneurs who at the time decided to undertake their business or enterprise. However, referring to agribusiness, it can be argued that they constitute a very dispersed and diversified sector of the economy; in addition, there is still much volatility in the creation and growth of this type of business, since according to data from the Ministry of Economy in Mexico, the possibilities of these businesses remaining successfully in the national market are, on average, between two and three years (Secretaría de Economía, 2013). This is because of different causes, such as lack of planning and information, deficiencies in operation, financial, of vision, of internal management, and disinterest, among others.

From this context, the Food and Agriculture Organization of the United Nations (FAO) (2015) recognizes the importance of entrepreneurship of agribusinesses in the Mexican territory, since according to Pérez (2018), Correa (2017), and Edwards and Shultz (2005), agribusiness enterprising is necessary for the development and growth of agricultural and livestock producing zones of a region, since technologies and human capital are integrated through these activities which allow evolving the primary sector of a nation towards an approach of value generation in various branches of the economy. This brings with it more and better opportunities that translate into job generation which, at the same time, guarantee adequate levels of remuneration and social protection.

According to international agencies, such as the Economic Commission for Latin America and the Caribbean (ECLAC) (2000a and 2000b) and the United Nations (UN) (2005), there are a series of limitations that prevent the full use of these opportunities. Problems of labor insertion predominate among these limitations, since for most young people in Latin America –including Mexico– entrepreneurship, work and employment continue to be the main mechanism of social integration and the fundamental basis to take advantage of the potential of a more marked autonomy, purpose that young people desire. That is, the scarcity of employment and the deregulation of labor relationships is exposed to extremely precarious labor conditions (Navarrete, 2001; Oliveira, 2006 and 2009; Espejo and Espíndola, 2015; Sunkel, 2015). This is worsened with the jobs or younger workforce, and further still when they are for the agriculture and livestock sector, since among young people it is considered that being employed in any of the activities of the primary sector is equivalent to performing a low-paid job that is not profitable because the notion prevails that these jobs are for those people who live in rural, marginalized or poverty-stricken areas (Macías, 2013). This way of thinking places the Mexican farmland at risk because if young Mexicans –including the children of the farmers themselves– do not want to undertake or work in activities related to the Mexican agricultural sector, then there is concern as to who will; without a doubt, it is an issue of collective interest.

Although in Mexico there are federal government programs that support enterprising or self-employed people in any economic sector of the country (*Programa de Fomento al Autoempleo, Programa de Apoyo a Jóvenes Emprendedores Agrarios, Programa de Apoyo para la Productividad de la Mujer Emprendedora,* and *Programa Nacional de Financiamiento a Microemprendedores*), very seldom do young entrepreneurs do it in the primary sector (Rivera, López and Mendoza, 2016; González, Bonilla and Rivera, 2012). This situation gives rise to the doubt about understanding the decision of young people in agribusiness entrepreneurship, with the central question being: Which are the individual and socioeconomic characteristics that influence young Mexicans for them to decide to undertake an agribusiness? The response implies studying the combination of known factors that have an influence on the creation of an agribusiness in the context of youth.

In Mexico there are few studies about the decision that young people make in entrepreneurship of an agribusiness; in addition, currently some universities promote the training of students to graduate as entrepreneurs and not as job seekers (Alvarado, Antonio and Ortiz, 2020). To comply with this, the students receive courses related to enterprising and little is known about whether they do actually get to implement a business. Boudabbous (2011) and Backes and Moog (2013) only make estimations about the probability of students being able to create their business, although they leave aside the area of agribusiness. This is why there is interest in contributing to the study of these themes and in providing with timely planning and construction of the future work situation for young people, based on the analysis of a discrete binary selection model, which will allow quantifying the probability of a Mexican young person to decide to undertake an agribusiness. Assuming that young people from the north of the country have greater opportunities and courses for business enterprising, since their ways of starting are different from young people from the south who generally have few opportunities, and most of them have not taken courses to create businesses.

MATERIALS AND METHODS

With the objective of identifying whether there is a relationship between individual and socioeconomic characteristics of Mexican young people and their decision to undertake an agribusiness, a (Logit) discrete binary selection model was used. It was conducted with the aim of testing the following hypothesis: young people who decide to undertake an agribusiness respond mostly to the socioeconomic environment where they develop and to their professional training.

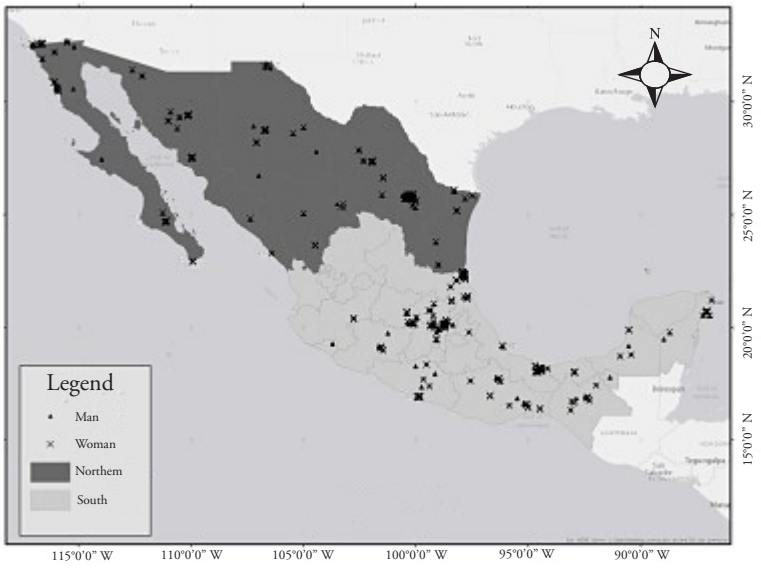
The economic and sociodemographic data of the young participants were obtained from the research network[3] in charge of the Entrepreneurial Development Center (*Centro de Desarrollo Empresarial*, CEDEEM) of Universidad Autónoma de Nuevo León (UANL), with a participation of 3213 young people (2089 for the states in the north and 1124 for the states in the south). This study corresponds to a transversal explicative research of non-experimental character, since the survey application was only in the first trimester of the year 2019.

For this purpose, sampling was done by quota and casual[4], with a non-probabilistic sampling technique, since the study had low budget and the intention was to have

the largest number of participants possible; the strategy implemented was that the one responsible for each academic body (AB) applyied the surveys to all the young people (students) who sympathized with the theme of the project, giving the network collaborators and participants a small souvenir from the university. Therefore, the authors requested explicitly for the surveys to be applied to young people who were studying in the area of social sciences –specifically in the economic-administrative sciences– but from study centers preferably in a state of the north and south regions of Mexico, so that participants were selected due to the accessibility to the place for those responsible from the AB and from the willingness from the young people to answer. It is for this reason that the surveys were not distributed proportionally between the states (Figure 1).

The questionnaire that was applied is constituted by 30 questions organized in two blocks: in a first block there are references to the individual characteristics of the young people, such as the municipalities where they reside, place of origin, gender, age, marital status, semester they study, professional career, and job they perform. In the second block, the following motives and preferences were quantified: enterprising, household income, amount destined to undertaking a business, expected yield, schooling of the parent, and number of members in their families.

In order to determine the propensity of young people to undertake an agribusiness, a logit binary model was used, which is common when the dependent variable (Y_{ijt}) has values of 0 and 1 (in our case, zero indicates a young person who does not want to undertake –or is not interested in undertaking– an agribusiness, and one indicates the contrary, that is, a young person who made the decision of undertaking an agribusiness). This implies that the variable Y_{ijt} follows a logistic distribution, so that (Martínez, 2008):



Source: prepared by the authors.
Figure 1. Geographical distribution of the sample.

$$Y_{ijt} = \frac{1}{1+e^{-Z_i}} \tag{1}$$

where:

$$Z_i = X_{ijt}\beta + \varepsilon_{ijt} \tag{2}$$

It can be defined that sub-index *i* refers to young people, sub-index *j* indicates the region where they reside, and sub-index *t* refers to the period of time. X_{ijt} is a vector that contains the independent variables (such as age of the young person surveyed in years [*Age*]; gender [*Sex:* 1 = Man, 0 = no]; grade of schooling in years [*Schooling*]; marital status [*Single:* 1 = Single, 0 = no]; zone of residence [*Urban:* 1 = Lives in an urban zone, 0 = no]; number of family members [*Family*]; average income of the family [*Income*]; age of the head of household in years [*Age_Father*]; gender of the father [*Sex:* 1 = Man, 0 = no]; grade of schooling of the father or head of household in years [*Schooling_Father*]; the head of the household owns a family business [*Business*: 1 = Yes, 0 = no]; economic support from a family member to undertake an agribusiness [*Members:* 1 = Yes, 0 = no]; average amount destined to the business [*Investment*] and average profitability expected in the short term [*Profitability*]), β is a vector that contains their respective coefficients, and the variable ε_{ijt} represents the random disturbance.

Pérez (2005) points out that, when using a logistic function, the natural logarithm can be applied to a logit model for better interpretation; therefore, equation (1) can be reordered for it to be established in the following way:

$$\ln\left(\frac{Y_{ijt}}{1-Y_{ijt}}\right) = X_{ijt}\beta + \varepsilon_{ijt} \tag{3}$$

Equation (3) can be estimated through ordinary least squares (OLS), since the technique of maximum likelihood was used to estimate the coefficients β. However, Greene (2000) and Maddala (2001) argue that the advantage of a logit type model on a linear probability model is that the probabilities estimated from the first can be out of the 0 to 1 range, while the probabilities that result from the second cannot be outside of the range. The dependent variable of the previous equation is not Y_{ijt} but rather the natural logarithm of $(Y_{ijt}/(1-Y_{ijt}))$, so that it is necessary to transform the coefficients in order to be interpreted as a change in probability of the dependent variable. That is, according to Moscote and Arley (2012), the marginal effects of such an equation should be calculated, being the partial derivative of the variables, which results in the following form:

$$\left(\frac{\partial Y_i}{\partial X_{ji}}\right) = \frac{e^{-Z_i}}{\left(1+e^{-Z_i}\right)} * \beta_j, \quad j = 1,2 \tag{4}$$

In Mexico there is heterogeneity between the different states and regions; that is, some components are not considered within the vector *X* such as the social, cultural and educational aspects. Under this perspective, it was decided to modify the traditional logit model and to include a fixed effect by regions (γ_j) that captures the unobserved heterogeneity. Therefore, the model remained in the following manner:

$$\ln\left(\frac{Y_{ijt}}{1-Y_{ijt}}\right) = X_{ijt}\beta + \gamma_j + \varepsilon_{ijt} \quad (5)$$

Lastly, with the objective of quantifying possible differences in the impact of the characteristics (*X*) on the probability of a young person undertaking an agribusiness, the same model was replicated by gender and a comparison was made between the north and south regions of Mexico.

RESULTS AND DISCUSSION

In the study sample there was a higher percentage of women (58%) compared to the percentage of men (42%) (Table 1). The average age of the survey respondents was similar between the two population groups, which was 20.4 years. In addition, it was found that the percentage of single men is equal to that of their feminine counterpart with 97%, which means that out of the total sample only 3% is married or in civil union. The women have a relatively higher average schooling (15.7 years), which represents the third year or sixth semester of undergraduate studies.

The average family income is similar in both population groups (which is equivalent to $ 8,484.2 pesos per month). Likewise, the characteristics of the family environment are similar for the two groups in question; for example, it is seen that most of the young Mexican people declared living in urban zones (on average, 80%), the heads of households have middle school education (on average, 11.3 years), and the families are made up, on average, by up to five members.

The sample of young people was larger in the northern states (65%) than in the southern states (35%). Regarding the average income of the households, it can be seen that for the northern region it is $ 8,478.1 pesos, and for the southern region $ 7,495.5 pesos. In turn, 68% of the heads of households in the northern region point to having a technical career (11.9 years of schooling), while 52% of those from the southern region have finished secondary school (9.2 years of schooling). A higher percentage of young people who inhabit rural areas in the southern region (39.9%) is also detected, compared to rural areas in the northern region (9%).

The men from the northern region of Mexico are willing to undertake an agribusiness (86%), since they recognize the importance of the agriculture and livestock sector in the country's economy, the same as young people from the southern region (82%). However, 40% of the young people from the northern region and only 31% of young people from the southern region said they are willing to undertake an agribusiness at the time of the

Table 1. Descriptive statistics of the variables.

Variables	National			Northern region			South region		
	Global	Man	Woman	Global	Man	Woman	Global	Man	Woman
Agribusiness	0.84 (.367)	0.85 (.362)	0.83 (.374)	0.85 (.360)	0.86 (.352)	0.84 (.369)	0.83 (.380)	0.82 (.387)	0.83 (.376)
Age	20.4 (3.31)	20.6 (3.83)	20.2 (2.87)	20.6 (2.96)	21.0 (3.20)	20.2 (2.70)	20.1 (3.87)	19.8 (4.96)	20.2 (3.11)
Gender	0.42 (.494)	1.0 (.00)	0.0 (.00)	0.46 (.498)	1.0 (.00)	0.0 (.00)	0.35 (.478)	1.0 (.00)	0.0 (.00)
Scholarship	15.6 (2.57)	15.4 (2.71)	15.7 (2.45)	15.9 (2.26)	15.8 (2.33)	16.1 (2.19)	15.0 (2.97)	14.5 (3.31)	15.3 (2.73)
Single	0.97 (.170)	0.97 (.172)	0.97 (.169)	0.98 (.145)	0.98 (.136)	0.98 (.152)	0.95 (.208)	0.94 (.234)	0.96 (.192)
Urban	0.80 (.399)	0.82 (.387)	0.79 (.407)	0.91 (.287)	0.91 (.290)	0.91 (.285)	0.60 (.490)	0.60 (.491)	0.60 (.489)
Family	4.65 (1.14)	4.68 (1.18)	4.62 (1.11)	4.58 (1.08)	4.68 (1.12)	4.51 (1.05)	4.76 (1.24)	4.69 (1.33)	4.81 (1.18)
Entry	8484.2 (868.1)	8489.1 (865.7)	8480.7 (869.8)	8478.1 (861.8)	8462.7 (866.5)	8491.2 (858.1)	7495.5 (779.5)	7552.5 (761.5)	7464.6 (788.2)
Age_Father	43.4 (3.31)	43.6 (3.83)	43.2 (2.87)	43.6 (2.96)	44.0 (3.20)	43.3 (2.70)	43.1 (3.87)	42.8 (4.96)	43.2 (3.11)
Gender_Father	0.76 (.428)	0.43 (.495)	1.0 (.00)	0.75 (.435)	0.44 (.497)	1.0 (.00)	0.78 (.413)	0.38 (.486)	1.0 (.00)
Scholarship_Father	11.3 (4.75)	11.5 (4.84)	11.1 (4.68)	11.9 (4.69)	11.8 (4.89)	12.0 (4.51)	9.2 (4.67)	9.9 (4.66)	9.80 (4.64)
Business	0.24 (.427)	0.25 (.431)	0.23 (.423)	0.19 (.392)	0.19 (.396)	0.18 (.388)	0.33 (.471)	0.37 (.483)	0.31 (.463)
Partners	0.37 (.483)	0.38 (.486)	0.36 (.480)	0.40 (.490)	0.41 (.492)	0.39 (.488)	0.31 (.464)	0.32 (.467)	0.31 (.458)
Investment	26 959 (13 353)	26 899 (13 377)	27 002 (13 340)	26 944 (13 412)	26 835 (13 348)	27 036 (13 471)	26 987 (13 250)	27 055 (13 461)	26 950 (13 143)
Profitability	16 478 (4966)	16 421 (5046)	16 519 (4908)	16 296 (4918)	16 327 (5064)	16 270 (4793)	16 816 (5040)	16 650 (5002)	16 906 (5062)
Observations	3213	1349	1864	2089	954	1135	1124	395	729

Source: prepared by the authors. The standard deviation is shown between parentheses.

survey. A higher percentage of women from the southern region would be willing to undertake an agribusiness compared to the men and women of the northern region, which could be associated to the fact that their parents have a family business related to the primary sector (31%). Another important piece of data is the average grade of schooling of the heads of households found in the sample, which were 12 years for the northern region and 9.2 years for the southern region which are equivalent to university and high school studies, respectively. This last result shows a high impact in the decision of the young person of wanting to undertake an agribusiness.

Estimations of the model for Mexico

Table 2 presents the results from the discrete binary selection model for the total sample from Mexico. The first column shows the estimations of the conventional logit model (Equation 4), the second column presents the results from the logit model that takes into account the fixed effects per region (Equation 5), while columns 3 and 4 present the estimations of the logit model (with both fixed effects), although they separate the population by gender (men and women, respectively).

It is convenient to mention that adjustment tests were made corresponding to the estimations; for example, when analyzing the quality of adjustment of the models, the indicator of the values that were adjusted correctly point out that the logit models foresee, on average, 85% of the observations. The statistical *Wald chi*^{2} function (115.7) shows that the value of coefficients is significant jointly to explain the probability of Mexican young people to decide to undertake an agribusiness. The value of statistical probability *Prob* > *Chi*^{2} (0.0000) for the four models indicates that the hypothesis of all coefficients being equal to zero can be rejected in one percent. Lastly, the interpretation of *Pseudo R*^{2} (0.0395) establishes that 3.95% of the variation of the dependent variable can be explained by the variation of the explicative variables of the model.

A classification matrix analysis was also conducted, which consisted in reviewing the model's quality. The results of this additional criterion show that the logit model classifies correctly 84.13% of the observations. If there were not an *a priori* model, it would be expected to classify correctly 11.57% of the observations and there would be mistakes 84.43% of the times. Through this criterion, it is concluded that the logit model allows a better classification since it is wrong 15.87% of the times instead of 88.43%. Likewise, there is a sensitivity of 93.28%, which indicates the probability of undertaking an agribusiness within the group of young people who decided to answer the survey. The complement of this sensitivity is the rate of false negatives: young Mexican people who argue not undertaking an agribusiness, although they could be classified with this preference.

The results for the population of Mexican young people (Table 2) show that men are 2.4% more decided to undertake an agribusiness than women. It is appreciated that the probability of undertaking an agribusiness increases in 2.1% in those young people who had a large family. In addition, living in a household where the head of the household is of the masculine sex is a key element that makes young people more inclined to undertaking an agribusiness (7.0%). A positive impact is observed (7.1%) in the age of the head of

Table 2. Marginal effects of the characteristics that have an influence on the probability of undertaking an agribusiness in Mexico.

Variable	Logit	Logit-Fixed	Logit-Man	Logit-Woman
Age	.041†	.039†	.038†	.039†
	(.007)	(.006)	(.010)	(.011)
Gender	.026¶	.024¶	N.A.	N.A.
	(.013)	(.012)		
Scholarship	−.004¶	−.004¶	−.004	−.003
	(.002)	(.002)	(.004)	(.004)
Single	.045	.040	−.014	.072
	(.040)	(.038)	(.053)	(.054)
Urban	.002	-.009	−.0006	−.00004
	(.015)	(.016)	(.025)	(.020)
Family	.020†	.021†	.031†	.009
	(.005)	(.005)	(.008)	(.007)
Entry	.015	.013	.036¶	.004
	(.012)	(.012)	(.018)	(.016)
Age_Fathe	.074†	.071†	.554†	.065†
	(.013)	(.011)	(.141)	(.022)
Gender_Father	.071†	.070†	.065†	.057†
	(.023)	(.024)	(.019)	(.012)
Scholarship_Father	−.004†	−.005†	.001	−.008†
	(.001)	(.001)	(.002)	(.001)
Business	−.0008	.003	−.009	−.001
	(.014)	(.015)	(.024)	(.019)
Partners	-.058†	−.060†	−.091†	−.045†
	(.013)	(.013)	(.022)	(.017)
Investment	.0007†	.0006†	.0007†	.0005†
	(.0001)	(.0001)	(.0001)	(.0002)
Rentabilidad	.0008	.006	.005	.0005
	(.0006)	(.006)	(.007)	(.0004)
Profitability	0.0395	0.0408	0.0484	0.0476
Observaciones	3213	3213	1349	1864

Source: prepared by the authors.
The standard error is shown between parentheses, †indicates significance at 1%, ¶at 5 % and §at 10 %.

household regarding the probability that a Mexican young man (their son) decides to undertake a business, as well as a reduction of 0.6% in the propensity to not undertake it for each additional year of education of the head of the household.

Columns 3 and 4 (results per gender) show considerable differences in the way in which the characteristics analyzed affect the propensity of undertaking an agribusiness in Mexico. The estimations show the in young men who have parents with "decent or stable" family income to sustain the family, the probability of undertaking an agribusiness increases in 3.6%. Likewise, it is possible to infer that the grade of schooling has a very important effect on the feminine population because it is seen that women are 0.8% more prone to undertake an agribusiness if their parents have less schooling.

It is found that with the young people who live in households where the head of the household is a man there is 6.5% more probability of undertaking an agribusiness than those who live in households where a woman is in charge. Men heads of households generate a similar effect on women, since the probability of undertaking an agribusiness increases by 5.7%. Referring to schooling and income, these factors have impacts that act in the same direction both for women and for men, although the magnitude of the effect is different for the masculine population, since the increase is greater.

In the case of the variable members, it is appreciated that if the young people obtain economic support from a family member to undertake an agribusiness, a negative effect both is seen for men and women (9.1 and 4.5%, respectively). This means that despite having the economic support to start an agribusiness, the young people are not interested in developing this type of business.

Estimations of the model for the north and south region of Mexico

Table 3 shows the estimations of the same probabilistic models, but for the specific cases of the north and south regions of Mexico the results show that there are differences in the variables that influence the propensity of a young person to undertake an agribusiness in the northern region compared to their equivalent in the southern region. A significant difference is that for the case of the southern region, there are discrepancies between the probability of men and women to be entrepreneurs of an agribusiness (contrary case in the northern region).

Other variables that were important to explain the interest of young people to undertake an agribusiness are age and family. In contrast, there are characteristics that are relevant for the southern region; for example, the young people from the south have 40% more probability of undertaking an agribusiness at an early age than the young people from the northern region (variable that was not significant).

The impact of the reduction of the family income has a positive influence on the decision of a young person to undertake an agribusiness and this decision is higher in the southern region than in the northern region. The additional years of education in young people of the northern region tend to decrease the decision of undertaking an agribusiness, compared to the young people from the south. It is also relevant that young people from the northern region receive greater support from some member of the family to undertake a business, however, at the moment of deciding whether it is an agribusiness, the probability decreases by 10.1% in men and 7.1% in women.

If the young population is separated by gender, it is seen that in the southern region of the country the individual and household characteristics have effects of different magnitude for each group, although they are not opposite effects if we take them as a national sample. For example, characteristics such as age, schooling and income received in the household increase the probability of undertaking an agribusiness more in men than in women. On the contrary, the sex and the father's schooling impact the feminine population in lower magnitude.

Lastly, a relevant difference was identified between both groups and regions regarding the amount of investment that young people are willing to make to undertake an agribusiness,

Table 3. Marginal effects of the characteristics that influence the probability of undertaking an agribusiness in the north and south region of Mexico.

Variable	North				South			
	Logit	Logit-Fixed	Logit-Man	Logit-Woman	Logit	Logit-Fixed	Logit-Man	Logit-Woman
Age	.010 (.019)	.008 (.019)	.033 (.041)	.025 (.017)	.402† (.112)	.047† (.010)	.056§ (.030)	.017 (.031)
Gender	−.001 (.020)	−.001 (.021)	N.A.	N.A.	.770† (.285)	.090† (.031)	N.A.	N.A.
Scholarship	−.009† (.003)	−.010† (.003)	−.004 (.005)	−.013¶ (.005)	.001 (.037)	.0008 (.004)	−.005 (.008)	.005 (.006)
Single	.008 (.054)	.010 (.054)	−.046 (.069)	.048 (.075)	.413 (.351)	.062 (.053)	−.015 (.075)	.095 (.080)
Urban	−.016 (.026)	−.017 (.025)	.031 (.044)	−.051 (.029)	−.025 (.170)	−.003 (.022)	−.002 (.038)	−.005 (.026)
Family	.012§ (.007)	.010 (.007)	.030† (.010)	−.005 (.009)	.246† (.075)	.031† (.007)	.029§ (.015)	.030¶ (.012)
Entry	−.0004 (.015)	.001 (.015)	−.007 (.022)	−.004 (.019)	.334¶ (.165)	.047¶ (.021)	.098† (.032)	.019 (.029)
Age_Father	.012 (.038)	.008 (.038)	.077 (.085)	.041 (.033)	.099† (.029)	.092† (.018)	.113§ (.062)	.025 (.066)
Gender_Father	.044§ (.025)	.045§ (.025)	.049¶ (.022)	.046§ (.025)	.990† (.319)	.150¶ (.057)	.108† (.039)	.101 (.100)
Scholarship_Father	-.002¶ (.001)	−.001 (.001)	.003 (.002)	−.007† (.002)	−.066† (.020)	−.008† (.002)	−.004 (.004)	−.009† (.003)
Business	-.028 (.020)	−.023 (.020)	−.018 (.030)	−.038 (.027)	.215 (.192)	.030 (.024)	.0003 (.041)	.034 (.029)
Partners	−.083† (.016)	−.087† (.017)	−.101† (.025)	−.071† (.021)	−.163 (.176)	−.016 (.023)	−.075 (.048)	−.011 (.028)
Investment	.0008† (.0001)	.006† (.0001)	.005† (.001)	.0005† (.0002)	.008† (.002)	.0009† (.0001)	.001 (.0007)	.0001 (.0007)
Profitability	.00003 (.0004)	.00001 (.0004)	.0009 (.0009)	.0003 (.0003)	.00002 (.0004)	.00001 (.0004)	.0008 (.0008)	.0002 (.0002)
Pseudo R^2	0.0320	0.0366	0.0473	0.0427	0.0882	0.898	0.1046	0.0961
Observations	2089	2089	954	1135	1124	1124	395	729

Source: prepared by the authors.
The standard error is found between parenthesis, †indicates significance at 1%, ¶at 5 % and §at 10 %.

and it is found that young people from the northern region are willing to invest 0.5% more than young people from the southern region (0.09%). Likewise, the young people who live in rural zones are 83.7% more prone to undertake an agribusiness than those who are found in an urban zone. However, this variable was not significant.

CONCLUSIONS

Men are more inclined than women to start a business in the agriculture and livestock sector, both at the national and the regional level. The characteristics analyzed (individual and socioeconomic) operate differently between the regions; the men from the southern region are more prone to undertake an agribusiness than the young men from the northern region.

The variables age, schooling, members, investment and gender of the head of household were the defining factors that have a relevant impact on the decision of the Mexican young people to undertake a business related to the agricultural and livestock sector of Mexico.

The main contribution of the study was the empirical use of a (logit) discrete binary selection model in research about agribusiness. Therefore, evidence was generated about the decision of Mexican young people regarding the enterprising activity of an agribusiness. Future studies can research what types of agribusinesses are more successful in the current profiles of Mexican young people. They will be useful for government programs that are involved in supporting young people who are determined to undertake in the Mexican agro sector through public policies, which would result in the efficiency of programs, since these studies allow understanding what type of young people and which zones to support.

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NOTES

[3]During survey application there was collaboration from fourteen academic bodies directed by the research network called "Entrepreneurial, regional and sustainable development" (*Desarrollo empresarial, regional y sustentable*) composed by the following academic bodies: UAEH-CA-85, UABC-CA-256, UACOAH-CA-90, UAGRO-CA-16, UANL-CA-242, UANL-CA-381, UANL-CA-386, UAQ-CA-133, ITSON-CA-035, UV-CA-306, UV-CA-335, UNISTMO-CA-16, UAZ-CA-206 and COL-0169-48, which are distributed in the regions that are object of study (Figure 1).

[4]The casual sampling allowed each person responsible for the ABs to select directly and intentionally the young people from their place of residence. Instead, sampling by quota consisted in making available the profile of the young people who had to be interviewed to the person responsible from the ABs, so that their selection was left to their decision, which had to have the desired profile in the study period. It is convenient to mention

that this type of sampling is the one most used when the budget is low, and that it can be done in a shorter time and that subjects who are available are particularly sought. For that reason, we recognize that the most evident criticism is that the sample is not random, the representativeness is not certain, and there are biases.

REFERENCES

Acs, Z. 2006. How is entrepreneurship good for economic growth? Innovation 1(1): 97-107.

Alvarado, E, C Antonio, y J Ortiz. 2020. Agronegocios: ¿Qué piensan los jóvenes egresados de escuelas y facultades de negocios en México sobre el emprendimiento en el sector agropecuario? Revista Agro Productividad 13(3): 37–46.

Backes U, y Moog P. 2013. The disposition to become an entrepreneur and the jacks-of-all-trades in social and human capital. The Journal of Socio-Economics 47: 55–72.

Baptista R, Karaöz M, y Mendonça J. 2014. The impact of human capital on the early success of necessity versus opportunity-based entrepreneurs. Small Business Economics 42(4): 831-847.

Boudabbous, S. 2011. L'intention entrepreneuriale des jeunes diplomés. Revue Libanaise de Gestion et d'Economie, 6: 1-20.

CEPAL (Comisión Económica para América Latina y el Caribe). 2000a. La brecha de la equidad: una segunda evaluación (LC/G.2096). Santiago de Chile, Chile. Boletín CEPAL (mayo): 61-78.

CEPAL (Comisión Económica para América Latina y el Caribe). 2000b. Equidad, desarrollo y ciudadanía (LC/G.2071/Rev.1-P). Santiago de Chile, Chile. Boletín CEPAL (agosto): 93-139.

Correa, G. 2017. El deber ser en los agronegocios. Revista de la Universidad de La Salle 72: 253-274.

Edwards M, y Shultz C. 2005. Reframing Agribusiness: Moving from farm to Market Centric. Journal of Agribusiness 23(1): 57-73.

Espejo A, y Espínola E. 2015. La llave maestra en la inclusión social juvenil: educación y empleo. *In:* Trucco, D y H Ullmann (coords). Juventud: realidades y retos para un desarrollo con igualdad. Libros de la CEPAL, N° 137 (LC/G.2647-P) Santiago de Chile, Chile. pp: 23-65.

FAO (Organización de las Naciones Unidas para la Alimentación y la Agricultura). 2015. Sistema de información técnica sobre agronegocios y comercialización. Primera edición http://www.fao.org/family-farming/detail/es/c/298292/ (Consulta: marzo 2019).

Greene W. 2000. Econometric Analysis. Fourth Edition. Prentice Hall. 756 p.

González O, Bonilla M, y Rivera J. 2012. Los agronegocios y su institucionalidad en México. Revista Desarrollo Local Sostenible 6(16): 2-11.

Guzmán A, y Trujillo M. 2008. Emprendimiento social: revisión de literatura. Estudios Gerenciales 24(109): 105-125.

INEGI (Instituto Nacional de Estadística y Geografía). 2012. Directorio estadístico nacional de entidades económicas. Recuperado de http:// www.inegi.org.mx

Macías A. 2013. Introducción. Los pequeños productores agrícolas en México. Carta Económica Regional 25(111), 7-18.

Maddala G. 2001. Introduction to Econometrics. Third Edition. Wiley. 664 p.

Martínez E. 2008. Logit Model como modelo de elección discreta: origen y evolución. Anuario Jurídico y Económico Escurialense 41: 470-483.

Moscote O, y Arley W. 2012. Modelo logit y probit: un caso de aplicación. Comunicaciones en Estadística 5:123-133.

Navarrete E. 2001. Juventud y trabajo: un reto para principios de siglo. El Colegio Mexiquense, Zinacantepec. 246 p.

Oliveira O. 2006. Jóvenes y precariedad laboral en México. Papeles de Población 12: 37-73.

Oliveira O. 2009. El trabajo juvenil en México a principios del siglo XXI. Revista Renglones 61: 37-70.

ONU (Organización de las Naciones Unidas). 2005. Objetivos de desarrollo del Milenio: Una mirada desde América Latina y el Caribe (LC/G.2331-P), J.L. Machinea, A. Bárcena y A. León (coords.). Publicación de las Naciones Unidas, Nº de venta: S.05.II.G.107.

Pérez C. 2005. Métodos estadísticos avanzados con SPSS. Editorial Thomson. 792 p.

Pérez O. 2018. Agronegocios en México: Competitividad y desafíos. Editorial Qartuppi. 132p.

Rivera R, López N, y Mendoza A. 2016. Políticas de apoyo a la productividad de la microempresa informal

¿Dónde está México? Revista Problemas del Desarrollo 184(47): 87-109.

Texis M, Ramírez M, y Aguilar J. 2016. Microempresas de base social y sus posibilidades de supervivencia. Contaduría y Administración, 61: 551–567.

Secretaría de Economía .2013. Programa de Desarrollo Innovador 2013-2018. Recuperado de http://www.economia.gob.mx

Sigalia R, y Carney S. 2012. Poverty reduction through entrepreneurship: Microcredit, learning and ambivalence amongst women in urban Tanzania. International Journal of Educational Development 32: 546-554.

Sunkel G. 2015. El acceso de los jóvenes a la cultura en la era digital en América Latina. *In:* Trucco, D. y H. Ullmann (coords). Juventud: realidades y retos para un desarrollo con igualdad. Libros de la CEPAL, N° 137 (LC/G.2647-P) Santiago, Comisión Económica para América Latina y el Caribe (CEPAL). pp: 171-204.