



Analysis of unemployment in entrepreneurial activity within economic sectors: Entrepreneurship by opportunity or necessity

Análisis del desempleo en la actividad emprendedora de los sectores económicos: emprendimiento por oportunidad o necesidad

Rafael Eduardo Saavedra-Leyva^{1*}, Michelle Taxis Flores²,
Erika Beltrán Salomón¹

¹Universidad Autónoma de Baja California, México

²Benemérita Universidad Autónoma de Puebla, México

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Abstract

The article explores the discussion of the effects of unemployment in sectorial entrepreneurship, under the line of how unemployment inhibits or favors the creation of businesses. For this, data was collected from the Mexican states during the period 2005-2019, developing an index of entrepreneurial activity. Based on data availability, an entrepreneurship model with unemployment and other theoretical variables is proposed. Different statistical methods find how unemployment contributes positively to the entrepreneurial initiative of the three economic sectors of Mexico. In this sense, this study concludes that unemployment encourages the emergence of business for the country in a significant proportion. Furthermore, the effects of other explanatory variables of entrepreneurship do not differ between economic sectors, therefore these sectors share similar characteristics in the development of entrepreneurs.

JEL Code: M13, E24, L60, L70, L80

Keywords: entrepreneurial activity; unemployment; economic sectors; entrepreneurship by opportunity; entrepreneurship by necessity

* Corresponding author.

E-mail address: eduardo.saavedra@uabc.edu.mx (R. E. Saavedra-Leyva).

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Resumen

El artículo explora la discusión de los efectos del desempleo en el emprendimiento sectorial, bajo la línea de cómo el desempleo inhibe o propicia la creación de negocios. Para ello, se recopilieron datos de las entidades federativas mexicanas durante el periodo 2005-2019, elaborando un índice de actividad emprendedora. Con base en la disponibilidad de los datos, se propone un modelo de emprendimiento en función del desempleo junto a otras variables teóricas. Por medio de distintos métodos estadísticos, se encuentra cómo el desempleo contribuye positivamente en la iniciativa emprendedora de los tres sectores económicos de México. En este sentido, se concluye que el desempleo propicia el surgimiento de una proporción significativa de las empresas del país. Además, los efectos de otras variables explicativas de emprendimiento no difieren entre los sectores económicos, por lo tanto, dichos sectores comparten características similares en el desarrollo de emprendedores.

Código JEL: M13, E24, L60, L70, L80

Palabras clave: actividad emprendedora; desempleo; sectores económicos; emprendimiento por oportunidad; emprendimiento por necesidad

Introduction

An entrepreneur has been described in the business environment as a creative person capable of solving market deficiencies through the emergence of a company. Following this approach, the concept of entrepreneurship by opportunity is conceived, where the birth of a business occurs when the initiative to exploit and commercialize a market opportunity is taken (Plummer et al., 2007). This entrepreneurial activity requires an economic, social, and institutional environment conducive to business creation and formation (Saavedra-Leyva & Taxis, 2019). Nevertheless, the development of new businesses can manifest itself even in adverse economic conditions, where there are low wages, difficulties in getting a better job, and a high unemployment rate. This phenomenon is known as entrepreneurship by necessity since people's main reason for starting their own business is a complicated employment situation (Acs, 2006). Consequently, entrepreneurship by opportunity is considered procyclical, while entrepreneurship by necessity is countercyclical in nature (Fairlie & Fossen, 2018).

Considering these two aspects, unemployment plays a key role in distinguishing between one entrepreneurial venture and another, as it can hinder or promote entrepreneurship depending on the economic context. Unemployment encourages the creation of companies since people with labor problems and low-wage prospects will prefer to become entrepreneurs to maximize their profit instead of remaining without a job or income (Audretsch et al., 2015), leading to an increase in new businesses. Nevertheless, unemployment mitigates entrepreneurial intentions when there are several unemployed individuals, complicating the birth of companies seeking high profits since these types of businesses arise within markets with a prosperous demand (Ritsila & Tervo, 2002).

Considering this ambiguity, this article examines the relation between unemployment and entrepreneurship in Mexico. Furthermore, a sectoral study is carried out to investigate contrasts or similarities of this relation between the three main economic sectors (primary, secondary, and tertiary), aiming to define what type of entrepreneurial structure is observed within these sectors. Based on the above, the study's hypothesis is the following: Due to the entrepreneurial heterogeneity among the economic sectors, unemployment intensifies tertiary entrepreneurship because it is the most active entrepreneurial sector, while unemployment diminishes primary and secondary entrepreneurial activity. To this end, this research contributes to the debate and distinguishes itself from others by using a sectoral analysis, which has been little explored in studies of entrepreneurship and unemployment in Mexico. Therefore, the empirical exercise of the research analyzes the Mexican states from 2005 to 2019. This paper proposes an entrepreneurship model as a function of unemployment and is developed by applying panel and generalized moments methods to solve possible causality problems between the variables considered in the study.

The paper is structured in six sections in addition to the introductory part. The next section discusses the literature concerning the relation between entrepreneurship and unemployment. Then, the data and their sources are described. Subsequently, a descriptive analysis of unemployment and entrepreneurial activity in economic sectors is presented. Next, the model is specified, and the statistical methods are explained. The results obtained are then analyzed. Finally, the conclusions and final comments of the research are presented.

Literature on entrepreneurship and unemployment

In recent decades, entrepreneurship has been the subject of an extensive bibliography and research in various contexts. There is no single definition, but entrepreneurship is the action or process that makes it possible to design an idea, identify opportunities, and translate them into a company (Coello & Pico, 2017). A simplified way of looking at it is expressed by Audretsch (2012), stating that entrepreneurship is closely related to the creation of new companies. Moreover, it is linked to socioeconomic, psychological, legal, and technological aspects and to deeply personal and idiosyncratic reasons (Wiklund et al., 2019). This is the case for Arenius and Minniti (2005), who link the decision for entrepreneurship with demographic, socioeconomic, and perception elements. The level of schooling and age of the entrepreneur are distinguished among demographic factors; wealth and employment status are some of the socioeconomic factors; and the state of alertness to opportunities, fear of failure, and confidence in personal abilities are among the perception variables. Consequently, research is oriented toward analyzing

individual and contextual determinants that incite certain people to become entrepreneurs, as addressed in the work of Álvarez-Sousa (2019).

Pérez (2014) explains how entrepreneurial activities have the strategic purpose of creating added value to society, as nations are currently exploring entrepreneurship as a relevant factor to stimulate economic growth (Dvouletý, 2017). The work of Acs et al. (2018) follows the same line, demonstrating how studying entrepreneurial ecosystems is useful for understanding the variation in economic growth rates between countries since entrepreneurship is considered a key element in stimulating the productivity of nations. Consistent with Acs et al. (2018), Galindo-Martin et al. (2016) discuss how entrepreneurs play an important role in economic progress and growth, while Pizzi and Brunet (2013) point out that higher levels of capitalist development correspond to countries with high levels of innovative entrepreneurship in their economies. To achieve this, innovative entrepreneurship needs a solid institutional structure capable of generating policies that encourage the development of novel ideas and a system where intellectual property rights are respected (Aghion, 2017). In this way, new innovative businesses will replace established companies with low investment in research and development (R&D). This entrepreneurial substitution will increase productivity and economic growth.

The relation between entrepreneurship and several factors has been studied to understand its behavior and impact on economies to promote and understand entrepreneurial activity. Accordingly, Ahmad and Hoffman (2008) describe six determinants of entrepreneurial performance: availability of capital, access to R&D and technology, capabilities, market conditions, regulatory framework, and culture. The first three refer to access to resources, which entrepreneurs consider the most critical success factors. The capability factor refers to the attitudes and virtues of individuals, i.e., it includes the entrepreneurs' human and social capital. Market conditions are related to entrepreneurial opportunities generated by participation in competition and the ease of entry to foreign markets. The regulatory framework includes all taxes, regulations, and other policies and public institutions. Finally, culture comprises each entrepreneur's assumptions, adaptations, perceptions, and learning.

Dvouletý (2017) points out that researching the determinants of entrepreneurship is a way to provide sufficient evidence to the corresponding people or organizations to formulate appropriate policies for the promotion and economic development of individuals, regions, and countries. Therefore, identifying which elements affect entrepreneurship and which influence it has become a relevant research topic for both developed and developing economies.

Entrepreneurship has evolved to the extent that there are different types of entrepreneurship, among which entrepreneurship by necessity and entrepreneurship by opportunity are distinguished (Reynolds et al., 2005). The latter results from the prevailing attractive business opportunities, while entrepreneurship by necessity arises due to the absence of opportunities so that individuals take their

destinies into their own hands and become entrepreneurs (Udimal et al., 2020). According to Reynolds et al. (2005), these entrepreneurship affect sectors of the economy differently: (1) job creation, (2) export expectations, (3) intention to replicate existing business activities versus the creation of a new market niche, and (4) market share in different business sectors.

For a better understanding of this topic, it is important to mention that there are two predominant hypotheses about the emergence of entrepreneurship. On the one hand, it has been related to the opportunities identified in the market when a country's economy is prosperous and unemployment is low, which is known as the pull effect (Ritsila & Tervo, 2002; Hinz & Jungbauer-Gans, 1999; Marlow & Storey, 1992; Meager, 1992; Storey, 1991). On the other hand, entrepreneurship is also motivated by adverse or unfavorable situations in the economy and a high level of unemployment; this is known as the push effect (Ritsila & Tervo, 2002; Storey, 1991; Evans & Leighton, 1990). From the perspective of Cheratian et al. (2019), the pull effect hypothesis is a procyclical relation, which suggests an inverse link between entrepreneurship and unemployment, where the former will be higher as the latter decreases. While the push effect hypothesis is a countercyclical relation, this hypothesis manifests itself when unemployment increases entrepreneurship. As a result, a close relation between entrepreneurship and unemployment is implied, which motivates research in different nations and contexts to learn more about its determinants and the impact that such a relation has on the economy. In general, the results have not stood out for their uniformity, and some are contradictory (Cheratian et al., 2019; Beynon et al., 2019; Cole, 2018; Dohse & Vaona, 2017; Dvouletý, 2017; Devece et al., 2016; Apergis & Payne, 2016; Audretsch et al., 2015; Fritsch & Pijnenburg, 2014; Faria et al., 2010). The above defines the relation between entrepreneurship and unemployment as dynamic and ambiguous as it leads to exploring the type of entrepreneurship, either by necessity or opportunity, in addition to other characteristics of the region where the study is conducted.

There are several studies on the relation between entrepreneurship and unemployment, but few focus on developing economies. According to García-Macias et al. (2018), Mexico shows particularly high heterogeneity in its territory, largely due to the diverse contexts in which the entrepreneurial dynamics unfold. Therefore, studying the relation between entrepreneurship and unemployment in Mexico will contribute to a relevant topic at the national and international level (Udimal et al., 2020; Cole, 2018; Apergis & Payne, 2016), in addition to offering the opportunity to analyze the results at the sectoral level, allowing the formulation of institutional policies that favor its operation. The following section mentions the data sources obtained for the empirical study of Mexico.

Description of the data

The data sources used in the empirical exercise are specified below; it is worth mentioning that all sources are publicly available. The study variable, Mexican entrepreneurship—whose information was obtained from the National Survey of Occupation and Employment (ENOE; Spanish: Encuesta Nacional de Ocupación y Empleo)—accounts for the number of independent workers, records the year of the beginning of their business activities, and reports the sector toward which their economic activities are oriented for each state (where an independent worker is a person who owns a business). For the purposes of this study, entrepreneurship is a business of recent creation; accordingly, the entrepreneur will be the person who owns a new business. Therefore, self-employed workers are considered entrepreneurs only if they started their business in the year prior to the application of the survey. Based on this information obtained from the ENOE, the entrepreneurial activity variable is constructed according to expression (1), where the number of self-employed workers weights the number of entrepreneurs in each Mexican state reported in the survey samples:

$$AE_{s,it} = \left(\frac{NTI_{s,it}}{TTI_{s,it}} \right) 100 \quad (1)$$

An expression similar to this Equation (1) has been used in the works of Taxis et al. (2016 and 2019), where AE is the entrepreneurial activity and is calculated with the number of entrepreneurs or new self-employed workers (NTI) divided by the total number of self-employed workers (TTI) registered for economic sector *s* in Mexican state *i* during year *t*. Thus, this index of state entrepreneurial activity is an annual percentage value, which indicates the proportion corresponding to the entrepreneurship of a sector for all the businesses established within that economic sector.

Furthermore, unemployment is the main explanatory variable of the study, and, as with entrepreneurship, its data were obtained from the ENOE, which reports quarterly unemployment rates for each state. Nevertheless, in practice, the average annual unemployment rate was used, which was calculated from the quarterly rates. Based on these unemployment and entrepreneurship data, entrepreneurial activity can be assumed out of necessity as long as the unemployment rate accelerates entrepreneurial activity since unemployed individuals who find it difficult to get a job are forced to start their own businesses (Álvarez-Sousa, 2019). On the contrary, entrepreneurship by opportunity will be inferred if unemployment discourages entrepreneurial activity. Consequently, a decrease in unemployment causes market demand growth, leading to the emergence of new businesses (Delgado et al., 2020).

In addition to unemployment, other explanatory variables of entrepreneurship, such as wages, are also included. An inverse relation is expected between wage growth and entrepreneurship since better salaries could convince individuals to work in a salaried job, reducing their intention to work independently and consequently reducing the creation of businesses. Entrepreneurship becomes a preferable alternative for people when they perceive low-salary prospects, encouraging them to start their own businesses (Faria et al., 2010). Likewise, a salary reduction means a reduction in labor costs for new employers, making entrepreneurship more attractive. Wage data were obtained from the Ministry of Labor and Social Security (STPS; Spanish: Secretaría de Trabajo y Previsión Social), which publishes the annual average daily wage of workers insured by the Mexican Social Security Institute (IMSS; Spanish: Instituto Mexicano de Seguro Social) in each state of the country. It is worth mentioning that these monetary figures are deflated using the National Consumer Price Index of the Bank of Mexico (BM).

Another control variable is education, whose effect on entrepreneurship has been addressed by Matlay (2006), Dickson et al. (2012), and Vargas and Uttermann (2020). A positive relation between education and entrepreneurship is assumed, where a population endowed with knowledge will have a higher chance of entrepreneurship. Annual data on education in Mexican states were obtained through the average grade of schooling, which is reported by the Ministry of Public Education (SEP; Spanish: Secretaría de Educación Pública).

Descriptive analysis

Before presenting the model used, the behavior of the data obtained on entrepreneurship and unemployment is analyzed. Figure 1 shows the pace of national entrepreneurship within its three main economic sectors from 2005 to 2019, where remarkable entrepreneurial activity in the tertiary sector can be noticed. One step below is secondary sector entrepreneurship, which maintains a similar pace to tertiary entrepreneurial activity, but with a lower magnitude. On the other hand, national entrepreneurship in the primary sector shows a rate of less than 3% during the period analyzed, with this being the sector with the lowest entrepreneurship. Nonetheless, it shows annual variations different from the other two sectors that share similar trends. For example, entrepreneurial activity in the primary sector increased from 2006 to 2007, while the secondary and tertiary sectors saw decreases in entrepreneurship. Likewise, the primary sector suffered a decrease in entrepreneurship from 2012 to 2013, different from the increase observed within the other two sectors.

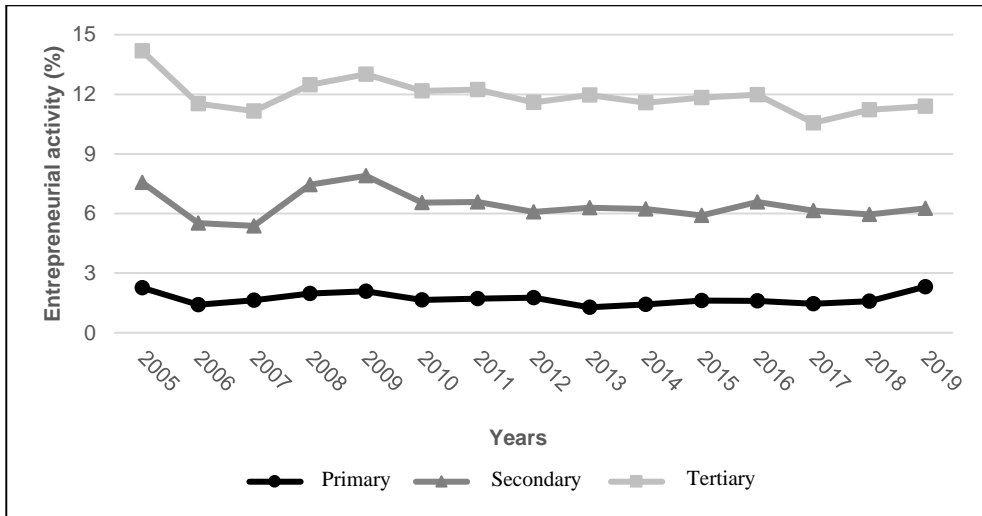


Figure 1. Entrepreneurial activity by economic sector in Mexico, 2005-2019
 Source: created by the authors with data from the ENOE.

Figures 2, 3, and 4 below show the relation manifested by sector entrepreneurship and unemployment in Mexican states through the scatter plot. These diagrams are constructed using two axes, which specify the national average sector entrepreneurship and the average unemployment of the country during the period 2005-2019. The average national entrepreneurship of the primary sector was 1.72%, the secondary sector obtained 6.42%, and the tertiary sector presented 11.92%, while the country's unemployment registered an average of 4.25%. This shows those states with higher and lower national entrepreneurship with lower or higher unemployment than the country's mean. Accordingly, 14 states presented an average unemployment rate higher than the national mean, including several from the northern and central border of the country. It is important to point out Tabasco and Guerrero as the states with the highest and lowest average unemployment, respectively.

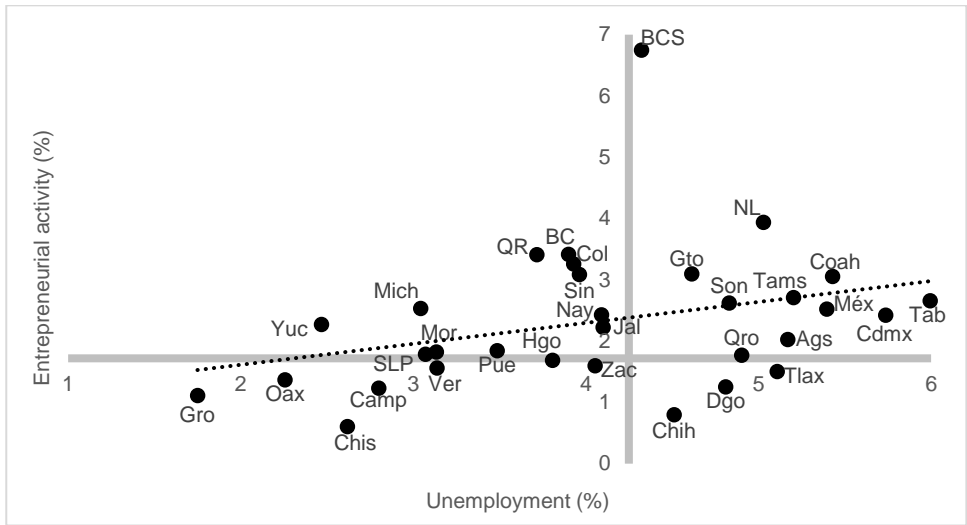


Figure 2. Entrepreneurial activity in the primary sector and unemployment in Mexican states, 2005-2019
 Source: created by the authors with data from the ENOE.

Figure 2 shows Baja California Sur as the state with the most entrepreneurship in the primary sector and Chiapas as the state with the lowest record in this type of entrepreneurship, with 0.6%. It also shows 11 states with unemployment and entrepreneurial activity in the primary sector higher than the national mean, as well as 7 out of 32 states with unemployment and entrepreneurship lower than the national mean. Therefore, the low or high entrepreneurial activity rates in these 18 states coincided with low or high unemployment rates. On the other hand, 14 states showed different relations to the previous case, as 11 of these states achieved a level of unemployment below the national mean, with primary sector entrepreneurship above the national mean. Only 3 of them, Chihuahua, Durango, and Tlaxcala, registered unemployment higher than the national mean and entrepreneurial activity lower than the country's mean.

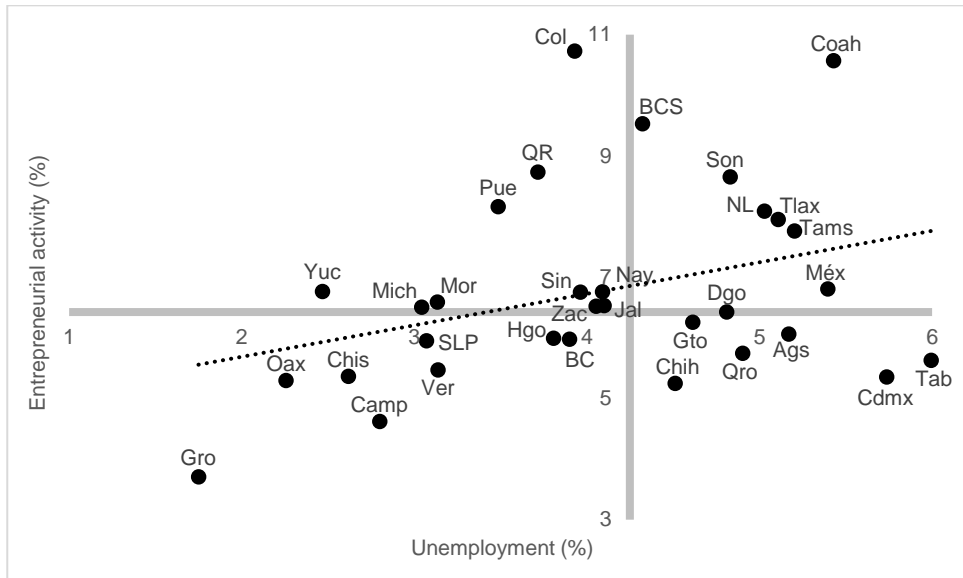


Figure 3. Entrepreneurial activity in the secondary sector and unemployment in Mexican states, 2005-2019

Source: created by the authors with data from the ENOE.

The relation between unemployment and entrepreneurship in the secondary sector of Mexican states is analyzed in Figure 3, where it can be seen that most of the states are found in the upper left quadrant, in which ten states have entrepreneurial activity higher than the country's mean together with unemployment lower than the national mean. The opposite case to the previous situation is presented in 6 states since these showed unemployment higher than the national mean when their secondary entrepreneurial activity is lower than the country's mean. On the other hand, 8 states maintained high unemployment levels together with entrepreneurship above the national mean. Nonetheless, eight other states presented unemployment and entrepreneurship below the national mean. Coahuila and Colima stand out as the states with the highest entrepreneurial activity within the secondary sector, both with a rate above 10%. In contrast, Guerrero is the state with the lowest entrepreneurial index in the secondary sector.



Figure 4. Entrepreneurial activity in the tertiary sector and unemployment in Mexican states, 2005-2019
 Source: created by the authors with data from the ENOE.

Figure 4 shows the relation between unemployment and entrepreneurship in the tertiary sector, showing how Baja California Sur, Nayarit, and Quintana Roo are the states with the highest levels of entrepreneurship, with averages above 15%. In contrast, the lowest levels of entrepreneurship in the tertiary sector are found in Baja California, Chihuahua, and Mexico City. Moreover, 24 Mexican states have entrepreneurial activity above the national mean, but 14 of these have unemployment below the national mean. Nonetheless, of the eight states with an entrepreneurial index below the national mean, Baja California, Morelos, Puebla, and Veracruz have unemployment rates below the national mean, and Chihuahua, Mexico City, Mexico State, and Queretaro have unemployment above the national mean.

When analyzing the linear trend of the 32 Mexican states within the scatter plots (Figures 2, 3, 4), it is possible to visualize a positive relation between entrepreneurship in the primary sector and unemployment. That is, as the unemployment rate is high, entrepreneurial activity in the primary sector tends to be higher, i.e., entrepreneurial activity in this sector will be low when unemployment is low. This same relation is also exhibited within the secondary sector, but that particular trend line manifests a slightly steeper slope. In contrast, tertiary entrepreneurial activity exhibits a negative relation with unemployment, such that low unemployment rates are associated with high rates of entrepreneurship, and higher entrepreneurial activity occurs where unemployment is low. It should be noted that the above conjectures are not definitive since the analysis ignores the effects of other variables on entrepreneurship

and does not specify causality between entrepreneurial activity and unemployment. Nonetheless, these limitations are overcome by the methods described in the next section.

Methodology

Based on the availability of the data sources consulted, a panel model is developed to analyze the information for the 32 Mexican states within the period 2005-2019. To this end, the Equation (2) below is proposed for entrepreneurship as a function of unemployment:

$$AE_{s,i,t} = \alpha_1 + \alpha_2 U_{i,t} + \alpha_3 W_{i,t} + \alpha_4 E_{i,t} + \epsilon_{i,t} \quad (2)$$

Where AE symbolizes entrepreneurial activity, U represents unemployment, W indicates wage, E indicates education, and i and t are state and year, respectively. It is important to remember that the dependent variable entrepreneurial activity in Equation 2 will be alternated to assess the impact of unemployment on entrepreneurship in the primary, secondary, and tertiary sectors, and as a whole.

On the other hand, the structure of a panel model will change if fixed or random effects are applied. Therefore, the Hausman (1978) test is performed, which consists of testing the null hypothesis of random effects; if the hypothesis is rejected, fixed effects are considered. In addition, the following tests are performed: the Jarque-Bera normality test, whose null hypothesis states that the residuals are normally distributed; the heteroscedasticity test by the likelihood ratio with the null hypothesis of homoscedastic residuals; the Pesaran test, where the null hypothesis states the absence of cross-sectional correlation; and the Durbin-Watson coefficient to detect serial correlation through values far from two in said coefficient.

Additionally, the Generalized Method of Moments (GMM) is used. Unlike the previous one, this panel method is dynamic and useful to overcome problems of heteroscedasticity, causality, or simultaneity among the study variables (Arellano & Bover, 1990; Alguacil et al., 2011) since there is a possibility that the ventures of previous years have an impact on current unemployment (Baptista & Torres, 2007) by creating new jobs. The drawbacks mentioned above are solved through the application of instruments, which will be the study variables lagged in a period, except for unemployment. It is worth mentioning that the Sargan test is applied to each of the GMM estimates. This test validates the correct specification of the model by not rejecting its null hypothesis (Arellano & Bond, 1991).

Another possible problem with Equation 2 is the existence of a correlation between the unemployment and wage explanatory variables since, in orthodox economic theory, the wage is the price in the labor market. Therefore, the existence or absence of work will depend on the wage price assigned by labor suppliers and demanders (Neffa, 2007). Nevertheless, Table 1 does not show a conflict of

correlation between unemployment and wage data. Nor does it show a considerable correlation with other explanatory variables. It only shows strong correlations between the dependent variables of entrepreneurship and entrepreneurial initiatives by sector, but they are not estimated as a whole.

Table 1
 Correlation analysis between study variables

Variables	Entrepreneurship	Primary sector entrepreneurship	Secondary sector entrepreneurship	Tertiary sector entrepreneurship	Unemployment	Wage	Schooling
Entrepreneurship	1.0000	-	-	-	-	-	-
Primary sector entrepreneurship	0.4445	1.0000	-	-	-	-	-
Secondary sector entrepreneurship	0.6663	0.2451	1.0000	-	-	-	-
Tertiary sector entrepreneurship	0.6843	0.1647	0.3722	1.0000	-	-	-
Unemployment	0.3834	0.1554	0.2150	0.0373	1.0000	-	-
Wage	-0.0415	0.0369	-0.0926	-0.3720	0.1484	1.0000	-
Schooling	0.4575	0.2369	0.2111	-0.1130	0.4507	0.4993	1.0000

Source: created by the authors with data from ENOE, STPS, and SEP.

Analysis of results

As mentioned above, this section presents the panel and GMM estimations of the effect of unemployment on entrepreneurial activity in the economic sectors. Table 2 shows the results obtained with the panel method, in which it is important to know whether it is appropriate to use fixed or random effects. The Hausman (1978) test, where the null hypothesis of random effects is tested, is used to resolve this question. The four entrepreneurship estimates obtained a p-value of less than 5%, so the random effects hypothesis is rejected, and fixed effects are applied to the four estimates in Table 2.

Table 2 shows the impact of unemployment on entrepreneurship in the primary sector. It can be seen that unemployment increases entrepreneurial activity in the sector by presenting a positive coefficient. Nonetheless, this result is not statistically significant. A similar finding is exhibited with the wage by finding a direct relation with the primary sector entrepreneurship, but without showing statistical

significance at any conventional level. Schooling is negatively related to primary sector entrepreneurship, although this relation is not statistically significant.

Concerning entrepreneurship in the secondary sector, Table 2 presents a positive and significant contribution to 1% of unemployment. An increase in one percentage unit of unemployment increases entrepreneurial activity in the secondary sector by approximately 0.29%. Nevertheless, the rest of the explanatory variables did not manifest statistical significance with the secondary sector entrepreneurship, although wage and education boast a relation contrary to the expected one with the secondary sector entrepreneurship.

Table 2
 Entrepreneurial activity results by sector and unemployment applying fixed effects, 2005-2019

Independent variables:	Dependent variable:			
	Primary entrepreneurship	Secondary entrepreneurship	Tertiary entrepreneurship	Entrepreneurship
Constant	0.6635 (0.7635)	4.0559 (0.1337)	16.0397 (0.0000)	7.2504 (0.0000)
Unemployment	0.1061 (0.2158)	0.2896 (0.0060)	0.3561 (0.0000)	0.3197 (0.0000)
Wage	0.0102 (0.2753)	0.0181 (0.1156)	0.0177 (0.0511)	0.0176 (0.0097)
Schooling	-0.2285 (0.3585)	-0.4773 (0.1176)	-1.1808 (0.0000)	-0.5537 (0.0023)
Hausman Test	0.0267 ^r	0.0043 ^r	0.0001 ^r	0.0000 ^r
Kao cointegration test	0.0011 ^r	0.0000 ^r	0.0000 ^r	0.0000 ^r
Jarque Bera Test	0.0000 ^r	0.0002 ^r	0.0609	0.0263 ^r
Durbin Watson Coefficient	2.0146	1.8911	1.8974	1.7183
Pesaran Test	0.0411 ^r	0.0417 ^r	0.0000 ^r	0.0000 ^r
Likelihood ratio test ¹	0.0000 ^r 0.0017 ^r	0.0000 ^r 0.8432	0.0000 ^r 0.8772	0.0000 ^r 0.8686

The p-value of each independent variable is shown in parentheses. The Hausman, Kao cointegration, Jarque-Bera, Pesaran, and likelihood ratio tests report the p-values of each estimate, where ^r indicates the rejection of the null hypotheses at the 0.05 level. ¹The upper row contains the p-values for the cross-section, and the lower row presents the p-values for the periods.

Source: created by the authors.

When entrepreneurship in the tertiary sector is analyzed by applying fixed effects (Table 2), unemployment contributes to business creation. That is, an increase of one percentage unit in the unemployment rate boosts entrepreneurial activity in the tertiary sector by 0.3561%. Moreover, this coefficient is statistically significant. Likewise, wages and education report statistical significance in their parameters, although with relations contrary to the assumptions, since wages increase entrepreneurship in the tertiary sector and education decreases it.

The last estimation in Table 2 shows the results corresponding to entrepreneurship as a whole. These show a negative relation with education and positive relations with wages and unemployment, all significant at 1%. Consequently, education reduces entrepreneurship by 0.5537%, while unemployment and wage increase entrepreneurship by 0.3197% and 0.0176%, respectively.

Table 2 also shows each estimate's normality, heteroscedasticity, serial correlation, and contemporaneous tests. The results of these tests show the following statistical problems: (1) the residuals of the four estimates are not normally distributed, (2) there is cross-sectional dependence in the residuals, and (3) the cross-sectional residuals are not homoscedastic. Based on the above, the GMM is used, whose statistical properties make it possible to obtain more efficient estimates despite the correlation problems in the residuals and heteroscedasticity (Arellano & Bover, 1990).

Therefore, the generalized method of moments is used to complete the statistical analysis. In this method, dynamic estimations are made by implementing lags using instruments, thus avoiding simultaneity problems among the variables of the study. It should be noted that the four estimates in Table 3 are correctly specified as they do not reject Sargan's null hypothesis. The results of the estimations are shown in Table 3. This mainly exhibits how unemployment is directly related to entrepreneurship in the primary sector to such an extent that an increase of one percentage unit in the unemployment rate increases entrepreneurship in the primary sector by 2.7958%. This parameter is statistically significant at 1%. Likewise, education shows a significant coefficient at 10%; therefore, an increase of one year in the average schooling of the population decreases entrepreneurial initiative by 1.3038%. The coefficient of wages is not statistically significant for entrepreneurship in the primary sector.

As in the previous estimate, entrepreneurial activity in the secondary sector shows significant relations with unemployment and education (Table 3). Accordingly, unemployment has a favorable influence on entrepreneurship in the secondary sector, while education has a negative impact on business creation, although the latter has a smaller impact (-2.2473) compared to unemployment (4.5923). On the other hand, wage did not reveal statistical significance with the secondary sector entrepreneurship.

Table 3
 Entrepreneurial activity results by sector and unemployment using the generalized method of moments, 2005-2019

Independent variables:	Dependent variable:			
	Primary entrepreneurship	Secondary entrepreneurship	Tertiary entrepreneurship	Entrepreneurship
Constant	1.6415 (0.4828)	9.3077 (0.0095)	23.1225 (0.0000)	4.133 (0.0465)
Unemployment	2.7958 (0.0030)	4.5923 (0.0015)	4.1136 (0.0017)	2.979 (0.0000)
Wage	0.0016 (0.7776)	-0.0060 (0.4938)	-0.0135 (0.0903)	-0.0123 (0.0237)

Schooling	1.3038 (0.0708)	-2.2473 (0.0417)	-2.6486 (0.0082)	-0.3908 (0.3526)
Sargan Test	0.2060 ^{nr}	0.3524 ^{nr}	0.9592 ^{nr}	0.1334 ^{nr}

The p-value is shown in parentheses. ^{nr} represents the non-rejection of Sargan's null hypothesis at the 0.05 level.

Source: created by the authors.

In Table 3, the three independent variables are statistically significant for entrepreneurship in the tertiary sector. Unemployment is positively related to entrepreneurship in this sector since an increase of one percentage unit in the unemployment rate increases business creation in the tertiary sector by 4.1136%. Nonetheless, wage and education mitigate the sector's company generation to such a degree that a unit increase in the average wage reduces entrepreneurship in the tertiary sector by 0.0135%. In comparison, an increase of one year of average schooling will decrease the sector's entrepreneurial activity by 2.6486%.

The last estimation in Table 3 shows the relations of the explanatory variables with total entrepreneurship in the three sectors, where unemployment and wages stand out as statistically significant. Unemployment contributes favorably to the emergence of companies with a coefficient of 2.979%, while wages discourage entrepreneurship by 0.0123%. Concerning the impact of schooling on entrepreneurship, this was negative but lacked statistical value.

Synthesizing Tables 2 and 3, it can be seen how the results of unemployment in entrepreneurial activity are consistent since both methods show how the lack of employment encourages entrepreneurial activity in the secondary and tertiary sectors and as a whole, suggesting that the lack of job opportunities is one of the reasons for the emergence of businesses. This is not the case in the primary sector, which only showed a remarkable contribution to unemployment when the lags were implemented. On the other hand, the wage results were in line with expectations, given that higher wage benefits discourage individuals from developing any type of business of their own, or more specifically within the tertiary sector. Concerning schooling, the most important findings were the opposite reasoning to the above, since a high level of schooling is associated with people who are not willing to be entrepreneurs. In this regard, the initiative to start a company is characteristic of individuals with a lower level of schooling. This conjecture is reported in the panel estimation for general entrepreneurship and the tertiary sector, and for all three sectors when the GMM was used. Likewise, the explanatory variables wage and schooling improved significantly in statistical terms in the GMM, as well as the size of the coefficients of unemployment, so this is presented as the factor with the greatest impact on the entrepreneurial activity of the states.

Conclusions

This paper analyzes the effect of unemployment on entrepreneurship. More specifically, the paper reveals empirical evidence of the impact of unemployment on business generation within each of Mexico's three major economic sectors. Using different panel methods, the results show the presence of a unique relation between the variables in the study. The relation conceives unemployment as a driving factor in the creation of companies. As a result, and based on the literature consulted, the dominant presence of entrepreneurship by necessity within the three sectors can be assumed. Therefore, the business structure of the sectors is conditioned to entrepreneurs with a low socioeconomic profile (Ramírez et al., 2013), with low investment and scarce planning. Based on this, the hypothesis of the work is partially fulfilled, only for the tertiary sector, while in the other sectors, a relation opposite to the results was expected, that is, entrepreneurship by opportunity, which is linked to innovation. For this, the innovative entrepreneur requires a considerable amount of capital to create a business where a novel product or process will be developed (Aghion, 2017).

On the other hand, this study also examines the impact of wages and schooling on entrepreneurial activity, finding ambiguous results depending on the estimation method. That is, when lags are applied in the GMM, schooling has an inverse influence on entrepreneurship, although this relation disappears in the primary and secondary sectors when estimated using the panel method. Meanwhile, wages present a positive relation in entrepreneurship as a whole and in the tertiary sector with the panel method, but this relation becomes negative in the lagged estimations for all sectors. These inconsistencies presented are attributed to the application of lags where an appropriate causal relation is defined which allows for statistically robust coefficients when using lags. In this respect, the effect of wages is in line with that expected within the lagged estimation; however, the effect of schooling is contrary to that previously assumed since the average degree of schooling tends to reduce entrepreneurial activity in the economic sectors. Nevertheless, this result is compatible with the direct relation between unemployment in entrepreneurial activity and the conjecture of entrepreneurship by necessity since this type of entrepreneur has a low schooling level, which makes it difficult to obtain a new job. Consequently, these people are pushed to start their own businesses to aspire to a better income. Based on the above, the GMM results are more theoretically coherent and statistically consistent, unlike the panel results, which are unreasonable from a theoretical point of view and present statistical inconsistencies.

Therefore, most Mexican entrepreneurial activity arises from economic necessity through people who present a complicated employment situation, where they aspire to a humble wage due to their low schooling level. As a result, this type of business tends to show slow growth and a high exit rate due to inadequate planning. Consequently, the present study advocates the creation of development and planning policies for entrepreneurs by necessity, as well as incentivizing entrepreneurship motivated by

market opportunities through the formulation of institutional policies that favor the operation of businesses (Udimal et al., 2020; Acs et al., 2018; Cole, 2018; Apergis & Payne, 2016).

Finally, the study's major limitation was the inability to differentiate by business size. As such, these results leave open lines of research that should be considered in the future to complement these conclusions. Examples could be an analysis by size, creating groups of states that present similarities, or working the sample by regions of Mexico. They could also include the development of work addressing the characteristics of unemployed people who choose entrepreneurship or studies on survival factors in Mexican entrepreneurship.

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