



# Economic growth in an enterprising region in Ecuador

## Crecimiento económico en una región emprendedora en el Ecuador

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### Abstract

*This article analyzes the levels of early entrepreneurship of the strategic industries of the main port of Ecuador, in the province of Guayas in the period 2012-2016. Secondary sources were used in relation to the business activity corresponding to the companies in the Superintendence of Companies of Ecuador and the Internal Revenue Service of Ecuador for sole proprietorships. On the other hand, Value Added Data Gross and the economically active population, the unemployment rate of the Institute of Statistics and Census of Ecuador were obtained from the Central Bank of Ecuador, and with this information the TEA (total early-stage entrepreneurial activity) was obtained as well as the % of companies established in the province of Guayas, in order to design two econometric models by ordinary least squares, in which the incidence of TEA was verified as well as the established companies in terms of economic growth and the incidence of unemployment and companies established in the TEA. The results showed that the TEA and the rate of established companies accounted for 97.07% of the province's economic growth, especially in the textile, garment, processed food and beverages, where high new and emerging entry rates are evident. Additionally, it was found that there is an inverse relationship between unemployment and entrepreneurship.*

### Resumen

Este artículo analiza los niveles de emprendimiento temprano de las industrias estratégicas del principal puerto del Ecuador, en la provincia de Guayas en el período 2012-2016. Se utilizaron fuentes secundarias en lo que respecta a la actividad empresarial correspondientes a las sociedades en la Superintendencia de Compañías del Ecuador y del Servicio de Rentas Internas del Ecuador para las empresas unipersonales, por otro lado del Banco Central del Ecuador se obtuvieron datos del Valor Agregado Bruto y la población económicamente activa, la tasa de desempleo del Instituto de Estadísticas y Censos del Ecuador; con esta información se obtiene la TEA (Tasa de actividad emprendedora temprana) y el porcentaje de las empresas establecidas en la provincia de Guayas. Se diseñaron dos modelos econométricos mediante mínimos cuadrados ordinarios, en los cuales se comprobó la incidencia de la TEA y las empresas establecidas en el crecimiento económico y la incidencia del desempleo y las empresas establecidas en la TEA. Los resultados evidenciaron que la TEA y la Tasa de Empresas Establecidas explican en un 97,07% el crecimiento económico de la provincia especialmente en los sectores textiles, confecciones, alimentos y bebidas procesadas donde se evidencian altas tasas de entrada nacientes y nuevas, además se constató que existe una relación inversa entre el desempleo y el emprendimiento.

### Keywords | palabras clave

*Early entrepreneurial activity, established companies, economic growth, unemployment.*

Actividad emprendedora temprana, empresas establecidas, crecimiento económico, desempleo.

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## 1. Introduction

Entrepreneurship is a global process present in all countries, which has developed since the existence of man, who has explored and worked as part of his/her provider nature. This economic initiative is seen as an option to labor and the need to generate wealth (Rodríguez, 2014). According to the report of the Global Entrepreneurship Monitor (GEM) (2017), in the last decade, half Latin American and Caribbean countries have presented significant, mainly positive, changes promoted by prudent macroeconomic policies that have allowed to face external shocks, and poverty levels which have reduced to less than half compared to the beginning of 2000, a middle class that has grown, and a strong investment that has occurred in Education, infrastructure and the productive strengthening of companies.

Entrepreneurship in Latin America and the Caribbean (LAC) is abundant, however, according to the World Bank report (2014), companies in this region are smaller and less likely to grow and innovate. The report reveals some positive facts, LAC is an area of entrepreneurs where the number of companies per capita is higher than in other countries and regions and in which the rate of entrepreneurs whose businesses are legally registered is considerably high in several economies of the region. However, despite a large number of companies, there is a considerable difference in innovation between LAC and the rest of the regions. This delay affects large and small companies, including companies with an export market.

In Ecuador, the term entrepreneurship started to arise since 2000 (Araque, 2015). Ecuador is the country with the highest total early-stage entrepreneurial activity (TEA) in Latin America and the Caribbean, and according to the report of the GEM Ecuador 2016 (2017) the total early-stage Entrepreneurial Activity at 2016 was 31.8%, the highest percentage was recorded in 2013 with 35.9%, time that is called "the entrepreneurship boom in Ecuador."

In this context, the topics to be addressed in this article are: Do the TEA and the established businesses influence the economic growth of the Guayas province? Are the province's unemployment rates related to the entrepreneurial activity?

The article is structured as follows: the first part provides a brief review of the literature on entrepreneurship and economic growth; the second part presents the methodology used for estimating the different econometric data and models; the third part indicates the results obtained; the fourth part presents the discussion of the results; finally, the conclusions present the information drawn from the investigation.

### 1.1. Review of the literature

The relationship between entrepreneurship and economic growth has been extensively studied, and the results of the different works do not indicate a single pattern, but vary depending on the region analyzed and the variables and indicators used. However, most studies confirm the positive relationship between the entrepreneurial activity and the economic growth (Stam, Suddle, Hessels & Stel, 2006; Acs, Audretsch, Braunerhjelm & Carlsson, 2012; Galindo & Méndez, 2012; Dau & Cuervo-Cazurra, 2014; Galindo, Mendez, & Castaño, 2016).

Lupiáñez, Priede and López (2014) and Galindo *et al.* (2016) carry out a review of a significant number of works addressing this relationship, which highlights that the promotion of a solid business base generates wealth, employment and well-being (Comisión Europea, 2003); in turn, the study of Lupiáñez *et al.* (2014) proposes that knowledge is a decisive factor, since the entrepreneur is the economic agent with the ability to convert knowledge into knowledge with economic value, being a main figure in the economic growth.

The role of cultural variables is taken into account in order to understand the relationship between the entrepreneurial activity and the economic growth in some works (Jaén, Fernandez & Liñán, 2013; Pinillos Costa, 2011), innovation and private investment (Galindo & Mendez, 2012) and the investment in knowledge (Acs, Audretsch, Braunerhjelm & Carlsson, 2012), which were determining variables in such works. Jaén *et al.* (2013) mention that the variable early entrepreneurial activity along with cultural variables help predict the level of economic growth, this relation was contrasted using a linear regression analysis on a sample of 56 countries (2001 to 2011), which revealed a negative global relationship between TEA and the level of income per capita, in which entrepreneurial activity explains in 37.8% the variance of the income level.

Galindo and Méndez (2012) considered a sample of 11 countries<sup>1</sup> during the period 2000-2010 to determine the relationship between entrepreneurs and the economic growth, using a logarithmic regression model which yielded significant results, where entrepreneurs have a positive effect on the growth, this being the main difference with the study of Jaén *et al.* (2013) that identified an inverse relationship between these two factors. It should be noted that Galindo and Mendez (2012) also included exogenous variables, innovation and private investment in the regression model, in which innovation also positively explains the economic growth, along with the entrepreneurial activity. Subsequently, Galindo, Mendez, and Castaño (2016) expanded this perspective, and they affirmed in their research that entrepreneurship is one of the main factors to stimulate the economic growth, because the entrepreneur is the one who uses the resources of capital and work for the generation of wealth that will be distributed in the society; it is essential that this distribution is fair, avoiding social tensions that affect the behavior and expectations of the entrepreneur. Therefore, for a correct distribution, which focuses on each receiving according to the contribution, the role of government is essential through economic policies and compensation principles that generate a balance in the social climate, which induces entrepreneurs to generate wealth. Additionally, they point out that economic growth is not a simile of the economic progress, in line with Holcombe's work (2007 cited in Galindo, Méndez and Castaño, 2016), who indicates that progress is related to the quality of the product while growth is related to the quantity, the entrepreneur being an essential factor in both processes, since this same economic agent is responsible for introducing innovation into the

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1 Spain, Denmark, Germany, France, Italy, Finland, Holland, United Kingdom, Sweden, Japan and the United States.

process, a factor that has an impact on progress, thus entrepreneurship is also the main factor in the economic progress.

Acs *et al.* (2012) by using an econometric model of generalized least squares determined whether entrepreneurial activity has a positive and systematic impact on the economic growth in a total of 18 countries from 1981 to 1998, finding that entrepreneurship makes a positive contribution to the economic growth. In addition, the investment in knowledge, as measured by the percentage of GDP in I+D and population school years, was identified as an important source of economic growth. Additionally, Stam, Suddle, Hessels, and Stel (2006) not only determine the relationship between entrepreneurship and economic growth, but also in figuring out what kind of entrepreneur most influences that growth. This research made a difference from the T total early-stage entrepreneurial activity in general, TEA strong growth, who expect to employ 20 or more workers within five years and average TEA-growth, which expect to employ 6 or more workers within five years, data obtained from the GEM (2002) for a sample of 36 countries. In addition to these variables, they also included in the model the independent variables per capita income and competitiveness growth. To contrast the impact of these factors on economic growth, the authors used an econometric model of simple regression, the results of which underpinned that the ambitious entrepreneurial spirit, i.e. owners who expect to employ 20 workers or more, contribute more to the economic growth than an entrepreneurial activity in general. It was also possible to verify that this generally occurred in countries in transition.

From another perspective, Dau and Cuervo-Cazurra (2014) proposed an approach in which entrepreneurship depends on the economic growth and pro-market institutions. To this end, they classify entrepreneurship in formal and informal, and they divide the pro-market institutions into their two main components, economic liberation and levels of governance. As a result of the research, economic growth as measured by GDP growth was found to have a significant and positive effect on both types of entrepreneurship, while governance levels have a positive effect on the formal but negative entrepreneurship in the informal and total entrepreneurship. Economic liberation has a positive effect on both types of entrepreneurship. Following the same approach but with different perspective, Liñán, Fernández and Romero (2013) raised a hypothesis in which the business activity rate correlates negatively with GDP per capita, i.e. a higher income is associated with less entrepreneurial initiative. The study sample corresponds to a total of 56 countries and a partial least squares econometric model was used to verify this hypothesis. The results of the model showed that GDP per capita plays an important role in explaining the level of entrepreneurial activity in the sample countries. As raised in the scenario, the level of income is negatively related to TEA.

Pinillos Costa (2011) studied the variables that affect entrepreneurship with a slightly different approach, working not only with economic and socio-demographic variables but also with cultural factors, which is the independent variable of the study. The basic hypothesis of the research is to verify the relation that if the cul-

ture of society is more post-materialist<sup>2</sup> then the total entrepreneurial activity rate will be lower. To contrast this hypothesis, a simple linear regression was developed where the independent variable is the level of post-materialism and the dependent variable is the TEA. In addition, different multiple regressions were performed including economic and socio-demographic variables, such as unemployment, per capita income and education level. The main result was that post-materialism is negatively related to entrepreneurial activity, verifying the study hypothesis in which, less materialistic societies tend to exhibit lower values of early entrepreneur activity. It should be noted that in this study the socioeconomic variables, unemployment, per capita income or level of study, were not significant in predicting the entrepreneurial activity.

Finally, Zuniga, Soza, and Soria (2015), who analyzed the impact of unemployment on entrepreneurship, suggest that the relationship between unemployment and the entrepreneurial activity is difficult to establish for its research area, since it was shown during 2011-2012 that changes in unemployment had a positive impact on entrepreneurship, while for the remaining years it was not possible to establish any kind of relationship between these two variables. The work focuses on the Chilean Patagonia during the period 2009-2012, with a main objective to contrast the existence of the opportunity effect or shelter effect<sup>3</sup>, effects studied in the research of Reynolds *et al.* (1995), Blanchflower and Meyer (1994) and Audretsch (1995) cited in Zuniga, Soza, and Soria (2015).

Based on this literature, the following hypotheses of this research are raised.

H1: total early-stage entrepreneurial activity —TEA— and established companies affect the economic growth of the province of Guayas-Ecuador.

H2: Unemployment and established companies have an impact on the early —TEA— entrepreneurial activity of the province of Guayas-Ecuador.

## 2. Materials and methods

### 2.1. Data and variables

Secondary data sources were used, and the company information was obtained from the Superintendency of Securities and Insurance Companies —SUPERCIAS— while information from sole proprietorships was obtained from the Internal Revenue Service for obtaining the Gross Value Added Data —BCE— and finally, the National Institute of Statistics and Census —INEC— was the source for obtaining the data on the economically active population and the unemployment rate.

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2 Post-materialism is the degree to which a society seeks intangible life objectives, such as personal development and self-esteem on material safety, a term coined by Inglehart in 1977.

3 The opportunity effect explains an inverse relationship between the origin of new businesses and unemployment, while the shelter effect explains that an increase in unemployment increases the interest to undertake a business.

The research was implemented for the period 2012-2016 with information from the province of Guayas, which is considered one of the economic development areas in Ecuador and the strategic industrial sectors were analyzed as established by the National Secretariat of Planning and Development —SENPLADES— in Zonal agenda 8, namely chipping, steelmaking, pharmaceutical, metalworking, fabrics and clothing, food and beverage and hardware and software development.

For this research, both sole proprietorships and companies from the above-mentioned industries were considered; also, to facilitate the identification and classification of companies by type of industry, the International Standard Industrial Classification was used —ISIC— adopted by INEC in the National Classification of Economic Activities, which allowed to clean-up and count the number of companies.

The —TEA— Early-stage Entrepreneurial Activity and the established companies are identified based on the conceptualizations used by the Global Entrepreneurship Monitor —GEM—.

For the GEM, the TEA is the percentage of the adult population that is actively involved in nascent businesses (companies with no more than 3 months of existence) or new businesses (companies with more than 3 months, but no more than 42 months).

Rocha (2013) calculates the TEA per year using the formula:

$$TEA = \frac{Enascent + Enew}{PEA Guayas} * 100 \quad (1)$$

Where *Enascent* is the total number of new businesses in the strategic industrial sectors under study, *Enew* corresponds to the total number of new businesses of the strategic industrial sectors under study, and the *PEA Guayas* is the active population of the province.

Established companies are calculated as a percentage of the adult population that is actively involved in a business with more than 42 months.

The TEA formula was adapted to quantify established companies.

$$Established = \frac{Nestablished}{PEA Guayas} * 100 \quad (2)$$

Where *Nestablished* refers to the total number of established companies in the strategic industrial sectors under study, while *PEA Guayas* is the active population of the province.

The variable of economic growth uses the Gross Value Added —GVA— of the province of Guayas, whose information was obtained from the Provincial Accounts of the BCE website. The unemployment rate variable refers to the situation of the unemployed citizen in the labor market, whose rates have been obtained from INEC for the province of Guayas.

**Table 1. Variables, indicators and sources of information**

Variable	Indicator	Description
Early entrepreneurial activity	TEA Rate	Developed in this research using data from SRI, SUPERCIAS and INEC.
Companies established	Established Enterprises Rate	Developed in this research using data from SRI, SUPERCIAS and INEC.
Provincial economic growth	GVA	Gross value obtained from the Central Bank of Ecuador
Unemployment	Unemployment Rate	Unemployment rate obtained from INEC

Source: Own Elaboration

## 2.2. Econometric models

To contrast the hypotheses raised and determine whether there is a significant incidence between the variables, two econometric regression models were established, equations (3) and (4) were estimated using the ordinary least squares —OLS— method. Nonlinearity contrast was applied only in equation (4) because logarithms were not applied in this model. Additionally, it was verified whether the residues of each of the two models follow a normal distribution.

$$\log GVA = \beta_0 + \log \beta_1 TEA + \log \beta_2 Established + \mu \quad (3)$$

Equation 3 seeks to verify the hypothesis of incidence of the exogenous variables TEA and rate of established companies on the dependent variable of economic growth. It was chosen to analyze this relationship based on the works of Lupiáñez, Priede and López (2014); Jaén, Fernández and Liñán (2013); Galindo and Méndez (2012); Stam, Suddle, Hessels and Stel (2006); Acs, Audretsch, Braunerhjelm and Carlsson (2012) and Galindo, Méndez and Castaño (2016) who have studied the relationship of the impact of entrepreneurship on the economic growth.

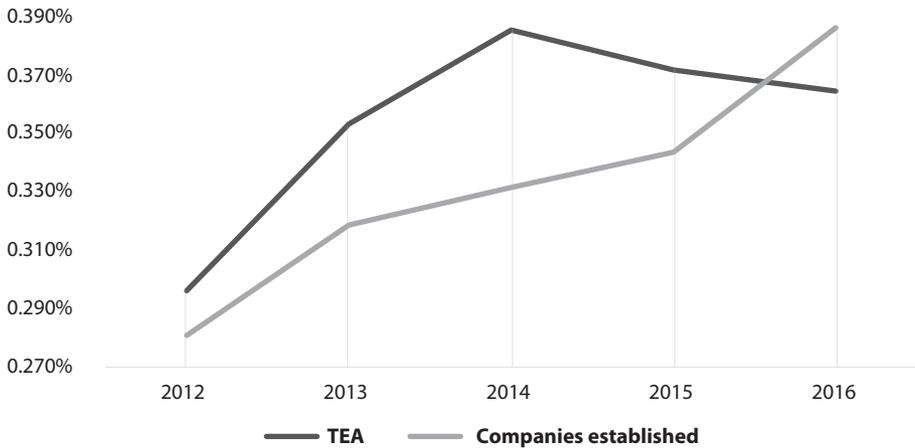
$$TEA = \beta_0 + \beta_1 Unemployment + \beta_2 Established + \mu \quad (4)$$

Equation 4 is intended to contrast the incidence of the independent variables Unemployment Rate and Established Business Rate on the endogenous variable TEA. The idea was to analyze this model based on the research of Zuniga, Soza, and Soria (2015), who established the relationship between unemployment and entrepreneurship for one year. Likewise, Pinillos Costa (2011) performed the same but with different results, since the author found no significance between unemployment and entrepreneurship.

### 3. Results

Figure 1 shows the evolution of the TEA and the Established Enterprises Rate for the period 2012-2016. The economically active population of the province of Guayas is considered as the denominator in these contribution percentages of the TEA and the total established companies. The figure shows how TEA has been superior to the established companies for most of the study period, excepting in 2016. TEA had a positive trend until 2014 where its highest peak is recorded, as of this year it has suffered a moderately significant setback. On the other hand, the Established Companies Rate has had a positive trend throughout the study period, where the greatest variation occurs from 2015 to 2016, due to the consolidation of companies created in previous years.

**Figure 1. TEA and Rate of Companies Established in the Strategic Industries of Guayas**



Source: Own elaboration. SRI database and Superintendency of Companies.

**Table 2. Total business activity of the Strategic Industries of Guayas**

	Gross Income	Gross Output	Net Income	Turbulence	Nascent enterprises	New Enterprises	Established enterprises
<b>2012</b>	2118	985	1133	3103	535	4797	5050
<b>2013</b>	2138	1168	970	3306	557	5517	5488
<b>2014</b>	2128	1575	553	3703	602	6121	5773
<b>2015</b>	2346	1097	1249	3443	609	6283	6364
<b>2016</b>	2209	841	1368	3050	587	6388	7397

Source: Own elaboration. SRI database and Superintendency of Companies.

**Table 3. Nascent enterprises by Strategic Industries of Guayas**

Nascent enterprises (up to 3 months)							
	Food and processed beverages	Textiles and Manufactures	Pharmaceutical	Steel	Development of Hardware and Software	Metal-mechanical	Ship making
<b>2012</b>	117	390	2	10	2	4	10
<b>2013</b>	120	407	3	9	3	5	10
<b>2014</b>	139	434	0	14	0	4	11
<b>2015</b>	195	382	4	10	1	2	15
<b>2016</b>	201	361	3	4	0	3	15

Source: Own elaboration. SRI database and Superintendency of Companies.

**Table 4. New Companies by Strategic Industries of Guayas**

New Companies (more than 3 to 42 months)							
	Food and processed beverages	Textiles and Manufactures	Pharmaceutical	Steel	Development of Hardware and Software	Metal-mechanical	Ship making
<b>2012</b>	1056	3513	21	66	3	37	101
<b>2013</b>	1195	4047	22	82	9	37	125
<b>2014</b>	1423	4404	22	88	16	49	119
<b>2015</b>	1543	4466	19	76	15	47	117
<b>2016</b>	1863	4241	22	88	14	41	119

Source: Own elaboration. SRI database and Superintendency of Companies.

**Table 5. Established Companies by Strategic Industries of Guayas**

Established Companies (over 42 months)							
	Foods and processed beverages	Textiles and Manufactures	Pharmaceutical	Steel	Development of Hardware and Software	Metal-mechanical	Ship making
<b>2012</b>	1883	2708	91	124	7	85	152
<b>2013</b>	1937	3093	89	113	7	90	159
<b>2014</b>	1922	3379	88	117	6	90	171
<b>2015</b>	1960	3952	82	118	7	88	157
<b>2016</b>	2145	4760	85	128	9	96	174

Source: Own elaboration. SRI database and Superintendency of Companies.

For 2014 the highest rate of turbulence was recorded, which was caused by an increase in gross outputs (Table 2), a relevant data because it occurred a year before the economic slowdown in Ecuador, thus being able to target companies as radar of the situation economic crisis, as they perceived the contraction of the economic cycle.

By visualizing the dynamics of the business demographics of the strategic sectors of Guayas, it was observed that the textiles and clothing industry and the food and beverage industry record the largest number of companies in both new and nascent companies (Tables 3, 4 and 5), strengthening the idea of the specialization in these industrial sectors in the province of Guayas and to a lesser extent, but certainly in force, the ship making sector, the oldest and most traditional of Ecuador's main seaport, accompanied by steelmaking. Finally, sectors such as pharmaceuticals and software and hardware development stand out with a good component of new and established companies, but to a lesser extent than the previous ones.

**Table 6. TEA and Rate of Established Companies of the Strategic Industries of Guayas**

	Nascent enterprises	New enterprises	Established enterprises	Guayas PEA	TEA (%)	Established enterprises (%)
<b>2012</b>	535	4797	5050	1799221	0.296	0.281
<b>2013</b>	557	5517	5488	1720708	0.353	0.319
<b>2014</b>	602	6121	5773	1743443	0.386	0.331
<b>2015</b>	609	6283	6364	1853859	0.372	0.343
<b>2016</b>	587	6388	7397	1913954	0.364	0.386

Source: Own elaboration. SRI database and Superintendency of Companies.

**Table 7. Guayas unemployment rate and GVA**

	Unemployment	GVA
<b>2012</b>	5.5%	20439.78
<b>2013</b>	5.4%	22763.86
<b>2014</b>	4.6%	24749.66
<b>2015</b>	5.2%	24409.21
<b>2016</b>	6.4%	24970.22

Source: Own elaboration. SRI database and Superintendency of Companies.

Table 6 shows the percentages related to the TEA and Established Companies of the study, as well as the number of New, Established and PEA companies of Guayas, which were used for the calculation. The TEA of the strategic sectors of the province under study presents indexes higher than the Rate of Established Enterprises (Table 6), with the exception of 2016. This information is corroborated by the report of the GEM Ecuador 2016 (2017), which mentions that Ecuador is characterized as a country with high levels of entrepreneurship, whose TEA is one of the highest in the region, and this in turn, is higher than the Rate of Established Enterprises for the province of Guayas. Conversely, Table 7 presents the evolution of unemployment and GVA of Guayas for the years of the study.

**Table 8. Correlation Matrix**

	VAB	Unemployment	Established	TEA
<b>TEA</b>	0.9475	- 0.2735	0.7014	1
Established	0.8765	0.4712	1	
Unemployment	- 0.0111	1		
<b>GVA</b>	1			

Source: Gretl Software. Own elaboration.

Table 8 shows the correlations of all variables considered in the study. It is noted that TEA is strongly related to GVA (0.9475) and Established Enterprises (0.7014). In turn, the correlation between the GVA and the established companies is positive (0.8765).

**Table 9. Normal contrast**

	Shapiro-Wilk		
	Statistics	gl	Sig.
<b>TEA</b>	0.859	5	0.224
Established	0.984	5	0.955
Unemployment	0.955	5	0.772
<b>VAB</b>	0.843	5	0.174

Source: SPSS Software. Own elaboration.

Table 9 shows the results of the Shapiro-Wilk test, which allows to estimate whether the variables have a normal distribution. The study was conducted for the different study variables, and in all cases it can be seen that the p-value is higher than 5%, determining that the data for each of the variables follow a normal distribution.

Table 10 lists the results of the first regression model that measures the impact of TEA and the Rate of Established Enterprises on the economic growth. While Table 11 shows the results of the second econometric model, where the impact of the Unemployment Rate and the Established Enterprises Rate is measured in the TEA.

**Table 10. Economic growth based on TEA and the Rate of Established Enterprises**

	Coefficient	Typical Desv.	Statistic t	P-value	
Const	14.7465	0.404546	36.4520	0.0008	***
l TEA	0.526539	0.105696	4.9816	0.0380	**
l Established	0.29977	0.0934246	3.2087	0.0849	*
Corrected R-squared		0.970754			
P value (F)		0.014623			
Normality contrast of the residues: Null hypothesis: errors are normally distributed Jarque-Bera contrasts = 1.22017, with p value = 0.543306					

Source: Gretl Software. Own elaboration

Table 10 indicates that the TEA variable has a probability value lower than the statistical significance level of 5% (0.0380), showing an incidence ratio of this variable on the GVA. The ratio of these variables is directly proportional, i.e., for each percentage point that TEA increases, the GVA will increase by 0.52 percentage points. It is also observed that the probability value of the descriptor estimator of the Established Enterprises Rate variable is close to the significance level of 5% (0.0849).

In addition, it can be observed that the relationship between the Established Enterprises Rate and the GVA is directly proportional, for each percentage point that the Established Enterprises Rate increases, the GVA will increase by 0.30 percentage points.

The p-value of the Fisher statistic is lower than 5% (0.01462), i.e. both the TEA and the Established Enterprises Rate are determined to have a collective impact on the GVA. The determination coefficient is 0.9707, showing that the TEA and the Rate of Established Enterprises explain 97.07% of the GVA. The logarithmic regression model is ideal, because it has a linear relationship and its residues are normally distributed. No nonlinearity contrast was performed, because the model is logarithmic. The normality test of the residuals indicates a non-significant p-value, being higher than 5% (0.5433), determining that errors follow a normal distribution; i.e., even though the number of observations is reduced, the estimators are reliable for making predictions and checking relationship hypotheses.

**Table 11. TEA based on Unemployment Rate and Established Business Rate**

	Coefficient	Typical Dev.	t Statistic	P-value	
Const	0.00267501	0.000486464	5.4989	0.0315	**
Unemployment	-0.0425209	0.00866271	-4.9085	0.0391	**
Established	0.95748	0.14191	6.7471	0.0213	**
Corrected R-squared		0.922128			
P value (from F)		0.038936			
Nonlinearity contrasts (logarithms) -					
Null hypothesis: the ratio is linear					
with p-value = 0.082085					
Contrast of Normality of Residues: Null hypothesis: Errors are normally distributed Jarque-Bera Contrasts = 1.41296, with p value = 0.493378					

Source: Gretl Software. Own elaboration

Table 11 shows that the probability value of the parameter corresponding to the independent unemployment variable is lower than the statistical significance level of 5% (0.0391), showing an impact ratio of this variable on TEA. It can be observed that the relationship between TEA and unemployment is inversely proportional due to the negative sign of the estimator, which means that at a lower unemployment the TEA will increase by 0.04 percentage points. It was also seen that the probability value of the descriptor estimator of the Established Enterprises Rate variable is lower than the significance level of 5% (0.0213), which means that this indicator affects the TEA. The relationship between these variables is directly proportional; for each percentage point that the Established Enterprises Rate increases, the TEA will increase by 0.95 percentage points. The p-value of the Fisher statistic is less than 5% (0.03894), hence it is determined that both unemployment and the Established Enterprise Rate have a collective impact on the TEA. The Determination Coefficient was 0.9221, which shows that unemployment and the Rate of Established Enterprises explain 92.21% on the TEA.

The linear regression model is ideal because it has a linear relationship and its residues are normally distributed. The nonlinearity contrast showed a p-value higher than the statistical significance level of 5% (0.0821), assuming that the relationship between unemployment, the Established Enterprise Rate and the TEA has a linear relationship; i.e., it is not necessary to estimate logarithms to perform the regression. The residue normality test showed a non-significant p-value higher than 5% (0.4933), indicating that errors follow a normal distribution; i.e., even though the sample is small, the estimators will be reliable for making predictions and checking relationship hypotheses.

#### 4. Discussion and Conclusions

The results obtained in Table 10, which establish the relationship and positive impact of the TEA and the Rate of Established Companies in economic growth and measu-

red by the GVA, is consistent with the study of Lupiáñez, Priede and López (2014), in which they conclude that there is a positive relationship between the activated entrepreneur and the economic growth, affirming entrepreneurship as a base of the economic growth. Similarly, the result of Galindo and Méndez (2012) is confirmed with this research, where entrepreneurs have a positive effect on the economic growth measured by the GVA, and it should be noted that the regressions used by these authors added a variable on innovation that also explains the economic growth along with the entrepreneurial activity. The results presented in Table 10 also agree with the research of Stam, Suddle, Hessels and Stel (2006); Acs, Audretsch, Braunerhjelm and Carlsson (2012) which indicate that the entrepreneurial activity has a positive and systematic impact on the economic growth, as measured by the variation in the GDP per capita. The latter is different compared to the results of Jaén, Fernández and Liñán (2013), which show an inverse relationship between TEA on the economic growth.

Table 11 shows that the TEA is explained by the Unemployment Rate and the Established Enterprises Rate. On the other hand, Zuniga *et al.* (2015) found evidence of this relationship for a year of study, showing that changes in unemployment have a positive impact on entrepreneurship, known as a shelter effect, according to these authors, i.e., an undertaking created by necessity, where unemployment has a directly proportional relationship with entrepreneurship.

In short, the unemployment and TEA variables are related. The difference of the results in the various studies occurs in the type of relationship, i.e., in some works the correlation is positive and in others it is negative. This study identified an inverse relationship between these variables, indicating that each decreasing unit of unemployment influences an increase of approximately 4% of TEA. In other words, a reduction in unemployment leads to an increase in entrepreneurial activity. In this study, self-employment measured by TEA means an increase in employment in the region related to an era of expansion of the Ecuadorian economy, recorded in much of the study period used, and gives an account of the creation of entrepreneurship opportunity for the improvement and not for a need for employment, and even people who, while employed, have decided to undertake in response to market opportunities or to have the necessary skills to do so (Pinillos Costa, 2011) or as Zuniga, Soza, and Soria (2015) call the opportunity effect.

This situation is complemented by the positive relationship found with the variable established companies and TEA, i.e. the number of established companies increases in the expansionary economic cycle leading to the strengthening of business clusters and a healthy entrepreneurial ecosystem that accommodates entrepreneurship by opportunity.

There is cluster specialization in Ecuador's Guayas province, specifically the textile and clothing and processed food and beverage sectors, which is evidenced by the high entry rates of nascent and new companies, as well as by the rates of established companies. Traditional strategic sectors such as ship making, steel and metalworking maintain a contribution of new and nascent companies to the economy of the province, and the software, hardware development, and pharmaceuticals to a lesser extent.

The contraction of the economy was detected by the new and nascent inflows of the different strategic sectors, identifying high rates of turbulence in 2014.

The inverse relationship between unemployment and early entrepreneurship identifies that companies created in the strategic sectors of Guayas would arise from the opportunity for improvement.

Finally, the evidence presented confirms the idea that early entrepreneurship and established companies drive the economic growth of the province of Guayas as a harmonious whole that promotes the new and maintains the existing companies, so that it converts this province into an economic development area of Ecuador.

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