



Influence of the macroeconomic environment on business creation in Peru

Influencia del entorno macroeconómico en la creación de empresas en Perú

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Abstract

In a scenario of large regional differences in the rate of business creation within Peru, the objective of this study was to specify the variables of the macroeconomic environment that influence business creation at the level of Peruvian departments. In order to do this, econometric regressions were performed with balanced panel data using three methods: ordinary least squares, the fixed effects model, and the random effects model. Through the F test and the Hausman test, the random effects model was chosen as the best. According to this model, business creation is directly influenced by gross domestic product, labor employment, financial credit and public investment spending. In this way, we determined the importance of macroeconomics in the microeconomic context of business creation in Peru.

JEL Code: L26, M13, M21

Keywords: business creation; business entrepreneurship; macroeconomic context; peruvian departments

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Resumen

En un escenario de grandes diferencias departamentales en la tasa de creación de empresas al interior del Perú, el objetivo del presente estudio consistió en especificar las variables del entorno macroeconómico que influyen en la creación de empresas a nivel de los departamentos peruanos. Para ello, se efectuaron regresiones econométricas con datos de panel balanceado utilizando tres métodos: mínimos cuadrados ordinarios, el modelo de efectos fijos y el modelo de efectos aleatorios. Mediante la prueba F y el Test de Hausman se eligió al modelo de efectos aleatorios como el mejor. Según dicho modelo, la creación de empresas está influenciada, en sentido positivo, por el producto interno bruto, el empleo laboral, el crédito financiero y el gasto de inversión pública. De esta manera se llegó a determinar la importancia que tiene el contexto macroeconómico en el proceso microeconómico de emprender nuevas empresas o negocios en el Perú.

Código JEL: L26, M13, M21

Palabras clave: creación de empresas; emprendimiento de empresas; contexto macroeconómico; departamentos peruanos

Introduction

Peru is one of the countries with the highest levels of business entrepreneurship in the world, ranking second in the rate of start-up entrepreneurship (Sérida, Alzamora, Guerrero, Borda, & Morales, 2020). In this scenario, large internal differences are observed among the 24 departments that comprise the Peruvian nation. For example, according to the National Institute of Statistics and Informatics (INEI, 2020) (Spanish: Instituto Nacional de Estadística e Informática), in the third quarter of 2020, 4 771 and 4 588 companies were created in the departments of Arequipa and La Libertad, and only 317 and 290 in Huancavelica and Moquegua, respectively. This picture is relatively similar to the large regional differences found in studies carried out for other countries by Acs and Armington (2004) and Storey and Johnson (1987), among others.

The decision to start a company or business depends on various factors or variables. Such factors can be classified into two groups, environmental and personal factors (García, Martínez, & Fernández, 2007), with the environment being a very determining factor (García, Zerón, & Sánchez, 2018; Álvarez & Urbano, 2012; Wennekers, Uhlaner, & Thurik, 2002). Nonetheless, macroeconomic aspects related to the environment and their fluctuations are considered decisive in determining the institutional economic framework in which a company is created and operates (Nitu, Feder, & Munteanu, 2017; Sipos & Badulescu, 2015; Lewis, 2006; Audretsch & Acs, 1994).

Among the explanatory macroeconomic variables usually considered in studies on new venture entrepreneurship are gross domestic product (GDP), GDP growth rate, inflation rate, unemployment rate,

financial system credit, interest rate, foreign trade, and taxes (Loukil, 2019; Arin, Zengyu, Minniti, Menon, & Reich, 2014; Makosso, 2013; Misra, Memili, Welsh, & Sarkar, 2012).

Given that regional or departmental factors also influence the entry of companies into the market within a country (Cheratian, Goltabar, & Calá, 2019), and in a scenario in which Peru shows large departmental differences in entrepreneurship, it is necessary to reflect on whether these differences are related to the evolution of variables in the departmental macroeconomic context. Therefore, given that there is no study on the subject for Peru, this paper aims to fill this gap, so the objective is to identify the variables of the macroeconomic environment that influence business creation at the departmental level.

Econometric regressions of balanced panel data with series corresponding to the 24 Peruvian departments between 2014 and 2019 are carried out to achieve this goal. Statistical information on business creation was collected from the "Business Demographics" Quarterly Bulletins of the National Institute of Statistics and Informatics (INEI).

This paper is divided into five sections, including this introduction. The second section systematizes the empirical literature and formulates a model that relates the macroeconomic environment to the microeconomic decision to create a company; the third section presents the methodological aspect; the fourth section shows the results and the corresponding discussion; finally, the fifth section presents the conclusions.

Literature review and theoretical model

The three most important economic indicators that correspond to the field of macroeconomics are GDP, the consumer price index or inflation, and employment or unemployment in the labor market; while the main instruments of macroeconomic policy are monetary, fiscal, and exchange rate policy (Mankiw, 2014). Therefore, given that monetary policy includes financial credit, fiscal policy, government spending, and taxes, and exchange rate policy is related to foreign trade, the analysis of the influence of the macroeconomic environment on business creation must involve this set of variables.

Literature review

The evolution of GDP determines the behavior of personal income and economic activity. Thus, a higher level of GDP dynamizes aggregate demand and the domestic market, generating opportunities to establish new companies (Fahim & Naamane, 2021; Loukil, 2019; Morales & Rodil, 2015; Kangasharju, 2000). Thus, in situations of economic growth and regions with larger GDP sizes, the rate of business creation increases, while in periods of economic contraction or small regions, closures or lower rates of

entrepreneurship occur. Thus, GDP cycles have direct effects on business entrepreneurship activity, configuring a procyclical behavior (Scholman, Stel, & Thurik, 2015; Mata, 1996).

Inflation tends to generate instability and uncertainty in a way that discourages investment and therefore business creation (Parker, 2009). When the inflation rate surpasses a certain threshold, it tends to negatively affect the financial depth, implying a lower availability of bank credit for investment and implementation of new businesses (Rousseau & Wachtel, 2002).

The level of labor employment is part of the wage bill and is a major source of aggregate demand, so its evolution also conditions business activity. In periods of rising employment levels or falling unemployment rates, aggregate demand and the market expand, thus increasing opportunities for new business start-ups. Higher labor unemployment discourages business entrepreneurship due to market contraction, but it can also pressure and stimulate people to create businesses out of necessity (Thurik, Carree, Stel, & Audretsch, 2008).

Financial products in general, and credit in particular, have positive and significant effects on the entrepreneurship process because they enable the execution of new investment and business projects (Charfeddine & Zaouali, 2022; Arif & Khan, 2019; Wujung & Fonchamnyo, 2016; Llussá, 2009). In turn, greater credit accessibility is important for small business creation (Aghion, Fally, & Scarpetta, 2007). Additionally, credit directed to consumer financing generates a favorable environment for entrepreneurship by increasing consumer spending and, consequently, aggregate demand (Asik, 2018; Holmes, 2010).

Fiscal policies influence the size of the market and the entry of firms into it, thus effectively stimulating entrepreneurial activity (Kneller & McGowan, 2011; Castaño, Méndez, & Galindo, 2016). Accordingly, government spending on physical infrastructure, highways, and roads acts as a complementary and contributing factor to greater private investment (Ramirez, 2000), reduces transportation costs, and expands accessibility to other regional markets, creating opportunities for new profitable businesses (Ghani, Kerr, & O'Connell, 2014; Audretsch, Heger, & Veith, 2015). Likewise, government investment can directly influence aggregate demand and thus the presence of new companies in the market (Abiad, Furceri, & Topalova, 2015).

Globalization and foreign trade generate opportunities and threats for business creation (Martinelli, 2004). Greater trade openness, on the one hand, allows access to the world market for potentially exporting sectors, thus contributing to the establishment of new companies; on the other hand, it implies an increase in imports of goods and greater competition in the domestic market, inducing the closure of domestic companies (Mankiw, 2014; Salman, Friedrichs, & Shukur, 2009; Mudavanhu, Bindu, Lloyd, & Muchabaiwa, 2011).

As a summary, Table 1 presents a set of relevant empirical studies on the relation between the aforementioned macroeconomic variables and business creation, specifying with a (+) or (-) sign those that found a positive or negative relation, respectively.

Table 1

Empirical studies on the influence of macroeconomic variables on the creation of companies

Macroeconomic variable	Authors
GDP per capita	Cancelo, Díaz, and Vázquez (2022) (+), Tleuberdinova <i>et al.</i> (2021) (+); Arin <i>et al.</i> (2014) (-); Winata (2008) (-); Álvarez and Urbano (2008) (-); Sipos and Badulescu (2015) (+); Salman (2014) (+); Martínez (2013) (+)
Inflation	Mohammadi and Rostami (2021) (-); Arin <i>et al.</i> (2014) (-); Winata (2008) (-); Sipos and Badulescu (2015) (+); Brás and Soukiazis (2018) (+)
Unemployment	Sweidan (2022) (-); Ersin and Karakece (2020) (-); Arin <i>et al.</i> (2014) (-); Winata (2008) (-); Álvarez and Urbano (2008) (-); Sipos and Badulescu (2015) (-); Ritsila and Tervo (2002) (-); Fuentelsaz, González, Maícas, and Montero (2015) (-); Parajuli and Haynes (2017) (-); Nekolová, Novosák, and Háyek (2016) (-); Gaygisiz and Yesim (2003) (-); Ali and Moradi (2013) (-); Fotopoulos (2014) (-)
Financial credit	Ghosh (2022) (+); Dutta and Meierrieks (2021) (+); Koloma (2021) (+); Del Olmo and Crecente (2021) (+); Morales and Rodil (2015) (+); Hartwell (2014) (+); Naudé, Gries, Wood, and Méintjies (2008) (+)
Public investment	Brás and Soukiazis (2018) (-); Gaygisiz and Yesim (2003) (-)
Foreign trade	Fahim and Naamane (2021) (-); Hartwell (2014) (+)

Source: created by the author

As shown in Table 1, at the empirical level, some studies found a direct relation between the level of GDP per capita and business creation, while others found an inverse relation. Nonetheless, Ali and Moradi (2013), Zhou and Park (2020), and Henning and Bach (2020), using the growth rate of GDP per capita as an indicator, only found a positive association between this variable and business entrepreneurship.

The relation between GDP and entrepreneurship is not necessarily linear. For example, in a study involving 36 countries, Wennekens, Stel, Thurik, and Reynolds (2005) specified that the relation between per capita income and the rate of start-up entrepreneurship was slightly U-shaped: as per capita income increased, the rate of entrepreneurship initially declined, then tended to increase.

All the empirical research reviewed in Table 1 shows an inverse relation between business creation and the labor unemployment rate. In the same vein, in terms of labor employment rate, studies by Méndez, Galindo, and Castaño (2020), Calá, Manjón, and Arauzo (2014), Brixy and Grotz (2006), among others, determine a positive relation between employment and entrepreneurship.

According to empirical research, credit from the financial system—usually expressed as a percentage of GDP—is shown to have a positive effect on the formation of new companies.

Theoretical model

Following the model formulated by Minniti and Bygrave (2001) and León (2017), this section presents a theoretical model that specifies the causal relation between the factors of the macroeconomic context with the microeconomic decision to start a business.

In principle, it is assumed that the individual who establishes a business is a rational economic agent seeking to achieve the maximum profit or welfare over time. This profit depends on a basket of goods and services they can acquire and consume. The quantity of goods and services they acquire is conditioned by the monetary income received (I). For a business entrepreneur, the monetary income received depends on the flow of benefits or profits obtained (π).

There are opportunity-based entrepreneurship and necessity-based entrepreneurship. In the first case, the entrepreneur usually opts for entrepreneurial activity because the flow of entrepreneurial benefits they expect to receive over time (t) is greater than the flow of wage remuneration (w) that they would alternatively receive as a dependent worker, and this wage remuneration represents the opportunity cost for the entrepreneur. Formally:

$$\int_0^T I(\pi(t))e^{-rt} dt > \int_0^T I(w(t))e^{-rt} dt \quad (1)$$

Where, r represents the discount rate and 0 to T years the period of benefit realization.

In the case of an unemployed individual who starts a business out of necessity, the opportunity cost would be close to zero so that the following formal condition would be met:

$$\int_0^T I(\pi(t))e^{-rt} dt > 0 \quad (2)$$

The total flow of benefits obtained by the entrepreneur is related to the number of businesses or companies created, so that at time t, one has:

$$\pi(t) = \sum_{i=1}^n \pi_i(t) = \pi_1(t) + \pi_2(t) + \pi_3(t) + \dots \dots \pi_n(t) \quad (3)$$

Where n is the number of companies created, such that π_i represents the profit generated by each venture. It is assumed that the entrepreneur maximizes profits, i.e., they try to obtain the maximum profit in each company created.

At time (t) , the opportunities for business creation, and consequently, the possibility of making profits, are directly related to the evolution of economic activity (AE) (Khyareh, Khairandish, & Torabi, 2018). In turn, the level and variation of such economic activity are influenced directly by macroeconomic factors (FM) (Mendoza, Herrera, & Arteaga, 2003). Consequently, increases in the level of macroeconomic aggregates (e.g., GDP and employment) and expansionary fiscal and monetary policies imply increases in the level of transactions, aggregate demand, and the sale of all types of goods and services in general, aiding the entry of new companies into the market and making it possible to take advantage of the profits that such ventures could yield. Formally:

$$\sum_{i=1}^n \pi_i(t) = f(AE(t)) \tag{4}$$

$$AE(t) = g(FM(t)) \tag{5}$$

Business creation tends to be procyclical; that is, in periods of expansive macroeconomic policies and increases in the level of economic activity there is a higher rate of business creation, while in periods of contractionary macroeconomic policies and stagnation of economic activity, not only does the rate of new business creation decrease but also the business mortality rate rises.

In summary, according to the theoretical model, the variables of the macroeconomic environment influence the microeconomic decision to form a company or business. A favorable evolution of macroeconomic variables increases aggregate demand and economic activity, thus expanding the market size and producing opportunities to implement new businesses. Within this framework, entrepreneurs establish companies trying to obtain the maximum profit in each constituted business. These profits represent the source of the entrepreneur's monetary income so that they finance the acquisition of consumer goods and services, trying to achieve the maximum level of welfare. The business entrepreneur is an economic agent that carries out a double maximization: they maximize profits as an entrepreneur and welfare as a consumer. Therefore, the business entrepreneur is an individual who tries to achieve better standards of living by generating higher levels of income through entrepreneurial activity.

Methodology

Statistical regressions of the following econometric balanced panel data model were performed to identify the macroeconomic environment variables that influence business creation at the departmental level:

$$Y_{jt} = a_j + b_{ijt}X_{ijt} + u_{jt} \quad (6)$$

Where: Y_{jt} is the business creation rate in department j in period t ; a_j and b_{ijt} , the parameters to be estimated; X_{ijt} , the macroeconomic variable i of department j in period t , with j equal to 24 Peruvian departments and t , six years comprising the period 2014-2019.

It was decided to use the panel data model method in this study because, unlike the time series or cross-sectional analysis, it has the advantage of increasing the number of observations to work with, capturing the heterogeneity existing among departments or over time, and reducing the potential problem of collinearity between the macroeconomic variables considered, so that the estimated parameters are much more precise.

Table 2 specifies the operationalized variables of the econometric model formulated:

Table 2
Operationalization of departmental variables

Variables	Description
Dependent:	
Business creation rate	Number of companies or businesses created in a year per 10 000 inhabitants
Independent:	
GDP per capita	Gross domestic product per capita in constant soles during 2007
Inflation	Percentage change in the consumer price index
Employment	Percentage of the economically active labor force (EAP) adequately employed
Financial credit	Financial system credit to the private sector as a percentage of departmental GDP
Public investment	Government investment spending (central, regional, and local government) per capita in constant soles during 2007
Foreign trade	Exports of goods to the rest of the world as a percentage of the department's GDP

Source: created by the author

The model did not consider relevant macroeconomic variables such as interest rate, exchange rate, wages, or taxes. This is because it assumes an internal economy with perfect mobility of financial capital and production factors, so macro prices (interest rate, exchange rate, and wages) are approximately

similar in all departments. In the case of taxes, they had a high correlation with the financial system's credit in such a way that they presented a potential collinearity problem.

The information on the business creation rate by department was prepared based on INEI's Quarterly Bulletins "Business Demographics" (2020). These Bulletins contain the number of new businesses registered in the Single Taxpayers Registry of the National Superintendence of Customs and Tax Administration (SUNAT) (Spanish: Superintendencia Nacional de Aduanas y de Administración Tributaria). Likewise, the following institutions were used as sources for the preparation of the statistical series referring to macroeconomic variables: INEI (GDP, employment), Central Reserve Bank of Peru (inflation, government investment spending), Superintendence of Banking, Insurance and AFP (financial system credit), and the Ministry of Foreign Trade and Tourism (exports of goods).

There are three statistical regression methods with balanced panel data: ordinary least squares (OLS), fixed effects model, and random effects model (Wooldridge, 2015). Therefore, the corresponding regressions were performed using these three methods. These regressions made it possible to determine the degree and direction in which macroeconomic variables influence business creation. In turn, the t statistic was used to identify the statistically significant explanatory variables, i.e., those factors of the macroeconomic environment that specifically influence the creation of new companies.

Since three slightly different results were found for the three methods used, the F test determined that the fixed effects model was better than the ordinary least squares model. Subsequently, Hausman's test showed that the random effects model was better than the fixed effects model.

Before performing the econometric regressions, it was evaluated whether or not the variables were stationary series. At levels, they were found to be mostly non-stationary or had unit roots. As seen in Table 3, only the business creation rate is shown to be stationary in the 4 indicators used because the probabilities are less than 0.05 in all of them.

Table 3
 Unit root tests of variables at levels: p-value

	Levin, Lin, & Chu t	Im, Pesaran, and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
Creation rate	0.0000	0.0178	0.0009	0.0000
GDP per capita	0.0000	0.9867	0.9980	0.9477
Inflation	0.0017	0.1578	0.0656	0.0069
Employment	0.0000	0.5253	0.3732	0.0169
Financial credit	0.0000	0.8186	0.5452	0.0561
Public investment	0.0000	0.1161	0.0583	0.0005
Foreign trade	0.0000	0.6029	0.5062	0.2108

Source: created by the author

The stationarity of the variables in their first differences was evaluated; the results are shown in Table 4. It can be seen that the series in their first differences are predominantly stationary, the exceptions being GDP per capita and foreign trade according to the ADF Fisher Chi-square indicator. From these results, it can be concluded that the series of the model in their first differences do not have a unit root and that they are integrated of order I(1).

Table 4
 Unit root tests of variables in first differences: p-value

	Levin, Lin, & Chu t	Im, Pesaran, and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
Creation rate	0.0000	0.0000	0.0000	0.0000
GDP per capita	0.0000	0.0141	0.1441	0.0474
Inflation	0.0000	0.0000	0.0000	0.0000
Employment	0.0000	0.0000	0.0021	0.0001
Financial credit	0.0000	0.0000	0.0002	0.0000
Public investment	0.0000	0.0026	0.0400	0.0070
Foreign trade	0.0000	0.0041	0.1697	0.0355

Source: created by the author

Results and discussion

Table 5 shows information regarding the level of the business creation rate in Peruvian departments for the years 2014 and 2019. The following aspects can be highlighted:

Table 5
 Entrepreneurship rate: number of companies created per 10 000 inhabitants

Department	2014	Department	2019
Madre de Dios	193.1	Madre de Dios	130.5
Arequipa	131.5	Lima	116.5
Lima	115.7	Arequipa	115.3
Tacna	107.9	Tacna	77.7
Ica	99.7	Cusco	93.7
Cusco	82.5	La Libertad	90.0
La Libertad	80.8	Moquegua	89.1
Tumbes	80.0	Ucayali	84.6
Moquegua	73.3	Tumbes	84.4
Apurímac	73.2	Junín	84.1
Lambayeque	72.5	Apurímac	84.1
Junín	72.5	Lambayeque	79.3
Ucayali	72.4	Ica	79.1
Ayacucho	70.5	Ancash	78.9
Ancash	64.2	Pasco	74.6
San Martín	59.7	San Martín	70.5
Piura	58.5	Huánuco	68.0

Puno	55.7	Puno	63.9
Pasco	49.7	Ayacucho	61.8
Loreto	47.2	Piura	60.5
Huánuco	42.0	Huancavelica	60.4
Cajamarca	37.7	Cajamarca	56.1
Amazonas	35.0	Amazonas	54.7
Huancavelica	27.7	Loreto	51.6

Source: created by the author with data from INEI (2020)

First: There are large departmental differences in the rates of business entrepreneurship. Second: In the entire study period, the department of Madre de Dios shows the highest rate. Third: The departments with the highest rate are located in the Coast region, and with the lowest rate in the Highlands or Jungle: in 2019, among the 12 departments with the highest rate, 7 are located in the Coast region (Lima, Arequipa, Tacna, La Libertad, Moquegua, Tumbes, and Lambayeque), and among the 12 departments with the lowest rate, 9 are in the Highlands or Jungle (Pasco, San Martín, Huánuco, Puno, Ayacucho, Huancavelica, Cajamarca, Amazonas, and Loreto). Fourth: In the study period, the group of the 12 departments with the highest or lowest entrepreneurship rate remained relatively constant, except for the department of Ica, which fell from 6th place in 2014 to 13th place in 2019. Fifth: Compared to 2014, in 2019 the departments with the highest rates experienced a downward trend in their rate, while those with the lowest rates experienced an upward trend; consequently, the departmental gaps in entrepreneurship rates were partially reduced.

Table 6 shows that the degrees of correlation between the macroeconomic variables of the model—considered as independent variables—are relatively low (less than 80%), indicating a potential absence of multicollinearity problems.

Table 6
 Correlation coefficients between independent macroeconomic variables (%)

	GDP per capita	Inflation	Employment	Financial credit	Public investment	Foreign trade
GDP per capita	1.00					
Inflation	-3.66	1.00				
Employment	54.19	-1.87	1.00			
Financial credit	3.02	2.82	46.27	1.00		
Public investment	32.30	-13.76	-7.66	-51.19	1.00	
Foreign trade	64.74	3.73	17.85	-20.89	11.96	1.00

Source: created by the author

Since the inflation, employment, financial credit, and foreign trade variables are expressed in percentage rates, and business creation, GDP per capita, and public investment per capita are expressed in absolute amounts, these last three variables were calculated in logarithms for the purposes of the

econometric regressions. The results of these regressions are presented in Table 7, which shows that financial credit is the only statistically significant variable in all regressions.

Table 7

Results of econometric regressions with panel data; dependent variable: logarithm of business creation rate

Macroeconomic Variables	OLS	Fixed Effects	Random effects
GDP per capita (in Log.)	-0.008829 (0.8845)	0.453610 (0.0002)	0.293203 (0.0010)
Inflation	-1.294912 (0.3484)	-0.959250 (0.3184)	-0.873814 (0.3681)
Employment	1.894089 (0.0000)	-0.156170 (0.7149)	0.861815 (0.0166)
Financial credit	0.927445 (0.0000)	2.304132 (0.0009)	1.133064 (0.0011)
Public investment (in Log.)	0.190249 (0.0000)	0.071483 (0.1234)	0.084979 (0.0602)
Foreign trade	0.128580 (0.2788)	-0.037401 (0.7828)	-0.059839 (0.6428)
Intercept	3.290926 (0.0000)	-0.389977 (0.7192)	0.909350 (0.2172)
R-squared	74.12%	92.63%	41.57%
F	65.3	49.4	16.2
Durbin-Watson	0.68	2.09	1.62

The p-values are shown in parentheses

Source: created by the author

Since the three regressions yielded slightly different results, F and Hausman's tests were applied to determine the most consistent model. In this regard, Table 8 shows that the probabilities of the statistics in the F test are less than 0.05, which indicates that between the OLS model and the fixed effects model, the latter is the best. Meanwhile, according to Hausman's test, the random effects model is shown to be better than the fixed effects model because the probability of the statistic is greater than 0.05. Therefore, based on these tests, it is concluded that the random effects model is the best and most definitive of the three results.

Table 8
 Best model determination test

F Test			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	12.457392	-23 114	0.0000
Cross-section Chi-square	180.945399	23	0.0000
Hausman's test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.0000	6	1.0000

Source: created by the author

According to the random effects model results, the macroeconomic variables that show statistical significance and influence business creation at the Peruvian department level are GDP per capita, employment, financial credit, and public investment. Thus, the positive sign of the estimated parameters indicates that the rate of business creation tends to be higher to the extent that GDP per capita, the percentage of the labor force with adequate employment, financial system credit as a percentage of GDP, and government investment spending per capita are also higher.

All regressions used the covariance matrix consistent with the problems of heteroscedasticity and autocorrelation because they were performed with two methods of the EViews statistical program: White diagonal standard errors and covariance, and Cross-section weights (PCSE) standard errors and covariance, obtaining in both cases the same statistical significance as shown in Table 7.

Figure 1 shows that the residuals of the regression of the final model follow a normal distribution, given that the Jarque-Bera statistic has a value lower than 5.9. This indicates that the random effects model chosen for the analysis has a strong goodness of fit.

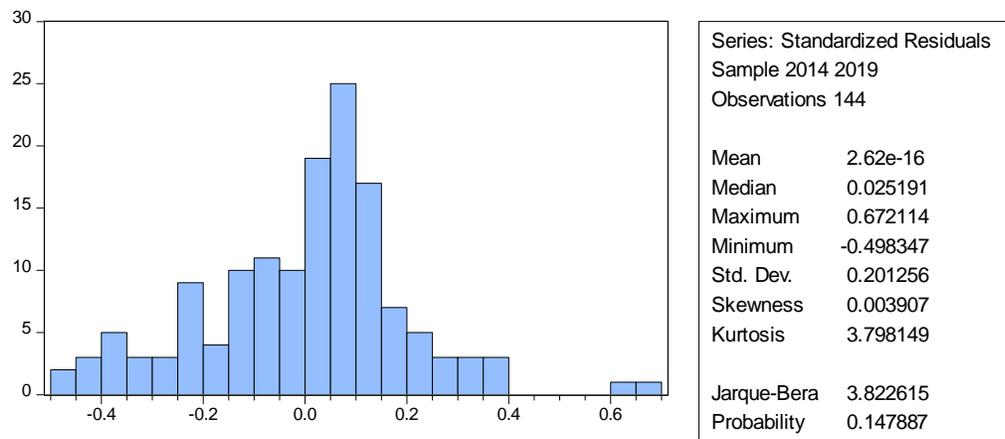


Figure 1. Normality test
 Source: created by the author

The unit root test was applied to the residuals of the regression of the final model to determine whether there is an equilibrium relation in the long run between the business creation rate and the macroeconomic variables studied. In this regard, Table 9 shows that the probability of the statistic is less than 0.05 in the four methods used. This indicates that the residuals do not have a unit root, so it can be affirmed that the business creation rate is cointegrated or that it maintains an equilibrium relation in the long run with the macroeconomic variables considered in the study and that the econometric regression carried out is not spurious.

Table 9
Unit root tests of residuals

Method	Statistic	Prob.
Levin, Lin, and Chu t	-12.0089	0.0000
Im, Pesaran, and Shin W-stat	-3.45755	0.0003
ADF - Fisher Chi-square	97.9724	0.0000
PP - Fisher Chi-square	136.741	0.0000

Source: created by the author

According to the result of the random effects model, the rate of business creation directly relates to GDP per capita; that is, among Peruvian departments, the higher the GDP per capita, the higher the rate of business start-ups. Since GDP per capita determines people's income, a higher GDP implies higher aggregate demand and market size, which generates opportunities to establish new businesses or increase the size of existing ones.

The result corresponds with what is observed at the descriptive level. Thus, in 2019, the departments of Lima, Arequipa, and Tacna, which are among the top four with the highest rate of entrepreneurship, are also among the top five with the highest GDP per capita. Likewise, the department of Amazonas, which ranks second to last in the creation rate, is located in a similar place in the level of GDP per capita.

The positive causal association found in this study between business creation and GDP per capita is similar to that found by other research carried out internationally, such as by Cancelo, Diaz, and Vazquez (2022), Tleuberdinova, Shayekina, Salauatova, and Pratt (2021), Loukil (2019), Klapper, Amit, Mauro, and Delgado (2007), Dvouletý (2017), Salman (2014), and Makosso (2013), among others.

The size of the adequately employed labor force is another macroeconomic variable that influences the entry of new firms into the Peruvian market. Thus, according to this study, the higher the percentage of the labor force that is adequately employed, the higher the rate of business formation in a department. A greater number of adequately employed workers implies a greater market demand for goods and services. This greater demand is produced by the increase in the wage bill, that is, by the greater

number of usually formal wage earners and by the higher wages they receive as compared to those who are precariously employed. In this way, a greater number of adequately employed workers generates a favorable environment for establishing new companies through its positive impact on aggregate demand.

In 2019, consistent with the econometric findings, the four departments with the highest rate of business creation (Madre de Dios, Lima, Arequipa, and Tacna) were among the top five departments with the highest percentage of the working population with adequate employment. In turn, the three departments with the lowest percentage of adequately employed workers (Huancavelica, Cajamarca, and Amazonas) were among the four with the lowest rate of entrepreneurship.

The existence of a positive relation between business creation and employment in the labor market was also found at the international level by Méndez, Galindo, and Castaño (2020), Brás and Soukiazis (2018), and Calá, Manjón, and Arauzo (2014). Likewise, in terms of unemployment, the result found in the present study agrees with research carried out for other countries that found an inverse relation between the unemployment rate and entrepreneurship, such as the work of Sweidan (2022), Novejarque, Pisá, and López (2021), Parajuli and Haynes (2017), Arin et al. (2014), and Álvarez and Urbano (2008), among others.

Financial credit contributes positively to the creation of new companies: a Peruvian department tends to show a higher rate of business creation to the extent that the credit/GDP ratio is higher, i.e., as long as the relative magnitude of credit granted by the financial system to the private sector is greater. Higher credit, on the one hand, boosts consumer spending and market demand and, on the other hand, implies greater financing for investment projects, thus favorably impacting the business creation process.

In line with the econometric result found, in 2019 the Peruvian department with the highest credit/GDP coefficient (Lima) was in turn the department with the second highest rate of establishment of new businesses, and the department with the lowest coefficient (Huancavelica) was located in the group of departments with the lowest rate of entrepreneurship.

The positive influence of financial credit on business creation was also determined by studies carried out in other countries by Cao and Palacios (2021), Koloma (2021), Klapper et al. (2007), Makosso (2013), Morales and Rodil (2015), and León (2019), among others.

Government investment spending favors the formation of private companies in Peru. Thus, the positive relation found between public investment per capita and the business creation rate indicates that the higher the investment made by the government sector, the higher the formation of new businesses in Peruvian departments. This favorable effect is produced not only because such fiscal spending boosts aggregate demand but also because it raises departmental competitiveness as long as it is in infrastructure.

In line with the positive effect of public investment on the entry of new businesses into the market found by the present study, it was observed in 2019 that the department that ranked first in the rate

of business creation (Madre de Dios) was in turn the one that presented the highest public investment per capita. Therefore, it would seem that in Peru, public investment is complemented by private investment (Tenorio, 2015) and positively impacts economic growth (Palacios, 2018).

Finally, it is worth noting that the results found are in line with the theoretical model formulated, i.e., they confirm that the macroeconomic variables considered in the study (GDP, employment, credit from the financial system, and public investment) have a positive influence on the decision to start new businesses, basically through their favorable impact on economic activity, aggregate demand, and the size of the markets.

Conclusions

The macroeconomic environment influences entrepreneurship in Peru. Thus, the large differences observed in business creation rates at the level of Peruvian departments are explained by departmental macroeconomic variables.

The elements that form part of the field of macroeconomic theory and policy are economic aggregates and monetary, fiscal, and exchange rate policies. Therefore, this research analyzed the influence of the following departmental macroeconomic variables on business creation: GDP per capita, inflation, labor employment, financial credit, public investment per capita, and foreign trade.

The final result of the econometric regression with panel data of the random effects model indicates that the rate of business creation in a Peruvian department tends to be higher to the extent that the levels of GDP per capita of the percentage of the labor population adequately employed, of credit granted by the financial system as a percentage of GDP, and of government investment spending per capita, are higher. Inflation and foreign trade show no influence because their parameter estimates were statistically insignificant.

In this way, the relevance of the macroeconomic environment variables for the entrepreneurship of new companies and the differentiated creation rate at the level of the Peruvian departments is econometrically demonstrated.

Although the research made it possible to identify the macroeconomic variables that influence business creation, it is recommended to carry out additional studies incorporating factors or characteristics belonging to the companies and the entrepreneurs as explanatory variables to deepen knowledge and understanding of this stage of the business creation process. Likewise, given that the research was conducted at the department level, it is recommended to conduct research at the economic sector level.

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