IMPACT OF ECONOMIC GROWTH BY SECTOR ON INFORMAL EMPLOYMENT

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ABSTRACT: Objective: The main objective is to explain the impact of economic growth by agricultural, trade and services sectors on informal employment in Peru. Scope: With data from historical series, it was selected from the year 2014 to 2021, represented by a total of 96 monthly data on economic growth and informal employment. Results: The concrete linear regression result defines a significant impact of economic growth on informal employment, with coefficients consistent with economic theory and highly significant, demonstrating robustness in explaining the goodness of fit of 85.45%. The Breusch-Godfrey test confirms the non-existence of autocorrelation in the estimation of the models, at a significance level of 5% for the F test, the null hypothesis is rejected and the alternative hypothesis is accepted. Conclusion: Economic growth at the level of the agricultural sector, manufacturing, services and commerce has an impact on informal employment.

KEYWORDS: Economic growth, informal employment, linear regression, trade sector, agricultural sector, manufacturing sector, service sector, Breusch-Godfrey test.

RESUMO: Objetivo: O objetivo principal é explicar o impacto do crescimento econômico dos setores agrícola, comercial e de serviços sobre o emprego informal no Peru. Escopo: Com dados de séries históricas, foram selecionados do ano de 2014 a 2021, representados por um total de 96 dados mensais sobre crescimento econômico e emprego informal. Resultados: O resultado concreto da regressão linear

define um impacto significativo do crescimento económico no emprego informal, com coeficientes consistentes com a teoria económica e altamente significativos, demonstrando robustez na explicação da qualidade de ajuste de 85,45%. O teste Breusch-Godfrey confirma a inexistência de autocorrelação na estimação dos modelos, ao nível de significância de 5% para o teste F, a hipótese nula é rejeitada e a hipótese alternativa é aceita. Conclusão: O crescimento económico ao nível do sector agrícola, da indústria transformadora, dos serviços e do comércio tem um impacto no emprego informal.
PALAVRAS-CHAVE: Crescimento
económico, emprego informal, regressão linear, setor comercial, setor agrícola, setor manufatureiro, setor de serviços, teste de Breusch-Godfrey.

1 I INTRODUCTION

The informal sector is understood as the productive units that are not formally constituted in the social environment (National Institute of Statistics and Informatics, 2006). Until the year 2018, informality in Peru added a total of 7 million 480 thousand productive units, constituting 18% of the Gross Domestic Product. The role assumed by the aforementioned informal sector in generating income for households, generating production and jobs is urgent. Informal employment meets the conditions of salaried without social security, unpaid workers of a formal nature, productive unit.

Informal type employment concentrates subsistence economic activities, does not contribute to the Gross Domestic Product, and does not appear as contributors to SUNAT. That is, it is that job that does not have labor benefits. The workers carry out activities individually, through their own efforts, and constitute family businesses with family-related workers who, in some cases, do not receive remuneration.

Economic growth is important for economic activity to develop in the market, it benefits formal and informal employment. However, formal employment must be promoted, and the promotion of greater education is necessary.

There is complexity about the definition of employment from informality, raised not only in Peru but also in South America (Ruiz et al., 2015). Although it has been defined as “salaried work”, “work that does not comply with the provisions of labor legislation”, “work without a contract”, “work without social protection”, “work in the informal sector”, even its measurement, such as classification are a topic of investigation.

Although the growth theory of the economy is explained by variables such as human capital, physical capital, innovation, technology and sustainable infrastructure (Esaku & Esaku, 2021), there are other key determinants of economic growth, and one Of the few issues studied as a factor influencing economic growth, is informality.

The activities of the informal sector affect economic growth, employers, in this case companies, operate clandestinely, without paying taxes, affecting work such as the selection and contract of labor without labor laws.

Background

Joshi et al. (2022) looks at disruptions to employment and business, access to water and hygiene practices in informal settlements in Nairobi. They maintain that informal settlements are home to millions of inhabitants, who are vulnerable and lack basic services, and that informal residents who work in informal labor markets nestle there. Results of a survey of 532 households that lack access to water show that 92% are less likely to pay for water. The reason is obvious, they don't have enough income to pay for better water service. They conclude that the employment crisis, especially in times of pandemic, has caused a health risk. They recommend greater infrastructure in water supply, accessible to poor families.

Ruiz et al. (2015) start from the question: Is it possible to compare informal employment in the countries of South America?, answers to this question that informal employment is that worker without a contract, in many countries informal employment is measured by means of a survey of households and the information turns out to be heterogeneous. The results reflect that informal employment should be classified into protected and unprotected people. They conclude that informal employment is defined as the deficiencies faced by the informal worker. They recommend taking informal employment into account as an indicator within the information systems to make comparisons.

Binay (2015) estimates the optimal informal employment ratio for the Turkish economy from January 2005 to December 2013, finds a relationship between informal employment and economic growth, with direct incidence results, using the Engle-Granger model. The results explain, if informal employment increased 1 point, then economic growth will increase 0.23 points. They conclude that the relationship between informal employment and GDP is statistically significant.

Mert (2021) analyzes economic growth under Solow neutrality, models the production possibilities frontier equation with technological progress, evidencing the stationarity of the series. The results indicate that there is growth in the long term, it is positive and depends on the factors of production. She concludes that the growth rate of productivity, technological progress, and capital determine economic growth.

Esaku & Esaku (2021) ask themselves a question: Is informality an obstacle to economic growth in Uganda? They explain using an autoregressive model to investigate informality as an obstacle to economic growth in the country of Uganda, through Annual time series data for the period 1991 and 2017. The results show the short- and long-term relationship between economic growth and informality. They show that if informality increases then the rate of economic growth will be significantly reduced in the long term as well as in the short term. Above all, in low-income countries, greater informality would be correlated with low rates of economic growth. The reason for this informality in payments is because many companies do not pay taxes, they are informal in the operations they

develop, affecting the collection of government revenue. They conclude that the degree of informality in the hiring of informal labor limits the benefits in the provision of social services, the research concludes that there is a negative relationship between economic growth and informality. He suggests investigating the factors of informality.

Tian & Guo (2021) analyze a study of the difference in income between formal and informal tourism employment in China", the findings lead to explain that income is an indicator of the labor market, through the General Social Survey of China between the 2010 and 2015 find that there is a difference in income between formal and informal employment in tourism in China, on the formal side the difference is in the expected gap and in the informal sector due to the reduction in quantity. They conclude that the human capital of informal employees must be improved to reduce the income gap.

Lehmann & Pignatti (2018) explain informal labor relations and the labor market: Is there segmentation in Ukraine? They affirm that the quality of life and well-being of individuals depends on the employment factor, there is formal segmentation of the labor market that separates informal workers from the market. The results show that informal employees wait to enter a formal salaried employment process, they do not choose voluntarily. They conclude that not all informal work implies a low quality of life and less well-being, since self-employment can generate more income than formal work.

Girma & Tilahun (2022) explain the predictability of foreign aid and economic growth in Ethiopia", argue that foreign aid and the policy environment contribute to economic growth, using a lag autoregressive approach, for the period from 1985 to 2019 in Ethiopia. The results show that there is a positive impact of foreign aid on economic growth. They conclude that economic growth is not

The National Institute of Statistics and Informatics (2006) in its publication referring to production and its relationship with informal employment at the level of the Peruvian economy, explains that employment from informality occurs in three out of four Peruvians, mainly in those populations that belong to the Economically Active Employed Population. And that in the Peruvian economy informal employment is known as the informal type unit, such as companies that do not comply with the tax law, create their market without contributing to the country, hire labor without complying with labor legislation.

Economic growth

It is defined as a measure of the standard of living that countries have, it is a priority policy objective, continuous and increasing economic growth, means that the country presents better food, housing, greater resources for health and control of environmental pollution, better education and retirement (Samuelson & Nordhaus, 2015).

It is a measurement established by the growth rate referred to the gross domestic product (Esaku & Esaku, 2021). Economic growth measures the quality of life in a country

(Olivier Blanchard, 2012). It occurs when people save and invest in physical and human capital, as well as new technologies (Parkin, 2007).

Importance of economic growth

It is relevant because it has the function of increasing the income of an economy (De Gregorio, 2012); explains the well-being of the countries (p. 269). It determines if a country is rich or poor, if the economic growth rate is higher, it indicates that the country has higher economic growth than the rest (Dornbusch et al., 2009).

It is an economic indicator that positions developed countries as emerging, its value is expressed in percentage terms. A higher percentage value indicates that the economy has higher economic growth and vice versa.

Before 1800, economic growth did not have significant growth, compared to the 21st century (De Gregorio, 2012). During the wars, economic growth has decreased and has had cyclical trends in different countries.

There is a competition to grow, it is said that the least developed country must grow faster than first world countries like the United States and China. Production increases as a result of the increase in productive factors (Dornbusch et al., 2009).

Economic growth is explained by capital and work, there are extensions to the Solow model, which determine economic growth such as savings, investment in technology, human capital, natural resources and population (Dornbusch et al., 2009).

Informal employment

Informal employment is defined as all employment in informal sectors (National Institute of Statistics and Informatics, 2006). Labor employment is defined as the job position that is not regulated in the labor market (Ruiz et al., 2015).

The informal sector is understood as the group of units that carry out production not only in goods but also in services, the effect is reflected in the generation of employment that favors family income, but without working or salary conditions, or fair and less legal (National Institute of Statistics and Informatics, 2006).

Labor market indicators

There are three labor market indicators, unemployment rate, participation rate and employment ratio:

a. *Unemployment rate*

It is the ratio between the number of unemployed people with respect to the economically active population (Parkin, 2007).

$$Unemployment\ rate = \frac{Number\ of\ unemployed\ people}{Economically\ active\ population} * 100$$

b. *Participation rate – labor forc*

It is calculated between the number of people without some type of employment and the labor force.

$$Participation\ rate\ in\ the\ labor\ function = \frac{Number\ of\ unemployed\ people}{Labor\ force} * 100$$

c. *R*eason for employment

It is determined by the ratio of the number of employed inhabitants to the population of working age (Parkin, 2007).

$$Employment\ ratio = \frac{Number\ of\ people\ employed}{Population\ of\ working\ age} * 100$$

2 | MATERIALS AND METHODS

The study qualifies towards a quantitative, non-experimental, longitudinal approach with data from historical data series of informal employment and economic growth collected from the Central Reserve Bank of Peru available from the years 2014 to 2021 (Central Reserve Bank of Peru, 2021). The scope is descriptive and explanatory, it plans the deductive and econometric method, the sample delimits a total of 8 years of evolution of informal employment data (Employment rate) and the economic growth of the agricultural sector, manufacturing, commerce and services (Percentage variations annualized) from January 2014 to December 2021 (Central Reserve Bank of Peru, 2021), information that was processed with monthly data for the linear regression econometric models, validated with the t-student statistical test, for the coefficients individuals, and the goodness-of-fit statistic for joint significance, Breusch-Godfrey autocorrelation test processed in the E-views econometric software (Gujarati, Damodar & Porter, 2010). The non-autocorrelation assumption establishes that the error of the regression model does not have to be correlated, the errors of period i do not have to depend on the errors of another period j (Court & Rengifo, 2011).

Model function

The econometric model of the impact of economic growth on informal employment is detailed below:

$$EI=f(CES)$$

Where:

EI : Informal employment

CES : Economic growth by sectors

ε_t : Standard error

3 | RESULTS

The estimation of the linear regression model indicates that informal employment is explained in 85.45% by economic growth (table 1). The t-student test confirms the significance of the estimated parameters, with values greater than 2. The decision rule is: if p-value "Prob (F-statistic)" = 0.0000 < 0.05, it is less than the level of significance of the test, the null hypothesis is rejected and the alternate hypothesis is accepted. In this case, the result confirms a lower p-value in accordance with the significance criteria, accepting the alternative hypothesis. This proves that the model specification is valid for prediction (figure 1). The results of the econometric estimation are presented below:

$$EI = \beta_1 - \beta_2 * CES$$

$$Informal\ Employment = 66.36 - 0.07 * Economic\ growth\ by\ sectors$$

$$(t\text{-}student) \qquad (329.47) \qquad (4.14)$$

$$\boldsymbol{R^2 = 85.45\%}$$

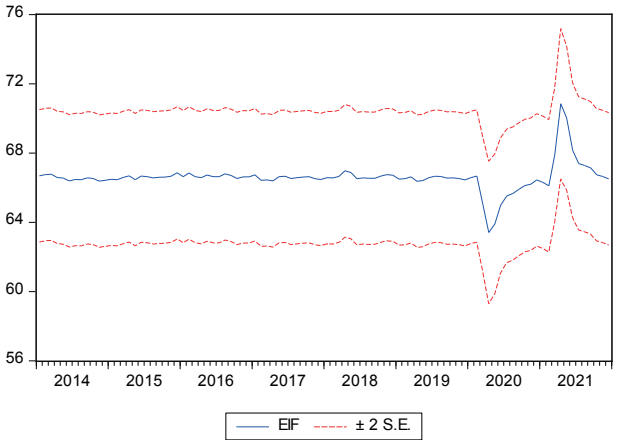
Ho: There is no linear relationship between economic growth and informal employment.

Ha: There is a linear relationship between growth and informal employment. If economic growth increased by 1%, then informal employment would decrease by 0.07%.

Dependent Variable: Empleo Informal				
Method: Least Squares				
Sample: 2014M01 2021M12				
Included observations: 96				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	66.36012	0.201412	329.4749	0.0000
Crecimiento E. por Sect.	-0.075627	0.018247	-4.144620	0.0001
R-squared	0.854508	Mean dependent var		66.58333
Adjusted R-squared	0.845513	S.D. dependent var		2.057114
S.E. of regression	1.901564	Akaike info criterion		4.143844
Sum squared resid	339.8990	Schwarz criterion		4.197268
Log likelihood	-196.9045	Hannan-Quinn criter.		4.165439
F-statistic	17.17788	Durbin-Watson stat		2.083090
Prob(F-statistic)	0.000074			

Note: Own elaboration, Eviews V.12.

Table 1. Econometric estimate of the economic growth model by sectors and informal employment



Forecast: EIF	
Actual: EI	
Forecast sample: 2014M01 2021M12	
Included observations: 96	
Root Mean Squared Error	1.881652
Mean Absolute Error	1.403422
Mean Abs. Percent Error	2.068225
Theil Inequality Coefficient	0.014126
Bias Proportion	0.000000
Variance Proportion	0.435673
Covariance Proportion	0.564327
Theil U2 Coefficient	6.565448
Symmetric MAPE	2.086788

Figure 1. Prediction of the economic growth model by sectors and informal employment

Source: Own elaboration, Eviews V.12.

To determine the presence of autocorrelation, the Breusch-Godfrey test has been used, denoting the absence of autocorrelation ($p < 0$), in the model of economic growth by sectors and informal employment (table 2). The p-value equal to 0.0000 is used for the F-statistic test, with a significance level of 0.05.

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	551.0804	Prob. F(2,92)	0.0000
Obs*R-squared	88.60401	Prob. Chi-Square(2)	0.0000

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/09/22 Time: 02:52

Sample: 2014M01 2021M12

Included observations: 96

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.061400	0.058165	1.055627	0.2939
CES	-0.007215	0.005604	-1.287551	0.2011
RESID(-1)	1.160542	0.108626	10.68380	0.0000
RESID(-2)	-0.180215	0.115538	-1.559791	0.1222

R-squared	0.922958	Mean dependent var	-4.13E-14
Adjusted R-squared	0.920446	S.D. dependent var	1.891530
S.E. of regression	0.533511	Akaike info criterion	1.622100
Sum squared resid	26.18635	Schwarz criterion	1.728948
Log likelihood	-73.86082	Hannan-Quinn criter.	1.665290
F-statistic	367.3870	Durbin-Watson stat	1.683155

Prob(F-statistic)	0.000000

Note: Own elaboration, Eviews V.12.

Table 2. Breusch-Godfrey Serial autocorrelation test of the economic growth model by sectors and informal employment

4 I DISCUSSION

The coefficients estimated in the model of the impact of economic growth on informal employment corroborate the positive relationship. As they maintain (Esaku & Esaku, 2021), whether in the chorus or in the long term, there is a relationship between economic growth and informality, within the latter informal employment.

Figure 2 presents a visual relationship between the behavior in the percentage variations of economic growth and informal employment. The health crisis affected informal employment with large increases during 2020. For its part, economic growth drastically decreased compared to the study horizon since 2014. This link entails taking employment policy measures for the economic recovery of the country in situations of international health crisis.

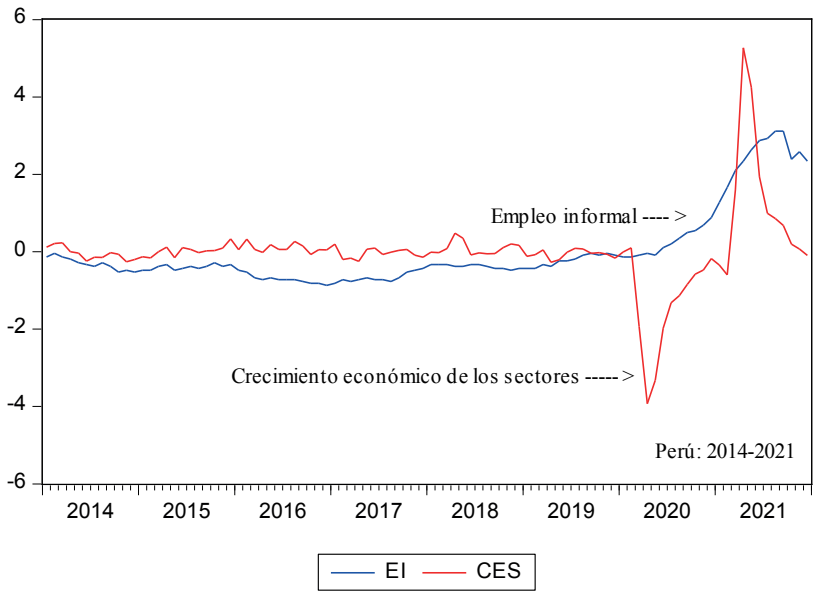


Figure 2. Relationship between economic growth and informal employment. Peru: 2014-2021

Source: Own elaboration, Eviews V.12.

5 I CONCLUSIONS

The estimated regression model indicates that economic growth by sectors contrasts a significant impact on informal employment. The goodness of fit is measured by the determination coefficient equal to 0.8545, it refers that 85.45% of informal employment is

explained by economic growth by sectors.

The agricultural sector contrasts a significant impact on informal employment, its estimated goodness of fit is equal to 91.12%; the manufacturing sector contrasts a significant impact on informal employment, its estimated goodness of fit is equal to 80.01%; the commerce sector contrasts a significant impact on informal employment and its estimated goodness of fit is equal to 85.16% and the services sector contrasts a significant impact on informal employment and its estimated goodness of fit is equal to 89.15%.

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