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ORIGINAL ARTICLE

Socioeconomic Determinants of Informal Employment in Peru: An Analysis for the Period 2020–2022

Determinantes socioeconómicos del empleo informal en el Perú: un análisis para el período 2020–2022

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Abstract

Informal employment is one of the main problems in the Peruvian labor market , affecting workers' rights and reducing average productivity compared to international standards. This study aims to identify the socioeconomic determinants of informal employment in Peru during the period 2020-2022. Data from the National Household Survey (ENAHO) provided by the National Institute of Statistics and Informatics (INEI) were used. The final sample consisted of 29,683 observations. A binary logistic regression model was used to estimate the probability of belonging to the informal sector. The results show that working in a microenterprise (OR=182; dy / dx =+0.215), being under 25 years of age (OR=11.7; dy / dx =+0.102), and being poor (OR=3.28; dy / dx =+0.049) are the factors that most increase the probability of informality. In contrast, having higher education (OR=0.097; dy / dx =-0.096), being married (OR=0.597; dy / dx =-0.021), and being male (OR=0.726; dy / dx =-0.013) significantly reduce informality. It is concluded that working in microenterprises and being under 25 years of age increases informality, reflecting the fragility of state support and the vulnerability of young people to precarious employment. Conversely, higher education acts as a mechanism for formal integration. Therefore, policies are urgently needed to simplify business formalization, strengthen youth employability, and expand the coverage and quality of higher education.

Palabras clave: *informal employment, education, poverty, labor market, neoclassical theory.*

Resumen

El empleo informal constituye uno de los principales problemas del mercado laboral en el Perú que afecta sus derechos laborales, y reduce la productividad promedio en comparación con estándares internacionales. El presente estudio tiene como objetivo identificar los determinantes socioeconómicos del empleo informal en el Perú durante el período 2020-2022. Para ello, se empleó los datos de la ENAHO proporcionados por el INEI. La muestra final estuvo compuesta por 29,683 observaciones. Se utilizó un modelo de regresión logística binaria para estimar la probabilidad de pertenecer al sector informal. Los resultados muestran que laborar en una microempresa (OR=182; dy/dx=+0.215) y ser menor de 25 años (OR=11.7; dy/dx=+0.102) y ser pobre (OR=3.28; dy/dx=+0.049) son los factores que más aumentan la probabilidad de informalidad. En contraste, con tener educación superior (OR=0.097; dy/dx=-0.096), estar casado (OR=0.597; dy/dx=-0.021) y ser varón (OR=0.726; dy/dx=-0.013) reducen significativamente la informalidad. Se concluye que, trabajar en microempresas y ser menor de 25 años incrementa la informalidad, reflejando la fragilidad del apoyo estatal y la vulnerabilidad juvenil frente a empleos precarios. En contraste, la educación superior actúa

como un mecanismo de inserción formal. Por lo que, urgen políticas que simplifiquen la formalización empresarial, fortalezcan la empleabilidad juvenil y amplíen la cobertura y calidad educativa en el nivel superior.

Keywords: *empleo informal, educación, pobreza, mercado laboral, teoría neoclásica.*

1. Introduction

Informal employment is one of the main problems in the Peruvian labor market. It is a working condition in which workers, regardless of their occupational category, perform activities that generate low income and are characterized by low productivity (Tello, 2014; Tenorio, 2020) .

Globally, the level of informality reaches 58%; however, for low-income countries the level of informality rises to 88% and for higher-income countries this figure reaches 13% (International Labour Organization , 2025). That is, as a country has a higher income level, there is a lower percentage of informal employment.

In Latin America, several studies have revealed key characteristics of informal employment. For example, Bernal et al. (2022) in Ecuador point out that the increase in informal jobs is characterized by low wages, low productivity, and low levels of education, which exposes workers to fewer opportunities for advancement. Furthermore, informal jobs are characterized by low quality and significant economic instability, meaning individuals do not receive a fixed income to meet their needs. Similarly, Caballero and Villadiego (2019) in Colombia found that informal employment coexists with high levels of poverty, destitution, and social inequality.

In Peru, 70% of workers are informal, which means that they do not have access to benefits such as paid vacations, CTS, health insurance or pension contributions (Herrera, 2025) It points out that informality not only affects labor rights, but also reduces the productivity of the average worker compared to international standards.

Furthermore, according to the National Institute of Statistics and Informatics [INEI] (2022), of the 2,754,000 households representing the 30% of households with the lowest incomes, 73% depend exclusively on income from the informal sector. The COVID-19 pandemic affected everyone, but disproportionately impacted both dependent and independent workers in the informal sector of the economy (Higa et al., 2021).

According to the National Center for Strategic Planning [CEPLAN] (2020), it is projected that by 2050 the informal sector in Peru will represent 6% of the Gross Domestic Product (GDP), and even then Peru will still be one of the countries with the highest levels of informality in Latin America.

Informal employment is a worrying social problem because the income earned by both men and women in this sector is lower than what they could earn in formal employment, meaning that being informal increases the likelihood of being poor (Timaná-Álvarez et al., 2021) . This problem, which is evident in Peru, is the result of an economic model that has failed to promote the development of sectors that employ the largest share of the workforce (Obregón and Espíritu, 2022). Consequently , our country has maintained a low unemployment rate, but at the cost of a high rate of informality (Peruvian Institute of Economics [IPE], 2023).

After experiencing one of its worst labor market crises due to the pandemic, Peru faces the challenge of overcoming the rise in informality and the decline in wages for informal workers. Most informal jobs have been generated in urban areas, through increased hiring of unskilled labor in companies with one to ten employees, primarily concentrated in agricultural production units (IPE, 2023).

Studies conducted in Peru on the determinants of informal employment are scarce, but they have been increasing over the last seven years. According to Valle (2021), income level is the most influential variable in informal employment, with a 10% increase in income reducing the probability of working in the informal sector by 10.3%. This indicates a negative relationship between income and informality. Similarly, Acosta (2019) points out that informal employment contributes to other social problems such as inequality, where low wages are concentrated among the least skilled and educated segment of the population.

Therefore, the social relevance of this problem, which significantly affects Peruvian workers, is evident, as is the need for a more detailed and up-to-date study on the factors that influence informal employment. In this regard, this research seeks to identify the socioeconomic determinants of informal employment in Peru during the period 2020–2022.

1.1 Theories and approaches related to informal employment

Neoclassical theory and human capital theory

Under neoclassical theory, informality is understood as a phenomenon that results from the inefficiency of labor markets to achieve an adjustment towards full employment and that these inefficiencies stem from state intervention through labor legislation (Morillo-Martínez, 2024).

Solis (2021) details that, in the neoclassical labor market, employers and job seekers use intermediaries to mitigate market mismatches and the costs arising from insufficient information; likewise, It specifies that this theoretical model is based on the following premises:

- Working time is the "object" of exchange in the labor market, resulting from an arbitrage process that considers the benefits derived from that work and the opportunity cost associated with leisure time. For this reason, labor is conceptualized as a commodity, with prices and quantities that must be evaluated as if it were another factor of production, such as land or capital.
- Where aggregate supply and demand coincide in the market, the price of labor power emerges, which cannot be modified by any individual intervention. Here, the following stands out: The relevance of the 'Walrasian auctioneer' is that it is able to retain the highest price offered by buyers by centralizing various individual offers and demands.
- The 'products' offered are similar, meaning that job seekers exhibit comparable skills and performance as a result of their professional training and education, making it easier to be replaceable by others.
- The workforce is dynamic in terms of geographic mobility and movement between different organizations. In other words, there are no impediments to these movements for economic reasons.
- Suppliers and consumers have access to complete and comprehensive information about the opportunities and requirements offered, including quantity, price, and quality (educational level, professional training, and skills). Furthermore, this information is readily available and cost-effective.

Consequently, informal workers are those individuals who seek to circumvent labor regulations in order to preserve a specific level of profitability or those who are unemployed or underemployed because the minimum wage hinders their integration into the formal labor market (Morillo-Martínez, 2024).

In the labor market, there are limitations in the price system to achieve full employment levels, and from this normative notion arises the general equilibrium model Arrow- Debreu where ideally it is established that unemployment is only voluntary (Monsalve, 2017).

That is, to the extent that unemployed workers choose this decision because they prioritize their leisure time over their work time; therefore, any attempt at state intervention in labor markets in favor of employment can lead to inefficiencies that hinder the incorporation of workers who were willing to perform work based on the remuneration established by the market, since the rigidity of the minimum wage is introduced (Morillo-Martínez, 2024).

Therefore, informality is directly related to the inherent structure of an economy, its labor and credit markets, and the respective price constraints in each of them.

On the other hand, human capital theory falls within the framework of neoclassical theory, given that its analysis is based on the methodological individualism that characterizes this school of thought and on the subjective approach to value, starting from the identification of those individual factors that contribute to increased productivity and the pursuit of profit maximization (Odriozola, 2008). Human capital theory maintains the imperative need to improve the skills of the workforce due to its impact on increased productivity (Odriozola, 2008).

From this theoretical perspective, "public policy proposals are derived regarding labor markets and the structure of the economy, including higher education and its content, in order to promote the inclusion or elimination of the informal sector" (Morillo-Martínez, 2024, p. 6). In this sense, marginalist economics encourages the implementation of economic policy measures highly focused on achieving this optimum in the labor market, which implies eradicating limitations related to the price mechanism or promoting national savings and greater access to education.

Institutionalist theory

Institutionalist theory argues that informal activity arises as a result of the frictions and costs stemming from the existence of an institutional legal framework that burdens businesses. It is classified as institutionalist because of its focus on the expenses that the government and institutions impose as an obstacle to the natural functioning of businesses (Solis , 2021).

From this theoretical perspective, the autonomous functioning of markets is favored, although a lack of confidence in state intervention in the economy is also expressed. In a state governed by the rule of law, regulations and obligations are established to support the operation of businesses; these include tax, health, financial, and labor regulations. Therefore, it is essential to recognize that inefficiency, bureaucracy, and government corruption have a significant negative impact on the process and cost of legalization, hindering the transition of businesses to formality (Sánchez, 2019). Rojas and Ladino (2016) specify that excessive regulation, such as laws on wages and sectoral unions, as well as social issues, impedes formal employment.

Dualistic approach

The dualist approach – or SIU approach – emerged in the late seventies, where the concept of the urban informal sector (SIU) was promoted by the Regional Employment Program for Latin America and the Caribbean (PREALC) of the International Labour Organization (ILO), through this term it was pointed out that the low income level of informal workers was one of the main labor and social problems of developing countries (Tokman, 2001).

From this theoretical perspective, the informal sector encompasses marginal activities that generate income for the most vulnerable sectors of society due to the lack of a social protection system, which becomes more relevant in times of crisis (Tokman , 2001).

Dualists associate the limited economic opportunities in the informal sector with the imbalance between population growth rates and modern industrial employment, as well as a difference in workers' skills (Solis , 2021).

Bourguignon (1978) establishes a relationship between poverty and sectors classified as modern (formal) and traditional (informal), while also noting discrepancies resulting from inequalities in education, age, working hours, and other factors (cited by Solis , 2021). These two sectors are integrated in a complementary manner in the long term.

The concept of "labor surplus" arises in this context to refer to those "excluded" from the formal sector. This does not imply that employment in the informal sector is inherently inferior to that in the formal sector. It simply means that workers in the informal sector are, in fact, excluded from the system of benefits upon which formal employment depends. Moreover, evidence indicates that the hypothesis that considers the informal sector as a mere "waiting room" is incorrect, since informal workers are frequently unwilling to abandon their occupations in favor of positions in the formal sector (De la Piedra, 1986).

The dualistic approach was criticized by Marxist theorists for its oversimplification of the market into two dimensions. In response, De la Piedra (1986) argues that this dichotomous division, instead of ignoring the existing diversity within the urban informal sector or postulating complete homogeneity within each of its constituent sectors, seeks to emphasize the fundamental differences between the formal and informal sectors, thus enabling the proposal of useful policy measures.

Neoliberal approach

Neoliberalism is an ideology based on economic liberalism, which favors economic policies that minimize the role of the state and maximize the private business sector (Olabisi , 2011). Neoliberalism

seeks to privatize control of the economy under the premise that this will lead to a more efficient organization.

Like institutionalist theory, this approach advocates for regulations that allow companies to operate and do not hinder business formality in its different dimensions: tax, health, financial and labor.

In this context, Hernando De Soto (1985) states that the informal sector is a response to the excess of state regulations and proposes the idea that the informal sector is made up of "warrior" micro-entrepreneurs who decide to operate informally to avoid the costs, time and effort involved in formal registration.

De Soto (1985) further stated that micro-entrepreneurs will continue to operate informally as long as government procedures are cumbersome and costly in terms of bureaucracy, lack of property rights—this aspect is highlighted as a means to transform informal property into real capital—and difficult access to the financial system and technology. In other words, unreasonable government rules and regulations stifle private enterprise.

In the context of emerging countries, this theoretical approach becomes more relevant given that they have higher rates of informality and at the same time a greater number of micro-entrepreneurs, as is the case of Peru (Loayza, 2008).

2. Materials and methods

The present study it is based on a non-experimental design since the independent variable is not manipulated to observe its effects on the dependent variable. The method used was the hypothetical-deductive method, which allows for the formulation and resolution of hypotheses regarding an object of study (Hernández et al., 2014).

Panel data extracted from the National Household Survey (ENAHO) of the National Institute of Statistics and Informatics (INEI) for the period 2018-2022 have been used.

To determine the final sample size, observations from 2018 and 2019 were excluded, given that the analysis period was from 2020 to 2022, and only households that remained in the panel throughout the entire analysis period were considered. Therefore, the final sample size was 29,683. The sampling method was probabilistic, by area, stratified, and multi- stage .

Stata software (Software for Statistics and Data Science) for the respective statistical processing and analysis. The variables of interest were extracted from the employment and income module (module 1477) and the summary module (module 1478), which are detailed below in Table 1.

The econometric model applied is a binary logit model , where the dependent variable (Y) is where the effect will be observed based on a logistic distribution function. This model is recognized for its operational simplicity and its ability to estimate the impact of independent variables on the probability of being in informal employment (Zuleta, 2022). In this regard, the model was specified as follows:

$$P_i = \frac{e^{Z(x)}}{1 + e^{Z(x)}} \tag{1}$$

Where: P_i = Probability of being an informal worker.

$$Z(x) = \beta_0 + \beta_1 X_{1i} \pm - - - - \mp \beta_x \tag{2}$$

Donde:

- Z: probability of having an informal job (1 = informal job / 0 = formal job)
- X1, X2, …, Xk are the independent variables of the model (higher education, being married, microenterprise, poor, annual income, agriculture sector, fishing sector, construction sector, transport sector, trade sector, being under 25 years old, being male, residing in the mountains, residing in the jungle).
- B's are the estimators of the coefficients of the logit model .

Table 1. Details of the study variables

Dependent Variable	Categorization
Formal Employment (Y)	0 = Formal, Informality = 1
Independent Variables	**Categorization**
Marital status (married)	Single=1, married=2
Level of education (ebr)	Has completed or higher regular basic education = 1, Does not have completed or higher regular basic education = 0
Income (annual)	It represents non-monetary and monetary income from dependent and independent employment. In soles.
Poverty (poor)	Is poor=1, Is not poor=0
Company size	Microenterprise=1, Small, Medium and Large Enterprise=0
Agriculture sector	Its main activity belongs to the agricultural sector=1. Its main activity does not belong to this sector=0
Fishing sector (fishing)	Its main activity belongs to the fishing sector=1, Its main activity does not belong to the fishing sector=0
Construction sector (construction)	Its main activity belongs to the construction sector=1, Its main activity does not belong to the construction sector=0
Transport sector (transport)	Its main activity belongs to the transport sector=1, Its main activity does not belong to the transport sector=0
Commercial sector (commerce)	Its main activity belongs to the commercial sector=1, Its main activity does not belong to the commercial sector=0
Age (under 25)	Their age is less than or equal to 25 years=1, Their age is greater than 25 years.
Sex (male)	Is male=1, Is female=0
mountain region (mountain range)	Resides in the mountain region=1, Does not reside in the mountain region=0
Jungle region (jungle)	Lives in the jungle region=1, Does not live in the jungle region=0

Note: The variables age, sex, and natural region act as control variables within the model. Source: Author's own elaboration.

- The coefficient B0 is the intercept.

Through a mathematical transformation, the probability ratios (Odds ratio) are found, which are expressed as follows:

$$\text{odds ratio} = \frac{P_i}{1 - P_i} = e^{z(x)} \tag{3}$$

Where $\frac{P_i}{1 - P_i}$ is the probability ratio that the worker is informal. Applying logarithms to the probability ratio, a logit function can be obtained , which is estimated using the maximum likelihood method (Gujarati, 2010).

3. Results

3.1 Descriptive Analysis

Informal employment showed a sustained increase, rising from 24.6% in 2020 to 28.7% in 2022. Simultaneously, the proportion of non-poor individuals increased slightly to 4.7%, while poverty remained relatively stable during the study period. Higher education enrollment registered a slight increase to 7.2%, although the majority still lack access to this level, which encompasses everything from incomplete higher education to postgraduate studies. In terms of income, a reduction in the low-income group and an increase in the middle and upper strata were observed, reflecting a certain socioeconomic restructuring, which is consistent with the evolution of the poverty category.

Of all economic sectors, the transportation sector stands out for having the largest proportion of individuals in the panel, and it also showed positive growth, increasing from 11.8% in 2020 to 13.9% in 2022. Regarding age, the number of individuals under 25 years old increased by 1.34% from one

end of the study period to the other, although those over 25 continue to represent the majority. As for gender, the number of men in the panel sample gradually increased, rising from 16.3

Also, those belonging to the jungle region remain relatively constant during the study period; while married individuals are more numerous in all years and increased from 12.6% in 2020 to 13.9% in 2022. Finally, the married status grows slightly in the analyzed period going from 9.8% in 2020 to 10.6% in 2022 , see Table 2.

Table 2. Evolution of the study variables, period 2020–2022

Indicators	2020	2021	2022
Informal employment			
Informal employment	24.60%	28.10%	28.70%
Poverty			
Not poor	22.10%	26.70%	26.80%
Poor	8.20%	7.60%	8.70%
Higher education			
Without higher education	23.00%	25.80%	26.20%
With higher education	7.20%	8.50%	9.20%
Income level			
Low	13.30%	10.50%	9.60%
Half	9.30%	12.00%	12.00%
High	7.70%	11.80%	13.90%
Productive sectors			
Agriculture	0.10%	0.10%	0.10%
Transport	11.80%	13.30%	13.90%
Trade	1.90%	2.40%	2.70%
Construction	0.70%	0.80%	0.90%
Fishing	0.02%	0.03%	0.02%
Age			
Under 25	4.40%	5.70%	5.84%
Over 25	25.80%	28.60%	29.60%
Sex			
Men	16.30%	18.20%	18.60%
Natural region			
Saw	12.60%	13.80%	13.90%
Jungle	6.90%	7.70%	7.70%
Marital status			
Married	9.80%	10.40%	10.60%

Note: The percentages are estimates based on panel data, and therefore reflect the evolution of the same cohort of individuals throughout the period 2020–2022. Consequently, the values should not be interpreted as population prevalences for each year, but rather as relative trends within the panel sample. Source: Author's own elaboration.

3.2 Econometric Model

Logit model estimation with panel data from the period 2020-2022 are shown in Table 2. At a global level, this model proved to be significant since the Wald chi-square p-value is equal to 0, which is less than the significance level of 0.01, which means that all the variables together significantly explain informal employment.

At the individual level, the variables marital status (being married), higher education, annual income, poverty (being poor), company size (belonging to a microenterprise), transport sector, age (being under 25 years old), sex (being male) and residing in the highlands and jungle region are significant, given that the p- values of each one present values less than 0.01, see Table 2. Likewise, the variables construction sector and commerce were not significant.

On the other hand, regarding the interpretation of the signs of the variables, it is observed that being poor, working in a microenterprise, working in the transportation sector, being under 25 years

of age, and residing in the highland and jungle regions have a positive relationship with the dependent variable; that is, these factors increase the probability of being informal. Meanwhile, being married, having higher education, having higher income, and being male have a negative relationship with the dependent variable; that is, these factors decrease the probability of being informal (see Table 3).

Table 3. Logit econometric model estimation , panel data period 2020–2022

Logistic Regression						
Maximum likelihood = -6272.337					Number of observations = 29,683	
					Wald $chi^2(12)$ = 1963.57	
					Prob > chi^2 = 0.0000	
Informal	**Coef.**	**Standard deviation**	**z**	**P>|z|**	**[95% confidence interval**	
Married	-0.492	0.103	-4.79	0.000	-0.694	-0.291
Higher education	-2.352	0.109	-21.59	0.000	-2.565	-2.138
Annual income	-0.000021	0.000001	-17.29	0.000	-0.000023	-0.000018
Poor	1.174	0.126	9.31	0.000	0.927	1.421
Microenterprise	5.135	0.137	37.44	0.000	4.867	5.404
Agro-rural sector	Omitted	—	—	—	—	—
Fishing sector	Omitted	—	—	—	—	—
Construction	-0.267	0.209	-1.28	0.201	-0.676	0.142
Transport	0.434	0.102	4.27	0.003	0.235	0.634
Trade	0.089	0.146	0.61	0.541	-0.197	0.375
Under 25	2.513	0.153	16.39	0.000	2.212	2.813
Man	-0.313	0.098	-3.19	0.001	-0.506	-0.121
Saw	1.109	0.114	9.7	0.000	0.885	1.333
Jungle	1.342	0.138	9.74	0.000	1.072	1.613
Constant	0.251	0.144	1.75	0.080	-0.03	0.532

Note: STATA omitted the agricultural and rural sectors and the fishing sector due to their small number of observations (n=89 and n=21, respectively). This small number of cases creates estimation problems, as the logit model with random effects requires sufficient variability within each category to reliably calculate the coefficients. While the most common significance level for the social sciences is 0.05, a level of 0.01 was chosen for a more rigorous and stringent analysis.

Source: Own elaboration

3.3 Odds ratios and marginal effects

The probability ratios - called odds ratios - and marginal effects were estimated for the relevant variables (excluding the construction and trade sector variables which were not significant and the agro-rural and fishing sector variables which were omitted) and the results shown in Table 3 were obtained.

Regarding the interpretation of the odds ratios, it appears that workers in microenterprises are 182 times more likely to work informally than those working in small or large companies. Those under 25 years of age are 11.9 times more likely to have informal employment than those 25 years of age and older (see Table 3).

Similarly, those living in the rainforest are 3.83 times more likely to work informally than those living in other natural regions. Those living in poverty are 3.3 times more likely to have informal employment than those who are not poor. And those living in the highlands are 3.07 times more likely to work informally than those living in other natural regions (see Table 3).

Regarding the findings on the marginal probability of having an informal job, working in a microenterprise (increases the probability by 21.5%), being under 25 years of age (increases the probability by 10.2%) and having higher education (decreases the probability by 9.6%) stand out as the variables with the greatest marginal effect, with the other variables remaining constant, see table 3.

It is worth mentioning that the marginal effect of income is very small but significant at a significance level of 1%; that is, for every increase of one sol in income, there is a lower probability of informality.

Table 4. Summary table of model coefficients, odds ratio and marginal effects

Variables	Coefficients (logit model estimation)	Odd ratios	Marginal effects (dy/dx)
Married	-0.492	0.597	-0.021
	(0.1028)	(0.0611)	(0.0042)
Higher education	-2.352	0.097	-0.096
	(0.1089)	(0.0104)	(0.0039)
Annual income	-0.000021	0.99998	-0.000001
	(0.000001)	(0.000001)	(0.0000)
Poor	1.174	3.277	0.049
	(0.1262)	(0.4135)	(0.0051)
Microenterprise	5.135	182.021	0.215
	(0.1371)	(24.91)	(0.0036)
Transport	0.434	1.548	0.018
	(0.1016)	(0.1547)	(0.0041)
Under 25	2.513	11.86	0.102
	(0.1533)	(1.801)	(0.0060)
Man	-0.313	0.726	-0.013
	(0.0981)	(0.0702)	(0.0039)
Saw	1.109	3.066	0.046
	(0.1143)	(0.3497)	(0.0045)
Jungle	1.342	3.827	0.055
	(0.1436)	(0.5250)	(0.0055)

Note: All values have a p-value less than 0.01 ($p<0.01$). (): standard deviation. If OR= 1, there is no relationship. An OR > 1 indicates a higher probability of being informal, while an OR < 1 indicates a lower probability compared to the reference category. Source: Author's own elaboration.

Table 5. Comparison of models according to information criteria: Akaike (AIC) and Bayesian (BIC)

Model	AIC	Odd BIC
Logit	12620.99	12720.57
Probit	12671.4	12787.58

Source: Own elaboration.

3.4 Robustness of the model

To determine which model is most appropriate for this analysis, a comparison was made of the information criteria (AIC and BIC) reported by the logit model with 12 variables and the probit model with the same number of significant variables. The logit model reported lower AIC values of 12621 and BIC values of 12721 compared to the probit model , which reported values of 12671 and 12788, respectively. Therefore, the logit model is considered more statistically significant and robust.

It should be noted that the difference in values of these criteria between both types of models is minimal; therefore, any substantial conclusion drawn from both models will probably be practically the same.

4. Discussion

This study focused on identifying the socioeconomic determinants of informal employment during the period 2020-2020. It was found that the following determinants significantly increase the probability of informality: being under 25 years of age (coefficient = 2.513, OR = 11.86 and marginal effect = +0.102), residing in the jungle (coefficient = 1.342, OR = 3.827 and marginal effect = +0.055), being domiciled in the highlands (coefficient = 1.109, OR = 3.066 and marginal effect = +0.046), and being poor (coefficient = 1.174, OR = 3.277 and marginal effect = +0.049).

On the other hand, having higher education (coefficient = -2.352, OR = 0.097 and marginal effect = -0.096), being married (coefficient = -0.492, OR = 0.597 and marginal effect = -0.021), being male (coefficient = -0.313, OR = 0.726 and marginal effect = -0.013) and having higher household income

(coefficient = -0.000021, OR ≈ 0.99998 and marginal effect = -0.000001) reduce the probability of belonging to the informal sector.

Belonging to a microenterprise increases the likelihood of informal employment by 182 times compared to workers in small or large companies. In this regard, De Soto (2007) states that microenterprises represent the largest number of businesses in Peru and are important sources of employment; therefore, to benefit their growth and sustainability, administrative simplification should be implemented throughout the government apparatus, and access to property titles should be promoted. In this sense, the empirical evidence found aligns with the theoretical contributions of the institutionalist and neoliberal approaches.

Furthermore, the results obtained are consistent with neoclassical theory and human capital theory in that educational attainment and salary level—which contributes to income composition—are relevant in influencing the likelihood of having informal employment (Solis , 2021). In the first case, having higher education produces a marginal effect of reducing the probability of informality by more than 20 percentage points, thus positioning education as a mechanism for formal integration. This result coincides with that reported by Caballero and Villadiego (2019) and Zuleta (2022), who specify that higher levels of education are associated with better working conditions and that 73% of informal workers have only attained a secondary education level.

In the second case, informal workers receive low wages to reduce costs for companies; that is, the lower the worker's income, the greater the likelihood of being informally employed in an organization (Timaná, 2020). In contrast, Tello (2014) states that informality is not a voluntary decision but rather a means of subsistence, and in this sense , workers perform low-income, low-productivity activities. Within this framework, the finding that the transportation sector is significant and positively associated with informality can be explained by its low productivity compared to the technological development of other sectors and its smaller contribution to GDP. This interpretation coincides with Tenorio (2020), who specifies that productive sectors such as extractive industries, commerce, and transportation are those that most demand labor with low levels of skills or specialization.

Regarding marital status, it was found that being married reduces the probability of belonging to the informal sector by 41%. This finding coincides with that reported by Rivera and Benavides (2018) in Ecuador, who detail that married people have a 3.7% lower probability of being informal workers, while being single increases the probability of belonging to the informal market by 5.08%. In this regard, Zuleta (2022) argues that married people are less inclined towards informality due to a preference for the economic stability and asset protection that marriage entails.

Regarding poverty, it was determined that being poor increases the likelihood of being in an informal employment situation by 3.3 times compared to those who are not poor; that is, there is a positive relationship between this socioeconomic level and informal employment. This coincides with the findings of Jurado and Riveros (2021), who explain that there is a positive relationship between a household being classified as poor and the strong probability that income earners have informal jobs.

Likewise, having a male partner reduces the likelihood of falling into informal employment by 28%. Zuleta (2022) reported a similar finding, arguing that women are more exposed to informality because they bear greater family or household responsibilities, leading them to seek more flexible schedules, which informal self-employment facilitates.

Also, being younger increases the likelihood of being in an informal employment situation by 11.9 times compared to those over 25 years of age. No studies were found that would allow us to compare this finding; however, human capital theory establishes that work experience is a key factor in salary level, and the latter is a reference point for the likelihood of preferring to work or not (Solis , 2021). In this sense, the fact that individuals under 25 years of age fall into informal employment may be due to their low level of experience, which is consistent with the low levels of wages they receive.

Finally, the finding that the probability of informality is higher in the Andean and Amazonian regions is consistent with the dualist approach. This approach argues that the limited economic opportunities in the informal sector are associated with the imbalance between population growth rates

and the low level of industrial development (Solis , 2021). In this sense, place of residence not only reflects geographical conditions but also varying degrees of modernization and persistent inequalities in access to education and quality employment.

5. Conclusion

The likelihood of belonging to the informal labor sector in Peru during the period 2020–2022 is strongly determined by the following socioeconomic factors: working in a microenterprise, being under 25 years of age, residing in the highlands or rainforest, and living in poverty. This demonstrates that informality disproportionately affects the most vulnerable groups and those living in the most remote areas of the labor market. Conversely, having higher education, being married, being male, and having higher income reduce the likelihood of belonging to the informal sector.

The fact that working in microenterprises and being under 25 years old increases the likelihood of informal employment reflects two critical dimensions of the Peruvian labor market: the fragility of state support provided to microenterprises and the vulnerability of young people to precarious jobs. Furthermore, higher education is a key mechanism for entering the formal sector, significantly reducing the probability of working in the informal economy. These findings highlight the urgent need for policies that promote administrative simplification in business formalization, strengthen youth employability through technical training and access to quality job opportunities , and improve the coverage and quality of higher education.

Empirical evidence confirms the relevance of various theoretical approaches analyzed, such as neoclassical theory, human capital theory, and neoliberalism.

Author Contributions

Martín Palomino Sayritupac: Conceptualization, research, Formal analysis, drafting, drafting

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The author declares that she has no conflict of interest.

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