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# Determinants of the Probability of Gaining a Job in a Colombian City with the Highest Unemployment \*

[English Version]

Determinantes de la probabilidad para acceder a un empleo en una de las ciudades con mayor desempleo de Colombia

Determinantes da probabilidade de acesso a um emprego em uma das cidades com maior nível de desemprego da Colômbia

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## Abstract

**Objective:** this article studies the main job search channels in Neiva, a city characterized by the highest unemployment rate in Colombia. The main purpose is to analyze the factors related to the use of formal and informal job search channels in Neiva. **Methodology:** to achieve this, an econometric model with a limited Probit dependent variable was estimated, considering demographic, labor, and socioeconomic characteristics that may affect the choice of job search methodologies. **Results:** among the main results, the higher the educational level, the higher the probability of finding a job through a formal job search channel; likewise, the higher the socioeconomic strata, the lower the probability of finding a job through formal channels. **Conclusion:** individuals with more favorable socioeconomic conditions are generally part of wider contact networks, which allow them to access the labor market more easily through informal job search channels.

**Keywords:** search; demand; unemployment; occupation; probability.

## Resumen

**Objetivos:** en este artículo se estudian los principales canales de búsqueda de empleo en Neiva, ciudad caracterizada por tener la mayor tasa de desempleo de Colombia. El propósito fundamental es analizar los factores que se relacionan con el uso de canales formales e informales de búsqueda de empleo en Neiva. **Metodología:** para lograrlo, se estimó un modelo econométrico de variable dependiente limitada Probit, teniendo en cuenta características demográficas, laborales y socioeconómicas que puedan incidir en la elección del medio de búsqueda de empleo. **Resultados:** dentro de los principales resultados se destaca que, a mayores niveles educativos, mayor es la probabilidad de acceder a un empleo a través de un canal de búsqueda formal, así mismo, a mayores estratos socioeconómicos, menor es la probabilidad de encontrar empleo a través de canales formales. **Conclusión:** los individuos con condiciones socioeconómicas más favorables, generalmente hacen parte de redes de contactos más amplias, que les permiten acceder al mercado laboral de manera más fácil, a través de los canales informales de búsqueda de empleo.

**Palabras-clave:** búsqueda; demanda; desempleo; ocupación; probabilidad.

## Resumo

**Objetivo:** este artigo estuda os principais canais de busca de emprego em Neiva, uma cidade caracterizada pela maior taxa de desemprego da Colômbia. O principal objetivo é analisar os fatores relacionados com o uso de canais formais e informais de busca de emprego em Neiva. **Metodologia:** para conseguir isto, foi estimado um modelo econométrico de variável dependente limitada Probit, levando em conta características demográficas, trabalhistas e socioeconômicas que podem influenciar a escolha do meio de busca de emprego. **Resultados:** entre os principais resultados, destaca-se que quanto maior o nível educacional, maior a probabilidade de acesso a um emprego através de um canal de busca formal; da mesma forma, quanto maior o estrato socioeconômico, menor a probabilidade de encontrar um emprego através de canais formais. **Conclusão:** os indivíduos com condições socioeconômicas mais favoráveis geralmente fazem parte de redes mais amplas de contatos, o que lhes permite acessar mais facilmente o mercado de trabalho através de canais informais de busca de emprego.

**Palavras-chave:** busca; demanda; desemprego; ocupação; probabilidade; desemprego.

## Introduction

The unemployment rate is one of the many indicators that exist to evaluate the economic situation of a country or region. Unemployment is one of the main problems of the economy and generates enormous concern in society, as it is directly related to the welfare and buying power of people (Bildirici, *et al.*, 2012). According to figures from Departamento Administrativo Nacional de Estadística (DANE), in 2020 the national unemployment rate was 15.9%, 5.4% above the figure recorded in 2019. In the thirteen main cities this figure reached 18.2%. The cities with the highest unemployment rates, according to the report, were: Neiva (26.1%), Ibagué (25.6%) and Cúcuta (23.7%); while the cities with the lowest unemployment rates were: Barranquilla (12.3%), Cartagena (14.6%) and Pasto (16.7%). It is important to mention that this increase in the unemployment rate is particularly explained by the global pandemic generated by the Covid-19 disease that started in 2019 and considerably affected the economy; however, it should be mentioned that even before 2019, in 2018 for example, Neiva's unemployment rate (11.6%) was above the national average (9.7%).

However, in the pre-pandemic period, Neiva did not register the highest unemployment rates in the country, the effect of the quarantines in the city caused the unemployment problem to worsen, and thus Neiva was categorized as the city with the highest unemployment. This is a structural problem generated by the city's weak industrial and entrepreneurial capacity. According to the Regional Labor Market Observatory of Huila, ORMET Huila, Neiva's business potential is concentrated in three main economic activities: wholesale and retail trade with 42.60%, accommodation and food services with 10.70% and manufacturing industries with 9.20%. These activities account for a large part of the city's employment generation; they are activities that were largely affected by repeated social isolation.

Generally, in economies with high unemployment rates, informality tends to be higher, and this affects the right to decent work or work with dignity, that is, work where one enjoys productive and decent employment, in conditions of freedom, equality, security and human dignity, where rights are respected and where there is commensurate remuneration and social protection (International Labour Office [ILO], 1998). According to Zepeda-Martínez (2016), periods of economic stagnation characterized by high unemployment rates accentuate workers' problems of not being able to find decent employment, which has led to migration and the informal labor economy.

Job search channels are mechanisms that enable such a search in the labor market, but, even so, it is a subject rarely studied in developing countries and

regions. The search process is usually complicated, since the efficiency of the search channel used must be verified and the determinants that may affect the type of occupation must be evaluated. If these channels are formal, the way they link people is regulated by institutions and the process is much more efficient compared to the management of informal channels.

According to José Uribe *et al.*, (2007), the central problem in the use of job search channels is the imperfect information that may exist in the market, and the possible restrictions involved in the search process (time available, biased information, search costs, etc.). That is, individuals differ in their characteristics, skills, preferences and resources, which causes the use of such channels to be differentiated among individuals. For example, people who have acceptable job characteristics but do not have access to good search channels are likely to accept jobs that do not suit them or that are not in line with their characteristics, experience and expectations, in contrast to people who have access to official and more efficient search channels (Weller, 2003).

"He who has the information, has the power." This famous popular adage acquires relevance in this context, as this situation of high unemployment rates can be attributed not only to the socio-economic situation of the country and the region, but also to the citizens' unawareness of the different existing job search channels (Bod'a, M. and Považanová, 2021).

The effectiveness of job search channels is closely related to the magnitude of frictional unemployment, and this can have a significant impact on the duration of unemployment (Viáfara and Uribe, 2009). For this reason, the purpose of this article is to analyze (through probabilities<sup>1</sup>) the factors that are related to the use of job search channels in Neiva.

In this work, two types of channels were defined: i) formal search channels, which refer to all channels that are public and freely accessible, i.e., visiting, taking, or sending resumes to companies or employers and/or employment exchanges or intermediaries, publishing or consulting classified ads, searching through public or private announcements, or through the SENA information system; and ii) informal search channels, which refer to the social capital of each individual. Informal channels include help from family, friends and colleagues, neighbors, and contacts with strong or weak ties.

From the methodological point of view, a Probit probability econometric model was estimated, based on a set of demographic, labor and socioeconomic characteristics. Information is available from DANE's integrated household survey (GEIH) for the year 2020.

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1. The probabilities will be estimated through Probit econometric probability models, which allow finding the statistical probability of the occurrence of a given event.

Usually, these types of studies are developed at an aggregate level of countries, or in the most important or outstanding regions. However, in a country like Colombia, characterized by presenting the highest Gini<sup>2</sup> coefficient in South America, after Brazil, internal socioeconomic inequalities are usually greater, thus, the studies that are developed for a certain region cannot necessarily be applied to other regions. Hence, this article is relevant, as it analyzes the problem of job search in a city like Neiva, with an economic and social reality that is different from the rest of the country.

### Theoretical Foundations

Unemployment, also known as out of work, is the situation in which people find themselves who do not have or cannot acquire a job, regardless of age, ability or desire to work, (Mankiw, 2014). In Colombia, a person is unemployed when they meet four conditions: i) they are of working age, ii) they do not have a job, iii) they are looking for job, and iv) they are available to work. The unemployment rate is the indicator that measures the relationship between the number of unemployed and the total active population. This rate measures the percentage of unemployment within the active population and its calculation, as deduced from the definition, is made by dividing the unemployed population by the active population (Departamento Administrativo Nacional de Estadística, 2020).

According to Mankiw (2014), unemployment tends to have greater consequences in developing countries, because the labor market is imperfect, being the macroeconomic problem that affects people more directly and more seriously. Unemployment can be analyzed from two aspects: structural unemployment and frictional unemployment. Structural unemployment consists of unemployment caused by the differences between the qualification or location of the job offer, and the qualification or location required by the employers of the same; that is, the differences between labor supply and demand. On the other hand, frictional unemployment shows how workers, given their different preferences and abilities, stop working because these do not match the current labor supply. Many times, frictional unemployment is also generated by an information problem. This is why the job search channels analyzed in this article are mainly related to the second type of unemployment.

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2. An economic indicator that measures income inequality in a territory.

An important aspect in the entire employment issue is the job search channels, which are the specific mechanisms that people use to look for and acquire a job.

According to Lin (1999), contact networks can provide additional information to potential workers or employers about the characteristics of companies, which allows individuals to have certain advantages. Granovetter (1974) goes a little further, and argues that the network of contacts can explain to a greater extent the achievement of a job, even more than the same traditionalist theories that make references to human capital; that is, those that have to do with the accumulation of productive capacities such as years of education. Authors such as Rees (1966), Mcentarfer (2002) and Montgomery (1991) argue that employers often use personal networks in employee selection processes, especially those that derive from recommendations from their own employees, particularly the most productive; as they infer that the recommended people, due to the fact of belonging to the social circle of a productive worker, will also have high levels of productivity.

For their part, Coleman (1998), Richards and Roberts (1998) refer to the importance of social and physical capital in the search for a job. Those who have a larger social capital and better socioeconomic conditions are more likely to find a job. Usually, greater physical capital is associated with higher productive characteristics, and this, added to an extended social network, increases the chances of being employed. When physical capital is lower, there are fewer productive characteristics, less education, and likewise, the achievement of a job with better conditions is limited.

Few studies in Colombia have investigated the subject of job search channels. Viáfara and Uribe (2009) used data from the Quality of Life Survey (QLS) to study the duration of unemployment and search channels in Colombia by applying a duration model and an efficiency indicator. The authors found that job search channels are essential during the duration of unemployment. According to them, informal job search channels are more used; however, the duration of unemployment for those who use these channels tends to be longer, indicating less efficiency than in formal channels. Along this same line, Del Río *et al.*, (2012) reached differentiated results in Cartagena. The authors found that the most used means of job search are mainly classified ads generated by companies, however, the most efficient channels for finding a job are the informal ones.

For their part, Morales *et al.*, (2019) measured the effect of the Public Employment Service (PES) as a formal search channel on the probability of finding a job in Barranquilla. Using propensity score matching techniques, the authors found that those who use this type of service are more likely to find

a job. Other research focuses especially on the duration of unemployment in cities such as Cali (García and Rivera, 2017), directed at specific populations such as the "ninis" (Mora, Caicedo *et al.*, 2017), with a gender approach (Arango and Rivers, 2015; Lora, 2020), for professional unemployed (Mora, Cendales *et al.*, 2017), or analyzing unemployment from a structural approach (Arango and Flórez, 2020). However, few recent studies at the national level analyze the factors related to the use of formal and informal job search channels.

At the international level, the empirical evidence is broader. Through probability models, Brinbaum (2020) studies the main channels of access to employment by descendants of immigrants in France, where networks (family and friends) and intermediaries (public and private) play a preponderant role in finding a job. In the same sense, Goel and Lang (2019) found in Canada that networks also play an important role in immigrants acquiring a job. The greater the network of contacts, the smaller the difference in wages with compared to other workers who do not use these networks. In addition, Leschke and Weiss (2020), using limited dependent variable models, found that social networks made up of family members, friends, or acquaintances can facilitate access to the labor market and thus improve integration in the labor market in the European Union. However, some markets are segmented toward activities carried out specifically by immigrants.

Other authors such as Nicole Gürtzgen *et al.*, (2021) in Germany, and Roshchin *et al.*, (2017) in Russia, analyzed how the internet era and digital information have impacted job search channels. Both studies conclude that the Internet has become an efficient and increasingly used tool, not only by the unemployed looking for work, but also by companies looking for workers with better productive characteristics. In France, people with higher levels of education and who have already worked, prefer to search a job through a website (Mussida and Zanin, 2020). Pradeep and Muraleedharan (2018) found that in the software industry in Bangalore, the most common methods of finding employment are informal. In the same way, Oesch and Von Ow (2017) find in Switzerland that those who seek employment through social networks are more likely to find better qualified jobs with higher pay. Similarly, Ailun Xiong *et al.*, (2017) used a Probit model and obtained similar results in China; additionally, they conclude that people with more experience and education tend to conduct a formal job search.

## Methodology

According to the objective, the population of employed people living in Neiva city aged between 18 and 65 years was taken into account. This type of research is classified as non-experimental research. It is also known as *ex post facto* research. The term comes from Latin and means after the events occurred. This method is used for determining the variables that significantly influence job search channels in the city of Neiva.

The data used was taken from DANE's Large Integrated Household Survey (GEIH) for the year 2020. To determine which are the factors that affect the probability that a person will get a job through formal and informal search channel, a Probit econometric model with errors of robust standards was estimated. It allows for controlling possible problems of heteroscedasticity. This model is part of the family of models of limited dependent variables. It indicates the probability of occurrence of an event, in this case, the probability that an individual acquires a job through a formal search channel. The Probit model presents an explained variable ( $Y$ ) which has only two possible outcomes: 0 and 1. In this case, 0 equals an individual who got a job through a non-formal search channel; while 1 corresponds to an individual who got a job through a formal search channel. The model also has a vector of explanatory variables ( $X_n$ ), as the variables defined in Table 1. According to these specifications, the model is expressed as follows:

$$P(Y = 1|x) = F(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n) = F(\beta_0 + \beta x) \quad (1)$$

Where  $F$  is a standard normal cumulative distribution function that assumes values that are strictly between zero and one,  $0 < F(z) < 1$ , for all real numbers  $z$ .

Table 1. List of Explanatory Variables

| General Characteristics | Variable type                    | Sector in which employed | Variable type                                     |
|-------------------------|----------------------------------|--------------------------|---------------------------------------------------|
| Head of household       | Binary, (1) is head of household | Industry (Base category) | Binary, (1) if one works in the industrial sector |

| General Characteristics      | Variable type                                     | Sector in which employed          | Variable type                                                        |
|------------------------------|---------------------------------------------------|-----------------------------------|----------------------------------------------------------------------|
| Own housing                  | Binary, (1) has own home                          | Agricultural                      | Binary, (1) if one works in the agricultural sector                  |
| Gender                       | Binary, (1) is female, (0) is male                | Mines and quarries                | Binary, (1) if one works in the mining and quarrying sector          |
| Married                      | Binary, (1) is married                            | Health and Community Services     | Binary, (1) if one works in the health and community services sector |
| Social security              | Binary, (1) pays social security                  | Electricity, gas and water supply | Binary, (1) if one works in the supply sector                        |
| Stable job                   | Binary, (1) job is stable                         | Construction                      | Binary, (1) if one works in the construction sector                  |
| Current journey satisfaction | Binary, (1) is satisfied with the current journey | Education                         | Binary, (1) if one works in the education sector                     |
| Online job                   | Binary, (1) found online job                      | Commerce                          | Binary, (1) if one works in the trading sector                       |
| Family allowance             | Binary, (1) receives some state family allowance  | Hotels and transport              | Binary, (1) if one works in the hotel and transportation sector      |
| Job satisfaction             | Binary, (1) is satisfied with the current job     | Real estate                       | Binary, (1) if one works in the trading sector                       |
| Experience                   | Continuous, in years                              | Public Administration             | Binary, (1) if one works in the public administration sector         |
| Age                          | Continuous, in years                              | <b>Type of occupation</b>         | <b>Variable type</b>                                                 |

| General Characteristics           | Variable type                                              | Sector in which employed        | Variable type                                             |
|-----------------------------------|------------------------------------------------------------|---------------------------------|-----------------------------------------------------------|
| Log <sup>3</sup> (income)         | Continuous, measure in log.                                | House work                      | Binary, (1) if one is a house worker                      |
| Primary Education (Base category) | Binary, (1) has primary education                          | Freelance worker                | Binary, (1) if one works independently                    |
| High school graduate              | Binary, (1) has High School degree                         | Private employee                | Binary, (1) if one is a private employee                  |
| Technician                        | Binary, (1) has technical education                        | Job without remuneration        | Binary, (1) if one is a house worker without remuneration |
| University graduate               | Binary, (1) with university education                      | Laborer                         | Binary, (1) if one is a laborer                           |
| Postgraduate                      | Binary, (1) if you are postgraduate                        | Government employee             | Binary, (1) if one is a government employee               |
| Low stratum (basic category)      | Binary, (1) strata 1 and 2                                 | Other occupations               | Binary, (1) if one has other occupations                  |
| Medium stratum                    | Binary, (1) strata 3 and 4                                 | Company size (N° employees)     | Variable type                                             |
| High stratum                      | Binary, (1) strata 5 and 6                                 |                                 |                                                           |
| From 6 to 10 employees            | Binary, (1) works in a company with 6 to 10 employees      | Only one person (Base category) | Binary, (1) only one employee in the company.             |
| More than 11 employees            | Binary, (1) works in a company with more than 11 employees | From 2 to 5 employees           | Binary, (1) works in a company of 2 to 5 employees        |

3 . Log means natural logarithm, in this case, the variable Income was expressed in natural logarithm in order to linearize the variable.

Generally, Probit models are preferred to as Logit models, basically because of the normal cumulative distribution, which gives priority to the assumption of normality; in other models, such as Logit that are distributed with a logistic function, the treatment of different specification problems turns out to be more complex. The use of econometric models of limited dependent variable, as showed in the previous section, has been generalized in research related to the labor market, especially when the purpose compares two situations; for example, employed or unemployed, formal or informal employment, or as in this case: job search through formal or informal channels.

Table 1 shows the list of independent or explanatory variables that were taken into account for the estimation of the proposed econometric model. However, it is important to notice that although a significant number of variables were considered, as it can be seen in Table 1, not all appear in the subsequent tables of the results, as some of them turned out to be statistically non-significant, and according to the adjustment of the model, omitting them from the estimates was more appropriate.

## Results and Discussion

When estimating the Probit model (see Table 2), it is remarkable that age has a negative relationship with the dependent variable; that is, the older the age, the lower the probability of accessing a job through a formal search channel. Individuals who receive a family allowance are less likely to access a job through a formal search channel. If the person is satisfied with the benefits and allowances they receive it reflects a higher probability of having obtained their employment through an informal search channel. The higher the income, the greater the likelihood of getting a job through formal search channels. Gender and socioeconomic strata did not present statistical significance, so it cannot be confirmed that these variables have any relationship with formal job search channels.

**Table 2. Probit Model Estimation Results**

| Variables                    | Coefficients          | Variables                         | Coefficients       |
|------------------------------|-----------------------|-----------------------------------|--------------------|
| General Characteristics      |                       | Working Sector <sup>∞</sup>       |                    |
| Gender                       | -0.0229<br>(-0.35)    | Agriculture                       | -0.732*<br>(-1.89) |
| Age                          | -0.00626**<br>(-2.21) | Mines and quarries                | 0.228<br>(1.08)    |
| Family allowance             | -0.185***<br>(-3.07)  | Electricity, water and gas supply | 0.196<br>(0.87)    |
| Job satisfaction             | -0.197**<br>(-2.45)   | Construction                      | -0.186<br>(-1.33)  |
| Log(income)                  | 0.278***<br>(4.15)    | Commerce                          | 0.0234<br>(0.22)   |
| Medium stratum               | -0.0780<br>(-0.88)    | Hotels and transport              | -0.178<br>(-1.47)  |
| High stratum                 | -0.606<br>(-1.52)     | Real estate                       | 0.157<br>(1.12)    |
| Online job                   | -1.112***<br>(-6.82)  | Public administration             | 0.646***<br>(3.82) |
| Current journey satisfaction | 0.210**<br>(2.12)     | Education                         | 0.442***<br>(2.95) |
| High School graduate+        | 0.367***<br>(4.07)    | Health and Community Services     | 0.195*<br>(1.33)   |
| Technician                   | 0.565***<br>(5.62)    | <b>Type of Occupation</b>         |                    |
| University graduate          | 0.547***<br>(4.64)    | Private employee                  | 0.596***<br>(3.05) |
| Postgraduate                 | 0.450***<br>(2.97)    | Government employee               | 0.950***<br>(5.82) |
| Constant                     | -2.564**<br>(-2.01)   | N                                 | 2327               |
|                              |                       | Pseudo R2                         | 0.1973             |
|                              |                       | Correctly predicted percentage    | 72.8%              |

Note. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Between () the z statistic of wald test. + the base category for the educational level is "no education". ∞ the base category for the sector where the individual works is the "industrial sector".

Concerning education, technicians, high school graduates, university students and people with postgraduate degrees have greater possibilities of gaining a job through formal job search channels than those without education. Private and government employees are more likely to gain employment through formal job search channels. With respect to the working sector, those in public administration, education, health and community services sectors have higher probabilities of gaining employment through formal search channels than those in the industrial sector. Agricultural workers are more likely to gain employment through informal job search channels. There is no statistical significance in the other economic sectors.

The goodness-of-fit of the pseudo- $R^2$  model of measures shows that the variation of the independent variables explains 19.73% of the variation of the probability of gaining employment through formal search channels. The percentage of correct prediction is 72.8% of the time, which indicates the accuracy of the estimated model of correct prediction for both the probability of gaining employment through formal and informal channels.

**Table 3.** *Marginal Effects of Explanatory Variables*

| Variables               | COEF.                       | Variables                           | COEFF.                  |
|-------------------------|-----------------------------|-------------------------------------|-------------------------|
| General Characteristics |                             | Sector where one works <sup>∞</sup> |                         |
| Gender                  | -0.0085997<br>(-0.02452)    | Agriculture                         | -0.224275**<br>(-0.087) |
| Age                     | -0.0023472**<br>(-0.00106)  | Mines and quarries                  | 0.0882373<br>(0.08317)  |
| Family allowance        | -0.0694325***<br>(-0.02263) | Electricity, gas and water supply   | 0.0755528<br>(0.08847)  |
| Job satisfaction        | -0.0740123**<br>(-0.03017)  | Construction                        | -0.067427<br>(-0.049)   |
| Log (income)            | 0.1043426***<br>(0.02513)   | Commerce                            | 0.008802<br>(0.0394)    |
| Medium stratum          | -0.0289661<br>(-0.03251)    | Hotels and transport                | -0.064894<br>(-0.04284) |
| High stratum            | -0.1939013<br>(-0.10159)    | Real estate                         | 0.0602433<br>(0.05462)  |

| Variables                    | COEF.                       | Variables                     | COEFF.                    |
|------------------------------|-----------------------------|-------------------------------|---------------------------|
| Online job                   | -0.4172493***<br>(-0.06183) | Public Administration         | 0.2513487***<br>(0.0654)  |
| Current journey satisfaction | 0.0789017**<br>(0.03718)    | Education                     | 0.1727***<br>(0.05932)    |
| High school graduate         | 0.1399012***<br>(0.03453)   | Health and Community Services | 0.0747382*<br>(0.04596)   |
| Technician                   | 0.21285895***<br>(0.03894)  | <b>Type of Occupation</b>     |                           |
| University graduate          | 0.2129003***<br>(0.04607)   | Government employee           | 0.3650056***<br>(0.09076) |
| Postgraduate                 | 0.1755781***<br>(0.05981)   | Private employee              | 0.2066404***<br>(0.06058) |

Note. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Between () the standard error. + the base category for educational level is "no education." ∞ the base category for the working sector is "industrial sector."

Marginal effects were estimated for the analysis of the magnitude of the parameters, which indicate how marginal changes of one unit affect the change in the predicted probability. These estimates are illustrated in Table 3. As noted, an increase in age decreases the probability of gaining employment through formal search channels by 0.23%. With respect to education, results show that people with high school degrees are 13% more likely to gain employment through formal search channels than those without education, while people with university or technical degrees are 21% more likely to gain employment through formal search channels than people without education. Likewise, those with postgraduate education are 17% more likely to gain employment through formal search channels. In general, higher levels of education are associated with a higher probability of gaining employment through formal search channels.

However, people who receive a family allowance are 6.9% less likely to gain employment through formal search channels than those without family allowance. For 1% income increase, the probability of gaining employment through formal search channels increases by 0.1%. Higher socioeconomic conditions are related to a higher probability of gaining employment through informal search channels.

In terms of occupational position in current employment, government employees have 36.5% higher probability of gaining employment through

formal search channels than other employees, while for private sector employees, this probability accounts for 20.6%. Likewise, people who are satisfied with the benefits provided in their current jobs are 7.8% less likely to gain employment through formal search channels than people who are not satisfied, networks or social capital allow them to find jobs with better conditions. With respect to the branch of activity, workers from the agricultural sector are 22% less likely to gain employment through formal search channels than those working in industry; on the other hand, for those working in the educational sector, the probability of gaining a job through formal search channels is 17.2% higher than in the industrial sector. A similar situation occurs with employees in the public administration, health and community services sectors.

Table 4 shows the marginal effects estimates for the binary variables. The statistical significance for each variable, with their respective categories, did not change with those presented in Tables 2 and 3; therefore, these were not incorporated into Table 4.

Results indicate that high school graduates have 46.2% of probability of gaining employment through formal search channels, while technicians have 52.4% of probability, and those with graduate degrees have 51.7% of probability. As educational levels increase, the greater the probability of gaining employment through formal search channels, because education provides individuals with greater productive characteristics to enter the labor market with a higher level of qualification.

These results coincide with those obtained by Uribe et al., (2007) who state that people with technical, high school, and university education levels present a higher probability of gaining employment through formal search channels compared to people without education. According to Oviedo (2007), if the level of education increases, the probability of choosing and gaining a job through formal search channels methods increases. In contrast, Quiñones (2010) found no relationship between years of education and job search through formal channels, he concluded that investment in human capital is not significant for gaining a job in a formal environment, a situation that goes against intuition.

**Table 4.** Probabilities of Gaining a Job through Formal Search Channels According to the Categories of the Explanatory Variables

| Variables                                | Cat.   | P.    | Variables                              | Cat. | P.    |
|------------------------------------------|--------|-------|----------------------------------------|------|-------|
| Education (cat. Base: Without Education) |        |       | Working Sector (cat. Base: industry)   |      |       |
| High school student                      | 0      | 0.352 | Mines and quarries                     | 0    | 0.385 |
|                                          | 1      | 0.462 |                                        | 1    | 0.458 |
| Technician                               | 0      | 0.346 | Sum. electricity, gas and water supply | 0    | 0.385 |
|                                          | 1      | 0.524 |                                        | 1    | 0.446 |
| University graduate                      | 0      | 0.360 | Construction                           | 0    | 0.391 |
|                                          | 1      | 0.533 |                                        | 1    | 0.335 |
| Postgraduate                             | 0      | 0.372 | Commerce                               | 0    | 0.385 |
|                                          | 1      | 0.517 |                                        | 1    | 0.392 |
| Stratum (cat. Base: low strata)          |        |       | Hotels and transport                   | 0    | 0.393 |
| High stratum                             | 0      | 0.388 |                                        | 1    | 0.339 |
|                                          | 1      | 0.223 | Real estate                            | 0    | 0.383 |
| Medium stratum                           | 0      | 0.391 |                                        | 1    | 0.432 |
|                                          | 1      | 0.367 | Public Administration                  | 0    | 0.352 |
| General Characteristics                  |        |       |                                        | 1    | 0.567 |
| Family allowance                         | YES    | 0.422 | Education                              | 0    | 0.378 |
|                                          | NO     | 0.367 |                                        | 1    | 0.517 |
| Job satisfaction                         | YES    | 0.398 | Health and Community Services          | 0    | 0.379 |
|                                          | NO     | 0.338 |                                        | 1    | 0.439 |
| Online job                               | YES    | 0.719 | Agriculture                            | 0    | 0.388 |
|                                          | NO     | 0.368 |                                        | 1    | 0.195 |
| Current journey satisfaction             | YES    | 0.380 | Private employee                       | 0    | 0.261 |
|                                          | NO     | 0.445 |                                        | 1    | 0.417 |
| Gender                                   | Male   | 0.390 | Government employee                    | 0    | 0.329 |
|                                          | Female | 0.383 |                                        | 1    | 0.649 |

The economic sector of education and public administration show 51.7% and 56.7% of probability, respectively, to gain employment through formal search channels. These sectors are characterized by more formal hiring activities with pre-established hiring processes. Sectors as agriculture show 19.5%

of probability. These types of economic activities are less formal and are characterized by poorly defined and more traditionalist processes. In this sense, private employees (41.72%) are less likely than government employees (64.90%) to access employment through a formal search channel.

Table 5. *Estimation of Probability According to Age*

| Age          | Probability  | Age          | Probability  |
|--------------|--------------|--------------|--------------|
| 18 years old | 0.4147698*** | 43 years old | 0.355041***  |
| 23 years old | 0.4026155*** | 48 years old | 0.3434606*** |
| 28 years old | 0.3905547*** | 53 years old | 0.3320253*** |
| 33 years old | 0.3785982*** | 58 years old | 0.3207443*** |
| 38 years old | 0.3667569*** | 63 years old | 0.3096265*** |

Note. \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

An important contribution of Probit models is that the probability can be estimated over the entire distribution of a continuous variable. This is one of the main differences with respect to linear probability models, where the effect of a continuous variable such as age can be estimated, which does not necessarily have to be linear. In this case, the age variable presents a probability distribution that is estimated in five-year intervals from 18 to 63 years of age. Estimates show that individuals aged 18 are 41.47% more likely to find a job through a formal search channel, while for individuals aged 63, this probability decreases to 30.96%. This shows an inverse relationship between age and the probability of finding employment through a formal job search method, as people increase their years of life, expand their social circle and acquire more work experience, making it less likely that they will find employment through formal channels; as, taking advantage of their social capital, they seek to access a job in which they achieve a higher level of job satisfaction (see Table 5). According to Fernández (1991), this may be caused by the diminishing returns of approaching older ages and the obsolescence of human capital; older age implies access to informal channels, contacts and friends to find a job. Along the same lines, Varela-Llamas and Nava (2015) also found that, at older ages, individuals are less likely to seek employment to improve income, which is reasonable due to a decline in the marginal productivity of labor over time.

## Conclusions

Unemployment is one of the main economic problems that countries such as Colombia face on a daily basis, as it affects especially the most vulnerable population with less productive characteristics. The interaction between supply and demand for employment is not always effective, and these mismatches, which have become a challenge for modern economies, can lead to unemployment problems; hence the importance of implementing job search channels that respond to the needs of the market. But the channels that should be especially encouraged are the formal ones, since this would indicate that the labor market is more institutionalized, and finding supply and demand is more agile. If the presence of informal channels is higher, this indicates that there is a labor market that adjusts much slower, thus the matching between vacancies and unemployed is inefficient.

The results of the estimated Probit model show that the higher the age, the lower the probability of getting a job through a formal search channel. In certain activities, people's productivity tends to decrease over time, hence the need to turn to family and friends, that is, to their own social capital, which should be greater as they get older.

Education is an important aspect of an individual's personal and professional development. Higher levels of education are associated with higher probabilities of accessing the labor market through a formal search channel. More education allows the individual to have more tools to compete for a job and to rely less on social capital (informal channels) to obtain employment. This is an important aspect, as it is a signal from the market that education truly increases the probability of accessing the labor market.

Individuals with favorable economic conditions have lower probabilities of accessing employment through a formal search channel; this is a matter of endowment, generally people with higher incomes have higher levels of education, which allows them to access jobs more in line with their abilities. Likewise, people who receive some type of family subsidy, present a greater probability of accessing the labor market, but through informal channels; this result makes sense, since individuals who receive this type of state support are generally people with low income levels and few productive characteristics (little education and experience), so they have few tools to compete in the labor market, and the easiest way to access the labor market is through recommendations from friends and acquaintances.

With respect to the branches of economic activity, individuals in education, public administration, health, and community services sectors have the

highest probability of accessing a job through a formal channel, while those in the agriculture sector have the lowest probability. In both cases, the level of formalism of each sector has a great deal to do with both market participation and the different contracting processes they carry out. In the first group there is a demand for employees with higher levels of qualification, who are more easily found in the labor market, since the unemployed with better qualifications compete there and companies have the option of choosing according to the productive characteristics of the individuals. In other sectors, labor profiles with lower levels of qualification are in demand, to develop more generalized or mechanized activities; therefore, it is easier to resort to informal channels to hire people, since the cost of using the channel is lower.

Alternatively, government employees have a higher probability of getting a job through a formal search channel; this seems a paradoxical result considering that the government sector is characterized by granting jobs according to the affinity with the politician in office, that is, the use of informal channels is more common. However, this result can be explained by the policy of public competitions through the National Civil Service Commission, which during the last 15 years has carried out more than 70 calls to fill public positions in different state institutions at all territorial levels. Private employees are also more likely to access employment through a formal search channel.

Likewise, workers who obtain employment through friends and family contacts are more satisfied with the job, indicating that informal channels apparently offer jobs where individuals are more satisfied, either because of the activities they perform and/or the salary levels. Similarly, the study revealed that one of the most relevant factors in determining which job search channel to select is education. In all the results found, it plays an important role, either directly or indirectly. This result is in line with those found in other regions of the country; however, it is considered pertinent to design training strategies, especially at the high school and technical and technological education levels, focused on the efficient use of formal job search channels.

The role of education is fundamental in job search processes; therefore, it is not only important to invest in education in the early stages of academic life, but also in a constant learning offer. This can help mitigate the age issue, because as people get older, the likelihood of using formal job search channels decreases.

Finally, it is suggested that future research could address the assessment of changes (if any) in the job-seeking behavior of the unemployed during and after the COVID-19 pandemic, because the social distancing norms put in place – to prevent the spread of the virus – might have contributed to an increased preference for certain channels.

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