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ANALYSIS OF THE INFORMAL SECTOR IN COLOMBIA IN THE LATE 2010's

Autor

Cheick Atji

COLOMBIA CIENTÍFICA
Conocimiento Global para el Desarrollo

ALIANZAEFI
Economía Formal e Inclusiva

Informality And Labour Market In Latin America

ANALYSIS OF THE INFORMAL SECTOR IN COLOMBIA IN THE LATE 2010's

By Cheick Atji[1]

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Abstract

We study the weight of informality in the Colombian labour market and wage consequences in extensive and intensive margins. Using **EMICRON** (*Encuesta de Micronegocios 2019)* data over 86,969 micro and small firms, our analysis show that four fifths operate in the informal sector and employ more than two thirds of workers. We also find a high intensive margin of informality in the Colombian context. The differentials in performance between formal and informal firms are not systematically related to industries in which they operate, but to internal characteristics of both sectors in terms of size and productivity. Our econometric estimates on the wage gap are statistically significant. An informal worker is paid 85% less than a formal worker in extensive margin and 62% in intensive margin. These estimates also indicate that the minimum wage is a good variable for measuring informality among workers in Colombia. Finally, we find out that our results are very consistent with most literatures on informality and stylized facts in low and middle-income countries.

[1] Atji graduated from a master's degree in economic expertise of development policies and projects from University of Paris 1 and a master's degree in applied economics from the University of Paris Cité. He works on health, education and labour market topics. atjicheick@gmail.com, Paris France

Foreword

This paper is the result of a 4-months research internship at the Institute of Research for Development (IRD) in Nogent-sur-Marne, France, in order to get my Master's degree in Economic Expertise of Development Policies and Projects. I worked in close collaboration with my internship supervisor Mr. Alain DESDOIGTS and a very dynamic and competent Colombian team[2]. The research work consisted in exploring, analysing and understanding the information of a new database EMICRON 2019 (Encuesta de Micronegocios 2019) built by the National Administrative Department of Statistics of Colombia (DANE) on Colombian microenterprises.

The subject choice is closely related to the characteristics of developing countries where informality remains a main component. Hence the purpose to understand the characteristics of informality, the strengths and dynamics that govern its functioning. The main objective was, on the one hand, to enhance and deepen my skills in data analysis with STATA and R-studio software. On the other hand, to extract and produce information on the informal sector in general and on the Colombian context in particular, while building on a pre-existing work, that of Gabriel Ulyssea (2018). Equally important was to conduct comparative analyses between Ulyssea (2018) results on Brazil and my results on Colombia, with a view to identify trends. Getting the data from DANE was easy. The cooperation with my internship supervisor and the Colombian team was done in a pleasant and very professional environment. A particular difficulty throughout the work was defining informality. And we spent a lot of time and work for that.

[2] I thank all the Colombian teaching staff for their help in the Colombian context. I am thinking in particular of **Mrs. Cristina FERNANDEZ**, **Mr. FERNANDO Jaramillo** professor at the University of Rosario, **Mr. Andres GARCIA Suaza, Mr. Juan Miguel GALLEGO, Mr. Camilo RIOS and Mr. Marlon SALAZAR**. They all provided me with tools and information that were of vital importance to my work. Their knowledge of the Colombian socio-political context, its labour market, its regulations in relation to the creation and operation of companies and the EMICRON 2019 database, have been of inestimable value to me. I would also like to express my gratitude to **Mrs. Tania GARCIA** of the National Administrative Department of Statistics of Colombia (DANE), for the clarification she gave me on the structure of the EMICRON 2019 database.

Summary

1 GENERAL INTRODUCTION

1.1 **Introduction**

Until the mid-1950s, early dualist approaches of structural change, such as the models of Rostow (1960) and Lewis (1954), considered that traditional poor economies could be transformed into modern, dynamic economies through a process combining appropriate economic policies and massive capital inflows from potential investors. A process that today's developed countries have gone through. The traditional or nowadays informal sector was supposed to disappear in this process, with the expansion of a modern formal sector that would absorb the abundant and unlimited labour force[3]. But contrary to these expectations, a large majority of developing countries have failed to develop a modern economy capable of providing adequate employment opportunities to their population. This is the case in Sub-Saharan Africa, India, some Southeast Asian countries such as Laos and Cambodia, Haiti, Eastern European countries such as Moldova and Kosovo, Central Asian countries such as Afghanistan and Nepal, Latin American countries such as Colombia, which is our field of study, and many others, where the informal sector and informal employment are still very much present, occupying a large part of the active population.

The informal sector occupies more than 60% [4]of the active population in the world. Informality is present in all countries, regardless of their level of development. According to the 2018 report of the International Labour Organization (ILO), 85.8% of jobs in Africa are informal, 68.2% in Asia and the Pacific, 68.6% in the Arab States, 40% in America and 25.1% in Europe and Central Asia. These figures show that the informal sector remains a major source of employment in many countries, where it is composed of *self-employed* workers, small enterprises, without formal structure or organization of capital, and casual employment.

The informal sector is not only a source of employment. It is also a source of production of goods and services for consumption by poor, middle-income and wealthy households. Its contribution to gross value added in many countries is very large, although its role in tax (Áureo and Scheinkman 2010) and government revenue leakage remains problematic.

[3] In his 1954 article entitled "*Economic Development with Unlimited Supplies of Labour"*, considered to be the very founding article of development economics, Arthur Lewis shows that the traditional sector is not only very abundant in labour force but also characterized by a high rate of disguised unemployment (surplus workers not essential to production)

[4] International Labour Organisation (2018)

This contribution ranges from 14% [5]in Eastern European and Central Asian countries to nearly 50% in Sub-Saharan African countries.

In spite of all its contributions, the sector is very much associated with low human capital, low incomes and wages, precarious forms of work and non-compliance with current social and fiscal norms, making its companies and workers very vulnerable to economic changes and shocks (case of COVID-19).

All these characteristics attributed to the informal sector often make it very poorly understood.

Indeed, stylized facts show that there is some interaction between formal and informal sectors, where formal firms exploit informal workers (Ulyssea 2018) and subcontract with informal firms (Áureo and Scheinkman 2010). These new facts not only challenge dualist approaches of structural change but also a part of our knowledges about the characteristics attributed to the informal sector and everything related to it.

These findings define our research framework. It aims to provide new knowledges and facts, through the Colombian context. The objective is to explore a new database (EMICRON 2019), in order to generate information that corroborates the aforementioned stylized facts and part of what has already been mentioned in the literature on informality.

This dissertation is organized as follows: in the first part, we present the host organization of the internship. In the second part, we review the literature on informality, especially the definitions adopted around the concepts of informal sector and informal employment. In the third part, we carry out statistical analysis on the Colombian informal sector. Finally, we conclude.

1.2 Motivation and object

Our main motivation is to provide relevant statistical information on the organization and structure of the Colombian labour market, its microenterprises and its informal sector.

The purpose of our study will be to establish stylized facts about the Colombian context through the exploration and analysis of EMICRON 2019. This will allow us to make comparisons between the formal and informal sectors in Colombia and to be able to establish trends with other Latin American countries such as Brazil and Mexico.

[5] International Labour Organization 2018, 2012 figures (ILO)

1.3 Context: Colombia, socio-economic environment and labour market

4th largest economy in Latin America and on its way to becoming the 3rd most populated country in Latin America with an estimated population of 50,882,884 [6]peoples (2020), Colombia is one of the oldest democracies in Latin America. Its capital Bogota alone has more than 9 million peoples. The Colombian economy derives a large part of its GDP mainly from the production and export of coffee and fossil resources (coal, emeralds, oil and natural gas), which constitute its most dominant export products. In 2018, fuels and industrial extraction products (especially oil and coal) accounted for 60% [7] of its exports. However, this dependence on fossil resources seems to be disappearing in recent years with the emergence of the service sector, which accounts for more than 59.7% [8] of GDP (2019) and employs nearly 64.1% of the Colombian workforce. The country is currently led by Ivan Duque, president of the republic since 2018.

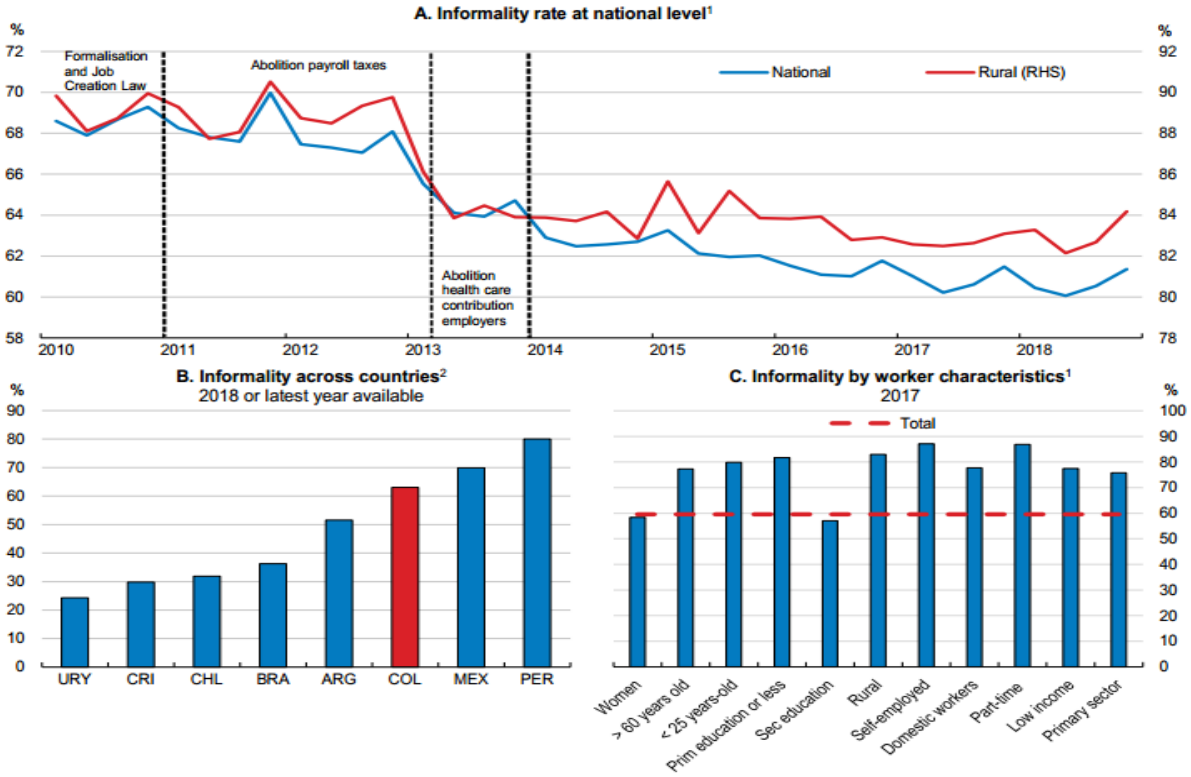
Economically, Colombia has achieved good economic performance, the last decade. Its annual growth rate is respectively 1.35% in 2017, 2.56% in 2018 and 3.28% in 2019 with a level of inflation that went from 4.3% in 2017 to 2.5% in 2020 (World Bank, database). Its GDP per capita remains stable with an average of $6,509 per capita between 2017 and 2019. In addition, the real effective exchange rate of its currency (USD/peso rate) has remained stable[9] between 2016 and 2019, making it a relatively stable and resilient economy. In terms of business climate, it is a very attractive country for investment. The 2020 doing business report ranks it 67th in the World ahead of Brazil (124th position). In 2018, among Latin American and Caribbean countries, it ranked 1st in terms of obtaining credit, 1st for the protection of minority investors, 3rd for property rights and 4th in the ease of doing business.

However, its corporate tax rate is relatively high (33%). A situation that prevents small and medium enterprises (companies with 1 to 9 employees represent 87.2% of Colombian companies (OECD 2019)) representing the largest proportion of Colombian business operators from prospering properly; thus pushing them to operate in the black (informal sector). Figures from 2018 showed that the proportion of informal workers, defined as those who do not contribute to the pension system or health insurance, was 33%. Also, it must be added to this that self-employment one of the most widespread forms in Colombia and essentially informal

[6] World Bank, 2020
[7] Embassy of Switzerland in Colombia, Economic Report 2018
[8] World Bank, 2019
[9] OECD, economic studies on Colombia, 2019

represents 43% of total employment (OECD 2019). **Figure 1** as below shows the extent of informality in Colombia and compared to other Latin American countries.

Figure 1: **Informal activity rate in Colombia, (OECD 2019, extract from economic studies on Colombia, p70)**



Despite the downward trend observed in recent years, the level of informality remains high in Colombia. Compared to other Latin American countries, Colombia has a level of informality of more than 60% after Mexico and Peru.

Socially, Colombia has made significant progress in the fight against poverty. Between 2010 and 2018, it has lifted 4.7 million [10]people out of poverty and 2.8 million out of extreme poverty (World Food Program, 2021). This result is linked to its two social programs, *Red Unidos, Mas Familias en Accion and Jovenes en Acccion, and the Mas Familias en Accion program*, both of which provide means-tested income and in-kind transfers to families living in extreme poverty.

Nevertheless, there are still strong inequalities in Colombia in terms of income. Indeed, the interdecile ratio (D9/D1) shows that households in the decile of richest individuals (D9) receive much higher income benefits and transfers than those in the first decile (poor households). The D9/D1 ratio is about 9 (OECD, 2019), indicating that the income gap between wealthy and poor

[10] World Food Programme, Projected Country Strategic Plan - Colombia (2021-2024)

households is 9 times higher than the income of poor households. This gap becomes larger in rural areas. In addition, the coverage of the pension system is limited and inequitable. It is estimated that only about one in three people of retirement age receives a contributory pension. This is related to the eligibility criteria for the retirement pension, for which only less than 20% of current retirees are eligible. This low coverage of the pension system reflects not only the importance of informality in the Colombian context but also the Colombian constitutional rule that ***"the minimum pension must be at least equal to the minimum wage"***, which obviously tends to exclude a large part of the population from the contributory system, given the high level of the minimum wage.

As far as the labour market is concerned, the Colombian government still needs to make significant efforts. Indeed, its unemployment rate has continued to rise over the past three years, from 9.11% in 2018 and 9.96% in 2019 to 15.44% in 2020 (World Bank, database). An increase often attributed to the level of the minimum wage, which itself has continued to increase from 781,242 Colombian pesos in 2018 to 828,116 in 2019 and 877,803 in 2020[11]. The 2015 OECD report also showed that the minimum wage represented 86% of the median wage, the highest level in the OECD area. This situation is pushing more and more Colombian companies, especially small and medium-sized ones, to move into the informal sector where labour costs are sustainable. Also, we must take into account the massive arrival of migrants from the Bolivarian Republic of Venezuela. The number of Venezuelan migrants has increased from 39,000 in 2015 to 1.76 million in July 2020 (Projected Country Strategic Plan - Colombia 2021-2024).

Finally, recent events related to President Ivan Duque's tax reform aimed at collecting $6.3 billion to replenish public coffers have had a significant impact on the Colombian economy. It suffered a recession due to the social movements of the middle and lower classes, which were the main populations affected by this reform. In addition, the reform included a broadening of the income tax base and a 19% VAT increase on goods and services[12]. A project that has finally been aborted for the time being.

Other factors are also responsible for the disruption of the labour market and the Colombian economic crisis. These include the conflict with the Revolutionary Armed Forces of Colombia

[11] https://fr.countryeconomy.com/marche-du-travail/salaire-minimum-national/colombie
[12] https://www.france24.com/fr/am%C3%A9riques/20210506-colombie-pourquoi-la-col%C3%A8re-sociale-ne-retombe-pas

(FARC), which is destabilizing the social and economic environment, but which we will not address in this section.

2 PRESENTATION OF THE HOST INSTITUTION: IRD

2.1 History and creation of the institution (1944)

Created in 1944, the Institute of Research for Development (IRD) is a public scientific institution under the dual supervision of the Ministry of Higher Education, Research and Innovation and the Ministry of Europe and Foreign Affairs.

At beginning (1943), the IRD existed under the name of the **Office de la Recherche Scientifique Coloniale (ORSC)** whose missions were to constitute a body of researchers, to create a high level scientific training specialized in the tropical world, and to set up research centers in the French Overseas Territories. The idea was to promote research in the French colonies, particularly in Africa, as a response to the awareness of the harmful effects of intensive peanut production in Senegal in the 1930s. This production caused soil wear, population displacement, food crop problems and the rise of demands for decolonization. The ORSC then evolved into the **ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer)** in 1953.

Following the independence of African states in the 1960s, ORSTOM set itself two main objectives: to promote France's policy of scientific and technical cooperation with countries known at the time as "Third World" [13]and to undertake fundamental research for their development. During the decades that followed the independence movements, the Office strengthened its organization and infrastructure in the French Overseas Departments and in Africa, and developed cooperation with countries in South America, Southeast Asia, and certain Arab states. In 1984 (by the Decree of June 5, 1984), it took the status of public establishment with scientific and technological character (EPST) [14]and passed under the supervision of the

[13] The Third World is a term coined in 1952 by the French economist Alfred Sauvy. He was referring to the non-industrialized countries in reference to the Third Estate under the old French regime. The third state was that part of the population that was excluded from the privileges of the nobility and the clergy.

[14] EPSTs are legal entities under public law with administrative and financial autonomy. Their main purpose is neither industrial nor commercial. Their mission is to implement the objectives defined by article L.112-1. Their mission is to implement the objectives defined in article L.112-1: the development and progress of research in all fields of knowledge; the valorization of research results; the sharing and dissemination of scientific knowledge; the development of a capacity for expertise; training in and through research. https://ics.utc.fr/parfaire/structure/co/04_orgStruc_03_local_02_etabPublicEPST.html

ministries of Research and Cooperation. By a new decree of November 5, 1998, ORSTOM became the Institute of Research for Development (IRD).

This new organization will create, in partnership with universities and EPST, mixed research units (UMR), international mixed units (UMI) and mixed services units (UMS) divided into (5) scientific departments namely:

- INTERNAL AND SURFACE DYNAMICS OF CONTINENTS **(DISCO)** **(see appendix 1)**
- ECOLOGY, BIODIVERSITY, AND FUNCTIONING OF CONTINENTAL ECOSYSTEMS **(ECOBIO)** **(see appendix 2)**
- OCEANS, CLIMATE AND RESOURCES **(OCEANS)** **(see appendix 3)**
- HEALTH AND SOCIETIES **(SAS)** **(see appendix 4)**
- SOCIETIES AND GLOBALIZATION **(SOC)** **(see appendix 5)**

IRD's priorities are in line with the implementation, associated with a critical analysis, of the Sustainable Development Goals (SDGs), with the aim of orienting development policies and responding to the major challenges linked to global, environmental, economic, social and cultural changes that affect the entire planet.

In France, the IRD is represented by **(4) large delegations**:

- **The South-East regional delegation** which includes: The South Provence-Alpes-Côte-D'Azur and Auvergne Rhône Alpes regions. In these areas, the delegation supports 18 research structures (including 2 observatories of the sciences of the universe and 2 associated units) spread over the sites of Aix-Marseille, Nice, Grenoble, Clermont-Ferrand. It also responds to the needs of the IRD headquarters' departments, services and missions.
- **The Occitania regional delegation**, based in Montpellier, supports 29 units located in Montpellier, Toulouse, Bordeaux, Sète and Perpignan.
- **The Île-de-France regional delegation** supports 22 research units.
- **The Western regional delegation, in the Brittany region**, supports 4 large research units specialized in marine sciences.

Worldwide, the Institute is present in:

- **West and Central Africa (9 countries):** Benin, Burkina Faso, Cameroon, Ivory Coast, Ghana, Guinea, Mali, Niger and Senegal.

- **Southern and Eastern Africa and the Indian Ocean (5 countries):** Kenya, Reunion, Madagascar, Seychelles and South Africa.
- **Latin America and the Caribbean (10 countries):** Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Martinique, Mexico and Peru.
- **Asia (5 countries):** Cambodia, Indonesia, Thailand, Laos and Vietnam.
- **Mediterranean (3 countries):** Lebanon, Morocco and Tunisia.
- **Pacific (2 countries):** New Caledonia and French Polynesia.

The institute has been headed by Mrs. Valérie Verdier, President and CEO, since February 12, 2020 and its headquarters are located in Marseille since 2008 (previously in Paris).

2.2 Research fields, missions and laboratories

IRD's research programs are designed to provide development assistance to countries in the South. These programs focus on human and social sciences, health sciences and natural and environmental sciences. They can be summarized in (5) major themes:

→ Improving the health of populations
→ Preservation of biodiversity
→ Understanding global changes, quantifying hazards and reducing risks
→ Sustainable management of ocean resources
→ Understanding the societies of the tropical and Mediterranean space

IRD's primary mission is to produce science focused on the intertropical and Mediterranean area, through scientific partnerships with higher education and research actors of the countries and regions concerned.

In this context, the IRD contributes to the advancement of scientific knowledge on sustainable development and to help better base development policies on science.

IRD's missions are located at (4) levels:

→ Promoting scientific research of excellence
→ Building equitable partnerships based on shared objectives and means
→ Share knowledge and know-how
→ Innovating and valorizing intellectual property

As far as its human and work environment is concerned, the Institute has 2050 employees, including 850 researchers and 1200 engineers and technicians (29% of whom work outside metropolitan France). The research units and laboratories are constituted as follows

- **75 units** including
  - → 1 labelled research team (ERL)
  - → 8 associated units (UA)
  - → 5 International Joint Units (UMI)
  - → 53 mixed research units (UMR)
  - → 7 mixed service units (UMS) including 6 Observatories of the Sciences of the Universe (OSU)
  - → 1 Service Unit (US)
- **37 International mixed laboratories (LMI)**
- **40 Young teams associated with IRD (JEAI)**
- **21 International South Research Groups (GDRI sud)**
- **8 Interdisciplinary and Partnership Structuring Programs (IPSP)**

3 LITERATURE REVIEW ON INFORMALITY

3.1 **Definitions of informality (informal sector and informal employment)**

3.1.1 International Labour Office (ILO) definitions

To date, there is really no international definition of the informal sector and informal employment that is unanimously accepted by the community of economists and statisticians. This is due to the complex nature of informality and the different structures, economic models and legislation in force in each country. This reality makes it difficult to adopt a definition that can be applied without restriction to all countries.

However, both the ILO have succeeded in establishing international standards and criteria for defining the informal sector and informal employment. According to the definition adopted at the 15th International Conference of Labour Statisticians (ICLS) in 1993, the informal sector is defined as ***"a set of units producing goods and services primarily to generate employment and income for the persons concerned. These units, having a low level of organization, operate on a small scale and in a specific manner, with little or no division between labor and capital as factors of production. Labor relations, where they exist, are based primarily***

on casual employment, kinship, or personal and social relationships rather than on contractual agreements with formal guarantees." [ILO, 1993]. From this definition, a number of criteria **(7)** are established by the ILO to characterize the informal sector:

1. **The institution to which they belong (government, enterprises, NGOs, private sector, households),** allowing the isolation of economic units that do not have a formal and conventional status.
2. **The final destination of production**, which aims to exclude enterprises whose final production is exclusively for their own final use.
3. **Registration of the economic unit under national legislation**, which concerns the registration of the unit with social security bodies and tax authorities responsible for collecting sales or income tax.
4. **Accounting**, which determines whether the business entity maintains a set of accounts required by law (e.g. balance sheets) or formal accounting.
5. **Employer's social security contribution or declaration of labour income.**
6. **The size of the economic unit**, as the informal sector is characterized by small enterprises (e.g. self-employed).
7. **Workplace,** which distinguishes between economic units that operate in the owner's home, on the street, on construction sites, on agricultural plots, etc., and economic units with fixed and visible premises, such as offices and factories.

Regarding the definition of informal employment, the same ILO convention defined any individual (worker or employer) as being informally employed if he or she is working in an informal enterprise. Hence, the informality of employment is determined by the informality of the sector in which the enterprise operates. Thus, according to the ILO, ***"own-account workers (without employees) operating in an informal enterprise are considered to be informally employed. Similarly, employers (with employees) operating an informal enterprise are considered to be informally employed. All contributing family workers in the family business are considered informally employed, regardless of whether they work in formal or informal enterprises."***[15]

[15] ILO 2018, Women and men in the informal economy, a statistical overview

Figure 2.1: Criteria for operational definition of the informal sector, (Source ILO, 2018)

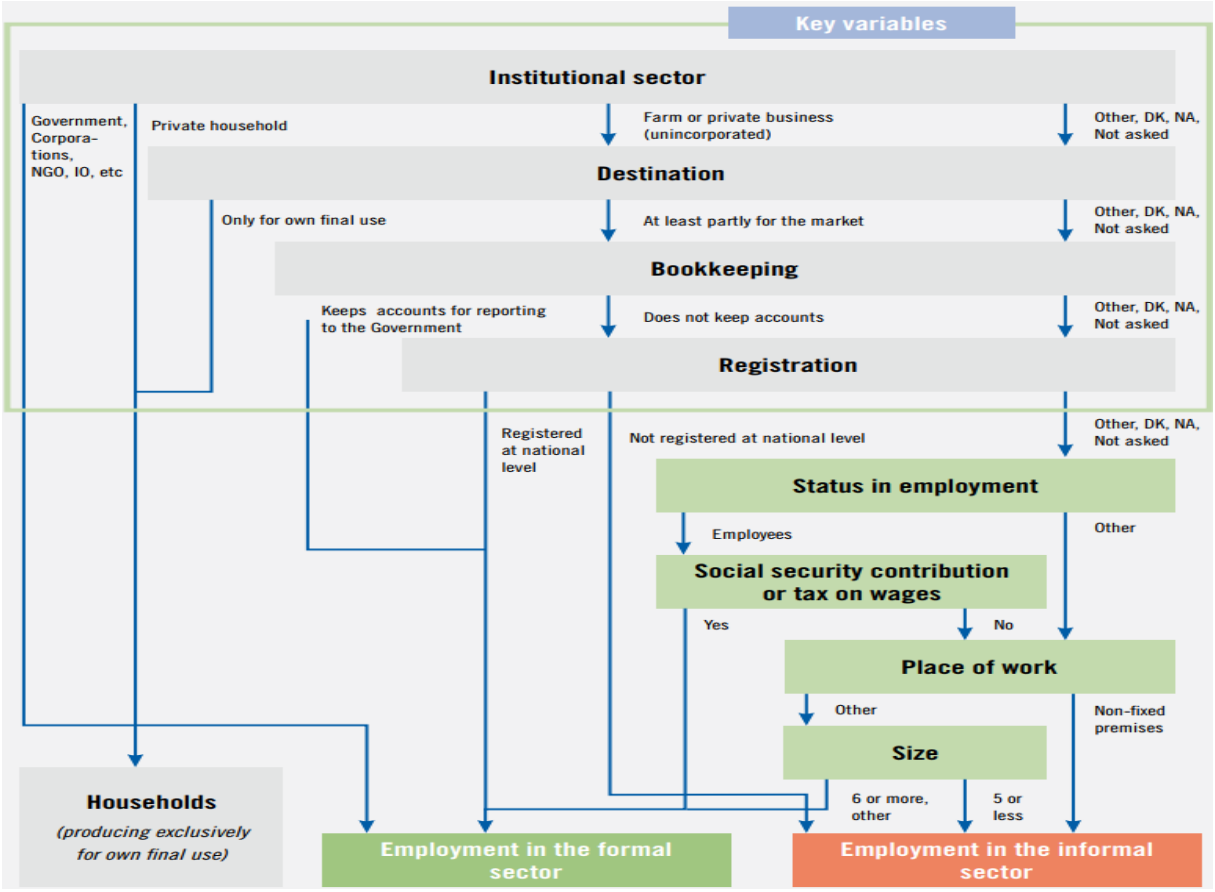
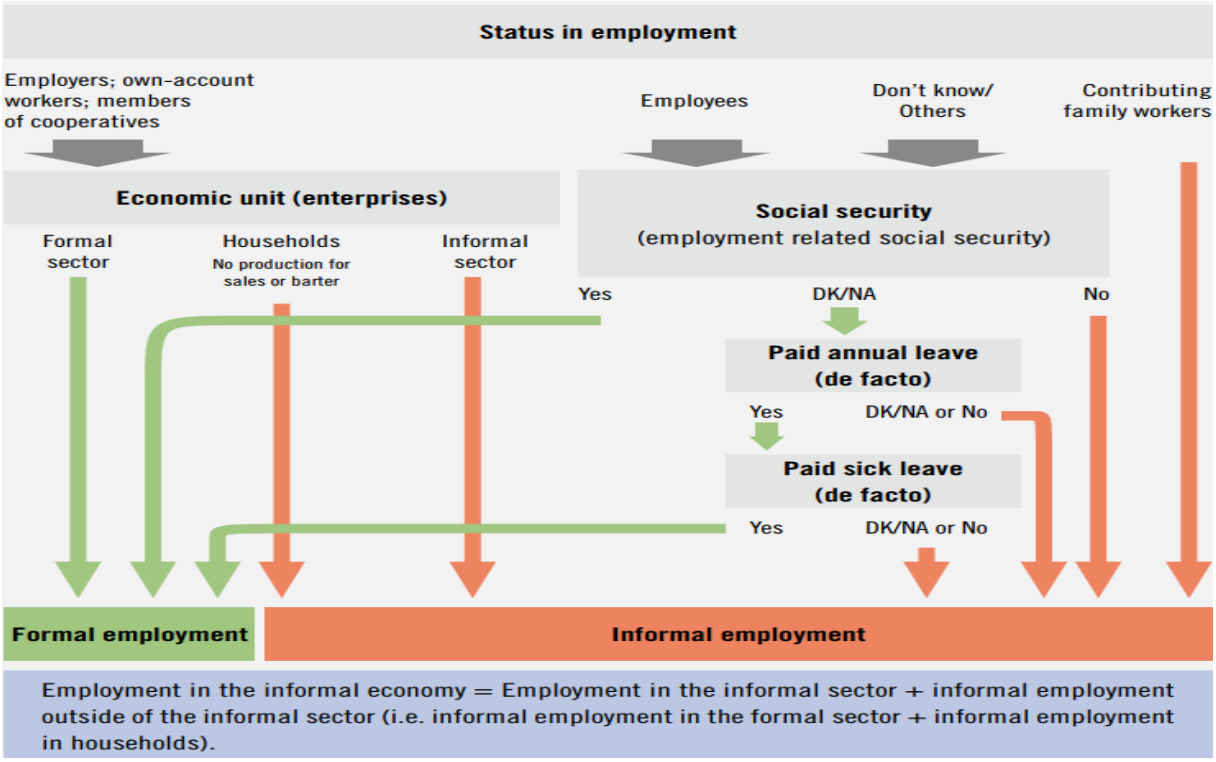


Figure 2.2: Criteria for an operational definition of informal employment, (Source ILO 2018)



3.1.2 Definitions from Ulyssea (2018)

The reason we highlight the definition of the concepts of employment and informal sectors from Gabriel Ulyssea's article is not only related to the fact that the article is the basic benchmark for our work but also to allow the reader to distinguish between the definitions and criteria adopted by Ulyssea and those adopted in our work. Considering that certain criteria used by Ulyssea (2018) are not relevant or applicable to Colombian context and also given the information we have in EMICRON 2019.

For example, in the Brazilian context, Ulyssea defines as informal enterprises those that are not registered with the tax authorities, which means not having a tax identification number (a definition that falls under some of the ILO criteria). Similarly, it defines as informal workers those who do not hold a formal employment contract, which in Brazil means not having a booklet *"carteira de trabalho"* that records the entire employment history of workers in the formal sector.

Furthermore, regarding the characteristics of workers, Ulyssea defines a worker as *highly skilled* if he or she has at least completed secondary school, which corresponds to at least 11 years of education, and *low-skilled* if he or she has not reached this level (less than 11 years of education).

3.1.3 Definitions in the Colombian context

There are two criteria to be considered in the case of Colombia. The first one is the possession of a Unique Tax Registry ***(Registro Único Tributario (RUT))*** [16]by the entrepreneur (i.e. the employer) and the second one is the registration at the Colombian Trade Chamber ***(Cámara de Comercio (CC)).*** In our study we choose to work with the registration criteria of the Colombian Trade Chamber (Cámara de Comercio (CC)). The preference for this criteria has several reasons.

[16] The **RUT** is both an administrative document and a system that allows the Colombian National Directorate of Taxes and Customs (Dirección de Impuestos y Aduanas Nacionales, DIAN), to collect complete information on taxpayers who are so-called natural persons (in the case of self-employed workers) or legal entities (in the case of companies operating with employees). The objective is to provide them with a TIN (Tax Identification Number, equivalent to the SIRET in France) that will allow to manage the collection, control and facilitate the fulfillment of their tax obligations.
https://www.gradiweb.com/fr/etapes-creation-entreprise-colombie/
https://www.dian.gov.co/impuestos/personas/Renta-Personas-Naturales-AG-2020/Paginas/Registro-Unico-Tributario.aspx

First, according to a study by Zulma Yined and Ingrid Caroline [17](2014), the RUT system is unknown to a large number of Colombian citizens, while chambers of commerce are well known. Moreover, when it was created, it was a simple non-mandatory administrative formality that only resulted in a certification in which it was stated that the tax obligations were indeed completed. Therefore, traders and companies did not consider the RUT to be necessary or a required part of their activity, even after it was imposed as a mandatory administrative registration process under the new Colombian tax laws. Furthermore, regardless of whether or not the RUT is required, the economic units do not face any obstacles in their business activities, given that there is no mechanism to prevent them from carrying out their commercial activities.

Secondly, the registration in the RUT is definitive, it is not renewable. Thus, firms that enter or exit the formal sector each year cannot be properly tracked because registration is final and they are on record permanently. The CC criteria is more appropriate because it takes into account the dynamics and flows that exist between entries and exits from the formal sector, thanks to the renewal of the firm's status with the Trade Chamber each year. Moreover, given that the renewal is costly, the choice of this variable is even more relevant since the price appears to be a fixed cost of entry in the formal sector. And the vast literature on informality has heavily emphasized the costs of entering the formal sector as one of the main causes of lack of firm formalization, Ulyssea (2018, 2020), Laporta and Shleifer (2008, 2014) and many others.

For all of these reasons mentioned above, we chose the CC[18] criterion.

We define as informal workers those not receiving payments for at least one of these 3 components of social security: *retirement, health, and social protection*. Due to the lack of information about employees' educational level in our data, we will focus our analyses on that of entrepreneurs. This decision has no real impact on our results. With regard to the educational level of the entrepreneurs, we consider three groups: the first group represents those who are illiterate to the secondary level, the second group those who have completed the secondary level and the third group those who have completed the post-secondary level. Finally, for precision reasons, throughout our study, we will refer to workers as entrepreneurs plus their employees within a company in order to avoid misunderstanding on the part of the reader. Similarly, we will use both firms and enterprises to define a production unit.

[17] Faculty of Graduate Studies and Continuing Education, Specialization in Management Control and Audit, Universidad la Gran Colombia

[18] We also find that the CC criteria is more restrictive than the RUT criteria in terms of informality, which means we get a higher informality rate with the CC criteria.

3.2 Features of the informal sector (size, activities, productivity)

It is well known in the literature that the informal sector [19]is characterized by a large number of micro and small enterprises (Laporta and Shleifer 2008, 2014), particularly self-employed workers, that operate outside of current tax and administrative legislation. These enterprises are typical of developing (Sub-Saharan Africa etc...) and emerging (Latin America etc...) economies where there is a majority of firms that operate with less than 5 workers (McKenzie and Woodruff 2013, Ulyssea 2018, 2020). They are very present in the agricultural sector, retail trade (sales of food products, groceries, clothing, shoes, etc.), manufacturing (sewing, carpentry, jewelry, repairs), and transportation of goods and people (Dupas and al. 2020), operating on a small scale. In addition, these enterprises are generally managed by entrepreneurs with little education and training, which explains their low productivity and profit. The products and services from their business are low quality, often using inputs that do not comply with sanitary standards and little capital and sold to low-income customers (Laporta and Shleifer 2014). In addition, these firms operate, all along their lifecycle (i.e., for years), with depreciated and obsolete technologies and other physical capital, which implies a lack of innovation on their part. Since the market economy implies competition between companies, the majority of them are bound to disappear in the long run.

Like its entrepreneurs, employees of informal enterprises are less educated and paid relatively low wages (often zero if they are caregivers or close relatives) compared to the state-imposed minimum wage in the market and receive no social benefits, making them vulnerable in their employment for safety, accident, illness, and retirement issues (Ulyssea 2018, 2020), (Laporta and Shleifer 2014), (Mckenzie and Woodruff 2013), (Meghir, Robin and al 2015), (C. Nordman, Robilliard and al 2011) (Nordman and Wolff 2009). Such low wages are also one of the many factors explaining the low productivity of firms operating in the informal sector.

For example, in a randomized experiment conducted by Supreet Kaur, Mullainathan and al.(2020) in a disposable plate factory in Odisha, India, it was found that increasing workers' cash flow boosted their productivity (an average 6.2 percent increase in plate production among the treatment group), implying that wages and productivity can move positively together.

[19] It is important to make a short distinction between the informal economy and the shadow economy, both of which are often confused in their interpretation. The shadow economy has similar characteristics to the informal economy with one difference. This difference lies in the legal nature of the activities. Thus, the shadow economy consists mostly of illegal activities (e.g., mafia activities, prostitution, narco-trafficking, etc.). While the activities of the informal economy are legal (e.g., agriculture, trade in food products, mechanics, etc.).

Finally, the informal sector is also associated with gender inequalities. In low- and middle-income countries, women are more likely than men to be employed in the informal sector, but also to be in the most precarious and lowest-paid categories of that sector i.e., low-wage activities (Nordman, Robilliard and al 2011).

These features of the informal sector result from a set of causes that explain the presence of production units in the sector. This in turn affects the level of economic development in countries with high rates of informality.

3.3 Causes and consequences for economic development

- **Causes**

There are several factors that contribute to informality. But only four of these factors mentioned in the literature have particularly received our attention.

The first is the quality of institutions, which is an argument that has been developed by historians of economic development to explain the diverging development trajectories of countries (Engerman and Sokoloff 2003), (La Porta and al. 1998), (Acemoglu and al. 2002) and (Rodrik and al. 2004). Although these literatures do not mention informality at all, they nevertheless provide clear explanations of the mechanisms that have led some countries to develop weak institutions that are themselves favourable to the spread of informal activities. It should be noted that economies that are strongly characterized by informal activities are also those that have poor institutional quality. According to the World Bank: ***"Informality is both the cause and the consequence of poor economic and institutional development. It is a problem because it implies that large numbers of people and a considerable share of economic activity do not fully enjoy the benefits of appropriate technologies and efficient production methods, nor do they have access to public services such as police and judicial protection, and the opportunity to share and mitigate risks such as old age, illness and unemployment."*** (Norman Loayza, 2018[20]).

The second factor is access to credit market. Any business start-up involves a huge initial investment due to fixed costs. Investment that requires using external sources of financing such as investment banks, public or private financial institutions, microcredit and many others. However, imperfections and constraints (Banerjee and Duflo 2008) such as client

[20] World Bank – Research Departement, 2018

creditworthiness, information asymmetries (adverse selection and moral hazard) between lenders and borrowers (Derksen 2015), or the lack of efficient financial institutions in the credit market, push firms, particularly micro and small firms, to operate on a small scale. This kind of scale requires a small amount of capital. In addition, the characteristics of credit applicants play a crucial role in the grant of credit. Indeed, applying for a loan implies providing a number of mandatory documents (registration and operating license, tax compliance and externally audited financial statements, etc.) established by banking legislation (Gemechu and Barry 2011). Documents that most micro and small businesses cannot provide because they fear facing costly and time-consuming paperwork that they do not have the luxury of affording, which obviously leads them to operate in an environment where they can contract credit informally (Nirosha and Stuart Locke 2016). Such reasons explain why, after becoming informal, enterprises cannot access the credit market to grow as they have used informal financing early on and therefore cannot justify the origin of their initial capital.

The third factor is unemployment via the phenomena of rural exodus and migration. This argument was put forward by Todaro and Harris (1970) in their rural-urban migration model. Indeed, the model suggests that a comparison between migrants' expected urban wage and the migrants' rural wage provides an incentive to migrate to the cities, despite the high unemployment rate. Thus, new migrants who arrive do not find employment in the formal sector immediately. Since living in the city is extremely costly due to personal needs and expenses associated with finding a job and paying rent, these migrants immediately move into the informal sector. This model is the basic model for analyzing migration and development and has been able to provide answers to the explanation (Todaro's paradox[21]) for the high rates of urban unemployment in developing countries. Furthermore, in various literatures, unemployment and informality are seen as two sides of the same coin (Olivier and Cristina Terra 2014).

The fourth and final factor concerns entry costs in the formal sector. The argument that has been mostly developed in the literature on informality and has been subject to consensus (Ulyssea 2018, 2020), (Mckenzie and Woodruff 2013), (Laporta and shleifer 2014), (Aureo and Scheinkman 2010) (Olivier and Cristina Terra 2014) etc...

[21] Todaro's paradox shows a coexistence between high urban unemployment and the growth of migration flows to the city. While the number of jobs increases as a result of a successful industrialization policy, underemployment may persist because the probability of finding a job will increase and so will the willingness of the labour force to leave, thus exacerbating the pre-existing high urban unemployment rate and increasing informality in the economy.

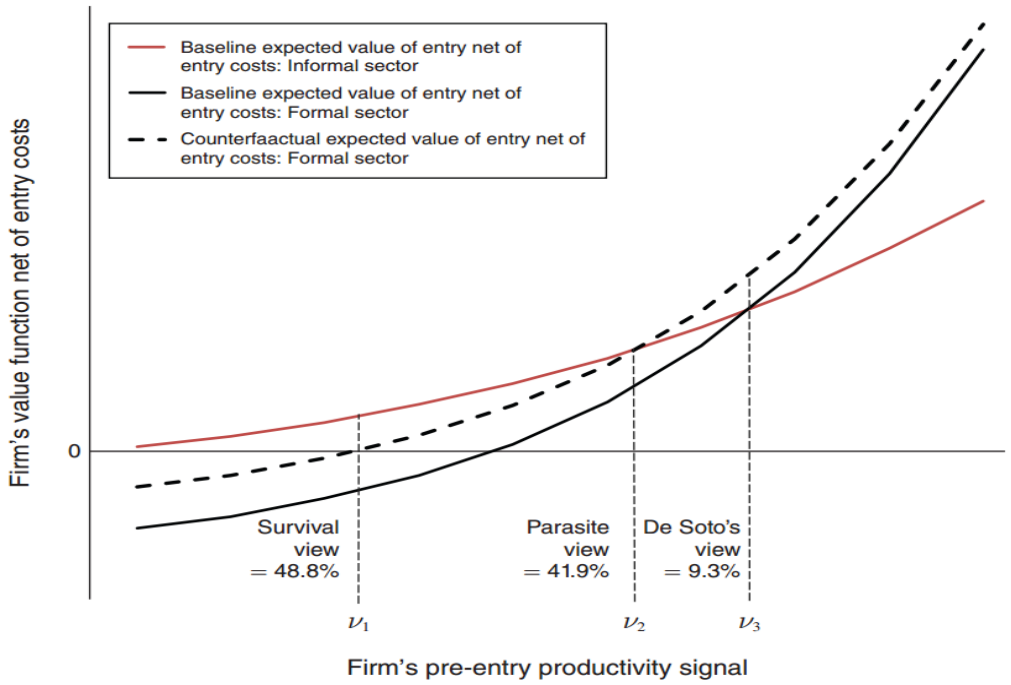
In fact, micro and small businesses face high entry costs in the formal sector. These entry costs include registration with the tax authorities, value added tax payments and taxes, labor costs with minimum wage, mandatory social security and pension contributions, labor-related charges such as: workers' mutual insurance, paid vacations, and dismissal costs. Additionally, the competitive capacity of the firm determines how long it can survive in the market; this capacity depends on the type of technology and the managerial strategies used by the firm to survive (Bloom, McKenzie and al. 2010). Regarding that, 3 views have been developed in the literature (Laporta and Shleifer 2014), (Ulyssea 2018), to explain the entry and exit decisions of firms in the formal sector.

The first is the survivalist view which concerns firms where 48.8% (Ulyssea 2018) are not sufficiently productive to enter the formal sector and therefore they prefer to stay in the informal sector where production and labor costs are sustainable for their activity.

The second vision is known as parasitic because firms of which 41.9% (Ulyssea 2018) could enter the formal sector but decide to stay in the informal sector to benefit from the absence of costs related to state regulation.

Finally, De Soto's view is that 9.3% of firms (Ulyssea 2014) cannot register due to high entry costs but have the productivity to compete with other firms once they are established in the market. Figure 4 as below shows the schematic framework.

Figure 3: **Pre-entry signal in the formal sector, (from Ulyssea 2018**)



- **Consequences**

The consequences of informality are multiple and most often lead to poverty traps. The literature and stylized facts show that a high rate of informality leads to significant tax evasion (Ulyssea 2018, 2020). Likewise, it can distort the labor market by altering the cost of labor (Meghir, Robin et al. 2015) and misallocate public goods as the absence of corporate and income tax contributions reduces the size of the tax base; this prevents governments from adequately financing public expenditures with their own resources. Moreover, low-income and middle-income countries are constantly relying on external financing (financial markets, the World Bank, the IMF and other private or public donors), which is pushing them into a "*spiral of unsustainable debt"*[22] (World Bank Group, 2020).

Furthermore, informality implies that workers are excluded from a number of benefits, including health coverage, social income transfers (e.g. family allowances), unemployment compensation and retirement pensions, which pushes them further into precariousness and even extreme poverty. This mechanism is the cause of many poverty traps (Kraay and McKenzie 2014).

Finally, the lack of formalization of enterprises is one of the many factors causing the inefficiency of public policies in low- and middle-income countries. The fact that they are not registered with the relevant authorities makes them invisible to policymakers (governors). Thus, it is unlikely that the development programs set up for them would be very effective.

4 DATA, STATISTICAL ANALYSIS AND RESULTS

4.1 *Encuesta de Micronegocios* (EMICRON 2019) data and methodology of analysis

- **Data**

The data are from the 2019 DANE's surveys of Colombian microenterprises. The sample includes 86,969 micro and small firms that were registered in these surveys and 121,520 workers interviewed (entrepreneurs + employees). Among the 86,969 firms surveyed, 86% [23](74,779) operate in the informal sector and 14% (12,190) in the formal sector, which

[22] World Bank Group, Global Waves of Debt, Causes and Consequences, 2020
[23] According to the Camara de Comercio criteria that we use to define the informal sector in Colombia.

corresponds to a population [24]of 5,158,004 informal micro and small firms and 716,173 formal ones. These figures show the high proportion of informality in the Colombian economy.

From the 121,520 workers interviewed, 67,130 are self-employed, meaning they work without employees, 8,839 are entrepreneurs with at least one employee and 34,551 are employees. The high proportion of self-employed is a characteristic observed in most low- and middle-income countries. From the 34,551 individuals employed in the enterprises, 20,597 are employees, 4,835 are partners or associates, and the other 9,119 are family workers or non-salaried workers.

Informal firms employ 20,404 of these employees, including those partially covered by social security contributions (only 818 of the 20,404). The formal firms employ 14,147 of them, with 70% (9,896) not receiving social security contributions, which indicates an important intensive margin of informality within the formal firms in this Colombia context. Such result had also been found from Ulyssea (2018) on Brazil.

In terms of educational level information on entrepreneurs, we use DANE's 2019 GEIH (Gran Encuesta Integrada de Hogares) household surveys to extract these data.

An infographic (**see appendix 6**) made by my co-worker (Lemoine Jade) provides a dashboard overview of EMICRON structure 2019.

- **Analytical methodology**

As explained in Introduction, our analyses are largely based on Ulyssea (2018) and DANE's methods.

→ ***Selection of industries***

Regarding industries, we consider 4 main businesses: services, manufacturing, retail and agriculture. While Ulyssea (2018) only considers the first three by excluding agriculture. The agricultural sector is kept as we avoid missing observations and individuals from the sample. Moreover its size is quite significant (11.1%).

→ ***Measures of firms Productivity, Size and Profit***

Following Ulyssea (2018), we measure productivity by the natural logarithm of value added per worker *log(VA/worker)* and firms size by the logarithm of revenues *log(revenues)*. As for profit, we measure it with DANE's method. Then, we regress the above-mentioned variables

[24] To estimate statistics at the national level, we use an expansion factor that corresponds to individual weights in the sample [iweight=F_EXP].

on the industrial variables (dummies) which are the 4 businesses considered in order to purge the inter-industry variations, which are likely to explain a part of our explanatory variables variance. Thus, using the residuals extracted from each regression, we generate density curves (Kernels density) that will allow us to make comparisons between formal and informal firms' productivity, size and profit. According to Ulyssea (2018), this procedure avoids biased comparisons due to industry specific features as firms operate in different branches.

Finally, we use DANE's method (Metodológia General Encuesta de Micronegocios-EMICRON, June 2020, p26-27) to calculate the revenues, value added and profits of firms, as described in the following table:

REVENUES = VENTAS_MES_ANTERIOR (SALES)			
ADDED VALUE = SALES – INTERMEDIATE CONSUMPTION			
PROFIT = SALES – INTERMEDIATE CONSUMPTION – LABOUR COSTS - INDIRECT TAXES			
SALES	**INTERMEDIATE CONSUMPTION**	**LABOUR COSTS**	**INDIRECT TAXES**
P3057 + P3058 + P3059 + P3060 + P3061 + P3062 + P4002 + P3063 + P3064 + P3065 + P3066 + P3067 + P3092 + P3093 **Modulo Ventas o Ingresos Page 39**	**P3056 A to D + P3017 (all except P3017_J)** P3056: all production costs P3017: investments P3017_I/12: costs of registration P3017_L/12: special costs (INVIMA, carne manipulacion de alimento…) **Modulo Costos Page 36-37**	P3079 (wages) + P3083 (social prestations) + P3081(health and retirement) **Modulo personal Ocupado**	Taxes per month (predial, rodamiento, SOAT, sayco) P3017_J/12 **Modulo Costos Page 37**

→ ***Regressions on wages***

We measure wage gap between formal and informal employees in the extensive and intensive margins[25]. Under the extensive margin, we compare the salaries of employees in formal firms

[25] The extensive margin is the share of informal workers exploited by informal firms and the intensive margin is the remaining share exploited by formal firms (Ulyssea 2018). The addition of both proportions equals the total informal workers in the economy. (Also refer to ILO, 2018)

versus those in informal firms and under the intensive margin we compare such salaries between formal and informal employees within formal firms.

Our baseline wage regression equation (E) is as below:

$$\mathbf{Log(wage_i) = \alpha social\_protection_i + \beta owner's\_hours\_of\_work_j + \varphi minimum\_wage + \delta time\_spent\_in\_firm_i + \theta 1 age_i + \theta 2 age_i^2 + \lambda urban + \gamma sexe_i + Firm\_fixed\_effect + Sector\_fixed\_effect + Geography\_fixed\_effect + \varepsilon_i}$$

Where $\log(wage_i)$ represents the logarithm of the wage for an employee ***i*** and the explanatory variables denote in respective order from equation: the employee's welfare contribution (dummy), the number of hours worked by the owner (the entrepreneur), the relative position of the employee's salary vis-a-vis the minimum wage i.e. higher or lower (dummy), the employee's time spent working for the firm, the age and age squared of the employee, the firm's location (rural or urban), the employee's sex, firm fixed effects, industry fixed effects, firm location fixed effects and the error term.

We run regressions on several specifications from the baseline equation. We test the robustness of the variables defining informality (social_protection and minimum_wage) of a worker. We exclude family workers and partners from the employees as they do not receive any salaries. The error terms are clustered at the firm level (Moulton 2006).

4.2 Comparative analyses of formal and informal sectors and results

4.2.1 Industries, productivity, profits and size of firms

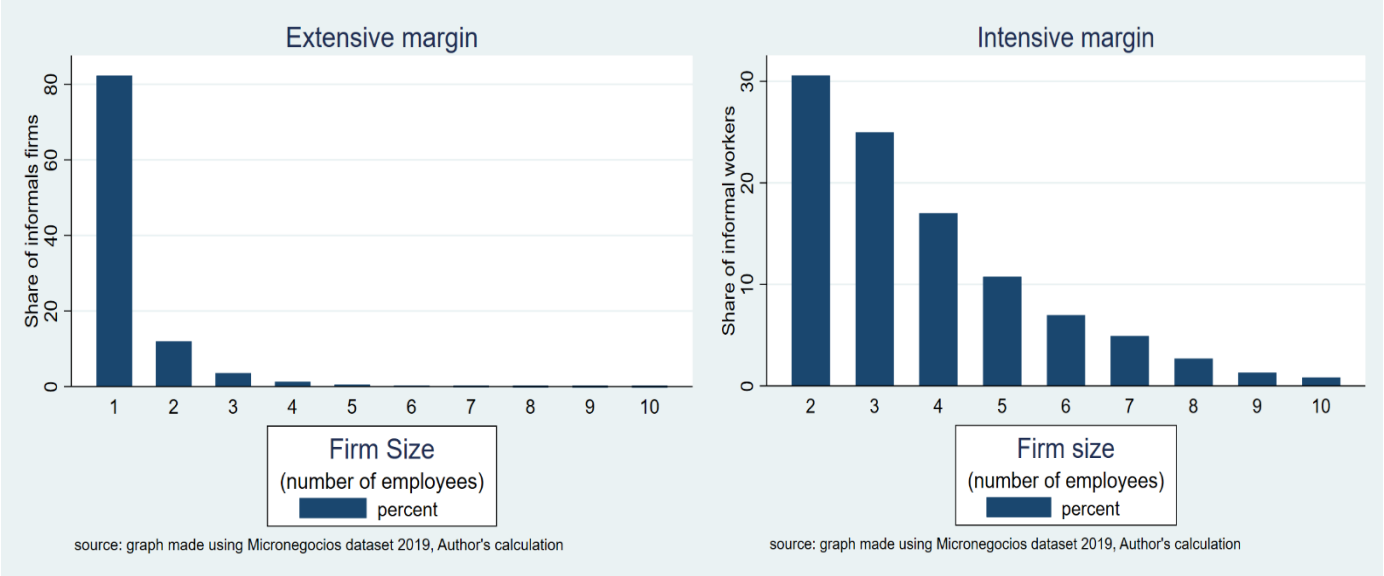
- **Industries and firms size**

In the whole economy, services represent 45.2% of economic activities, manufacturing 12.6%, retail trade 31% and agriculture 11.1%. We notice that services have expanded in Colombia's economy in recent years, confirming the stylized facts mentioned above. Both formal and informal activities are dominated by services and retail, with a high proportion of services (46.7%) within informal sector and a high proportion of retail trade (50.2%) within formal sector. These results are similar with the ones that Ulyssea (2018) found for Brazil where we observe for the services, manufacturing and retail trade sectors respectively a distribution of 41.9%, 9.3% and 48.7% in the economy. Likewise, the sectors are dominated by services and retail.

As for firms size distribution (number of workers), we find in Colombia more than 75% of firms operating with only one person (self-employed). However, focusing on sectors, just 25% of formal enterprises are running with only one person, compared with more than 75% of informal firms. We also look at similar trends for Brazil with Ulyssea (2018) with a different pattern across the entire economy. Only 25% of firms are running with a single individual; what is 3 times less than in Colombia.

As far as firms size is concerned, we find the same distribution of extensive and intensive margins as Ulyssea (2018); hereafter **Figure 4.1:**

Figure 4.1: Informality margins and firms size, (Author)

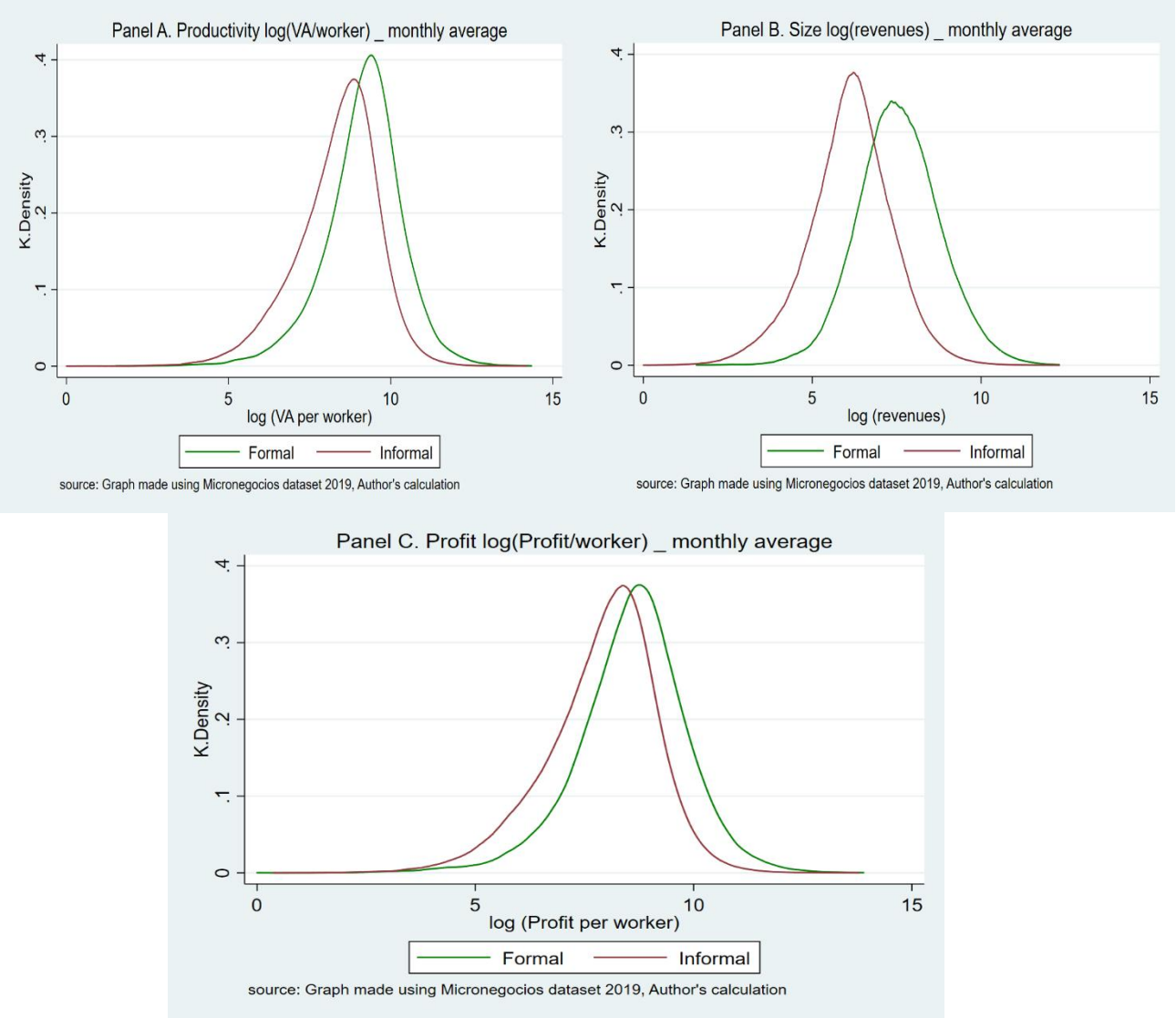


Consistent with Ulyssea's (2018) results on Brazil, we likewise find for Colombia a decrease of both margins along with firms size. The explanation put forward for this result is that as firm size increases, they become too visible to the authorities and thus likely to be audited (Aureo and Scheinkman 2010). This means the risk of being discovered.

- **Productivity, revenues and profits of firms**

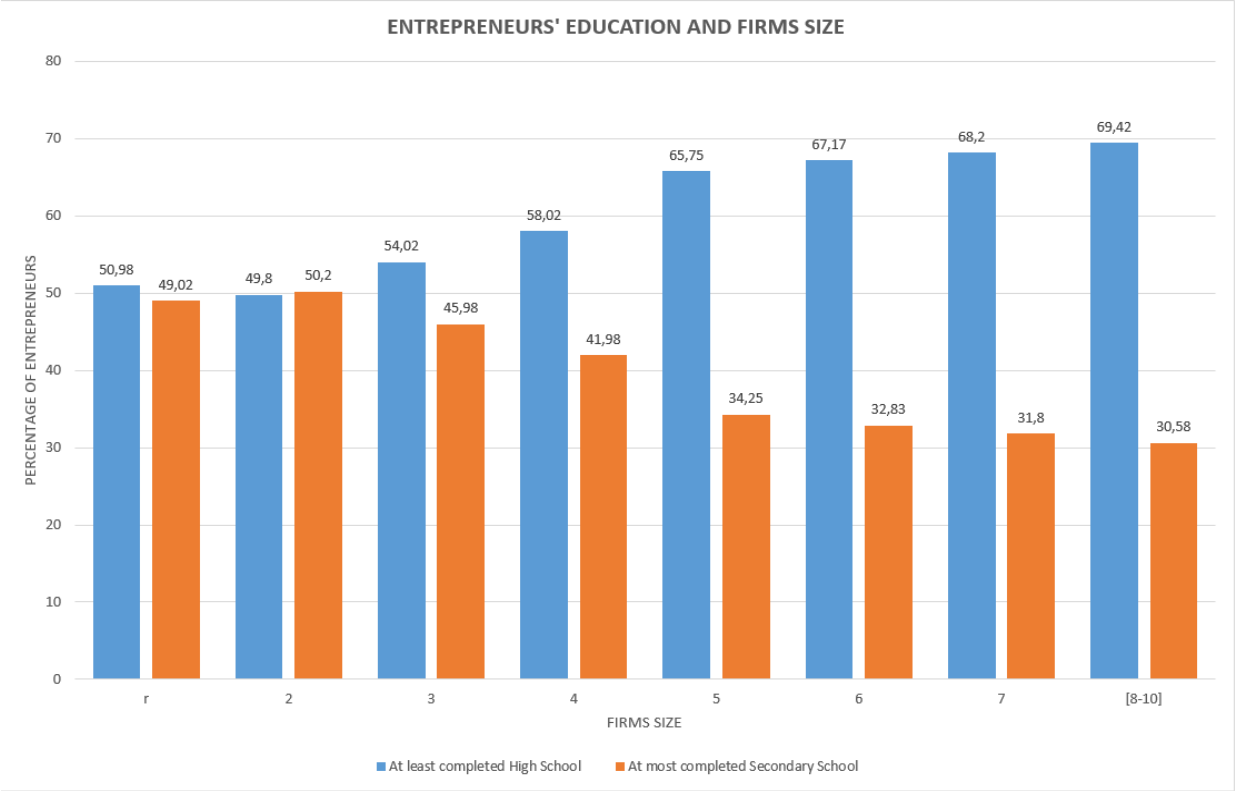
The literature on informality has often interpreted the differences between formal and informal firms as evidence that they operate in different sectors and do not produce the same goods and services. The density curves (Figure 4.2) show that there are still differences between the two types of firms even without taking into account industries effect.

Figure 4.2: Productivity, profits and size of firms (Author)



The density curves show overlapping regions between formal and informal firms productivity and profit. The gap becomes significant across sizes (in terms of revenues). This suggests that the difference between formal and informal firms is not just that they operate in different industries and produce different goods and services. It is also a matter of size and performance due to firm-specific characteristics independently of their home industries Ulyssea (2018). In addition, the literature mostly support that such difference results from the types of technologies that firms use and workers educational level, in particular the manager (Mckenzie and Woodruff 2013). Aureo and Scheinkman (2010) show, in Brazil, that unskilled managers are more likely to migrate to small and less efficient firms which are commonly informal. While the opposite effect is true for skilled managers. **Figure 5** as below shows this:

Figure 5: Entrepreneurs educational level and firms size (Author)



We note that the proportion of highly skilled entrepreneurs (who have at least completed high school education) increases with firm size and that of unskilled entrepreneurs decreases with that size. One potential explanation for this phenomenon could be a psychological effect of both types of entrepreneurs. The highly qualified entrepreneur will always seek to work in big firms as they value their qualifications and expect a return on investment from the efforts they made to acquire this human capital and start their business. As for unskilled entrepreneurs, this may be an undervalue of their ability to run a large firm, given their educational level. However, the arguments we are putting forward are quite arguable.

4.2.2 Moments et comparison between Brazil, Colombia and Mexico

We use 16 moments to compare the extent of informality and firm size between Brazil, Colombia, and Mexico. These moments are divided into 5 categories. These are: 1) *the share of informality among low-skilled and high-skilled employees*; 2) *the overall share of informality by the following firm sizes*: 1-2, 3-4, and 5-10 employees; 3) *the average share of informal employees within formal firms of sizes* 2-3 and 4-5 employees; 4) *the share of informal firms with less than 2 employees and informal firms with less than 5 employees*; and 5) *the share of*

formal firms with 6, 5-10, 11-20, 21-50, and more than 50 employees. However, we will change the composition of some moment groups for Colombia as a result of its firms size distribution, which shows a self-employment pattern (over 75%). **Table 1** shows countries' moments distribution.

➢ **MOMENTS CALCULATION**

	ULYSSEA'S CALCULATION BRAZIL			CALCULATION ON EMICRON 2019 COLOMBIA			JORGE ALVAREZ'S CALCULATION ON MEXICO (IMF 2019)	
	Moments	Model	Data	Moments	RUT (P1633)	Camara de comercio (P1055)	Model	Data
MOMENT 1 GROUP	***Share of informal employees***				**0.64**	**0.86**		
	All	**0.35**	**0.35**		5,320,633	5,734,851	**0.55**	**0.56**
	Low-skilled	**0.42**	**0.42**	**Entrepreneurs**	**0.83**	**0.91**	-	-
	High-skilled	**0.27**	**0.26**	**skills**	**0.63**	**0.81**	-	-
MOMENT 2 GROUP	***Share of informal firms***	**0.69**	**0.69**	-	**75.69** 4,446,117	**87.81** 5,158,004	**0.92**	**0.89**
MOMENT 3 GROUP	***Informal workers within formal firms of size 1-5***	-	-	**1-10**	**0.15** 874,516	**0.09** 576,847	**0.23**	**0.21**
MOMENT 4 GROUP	***Size distribution: informal firms***				**0.95**	**0.94**		
	≤2 employees	**0.77**	**0.96**	-	4,182,663	4,818,876	**0.76**	**0.79**
	≤5 employees	**0.99**	**0.99**		**0.99** 4,428,807	**0.99** 5,132,152	**0.92**	**0.96**
MOMENT 5 GROUP	***Size distribution: formal firms***				**0.97**	**0.95**		
					1,384,304	680,961		
	≤5 employees	**0.70**	**0.70**	-	**0.03**	**0.05**	**0.52**	**0.52**
	6-10 employees	**0.15**	**0.14**	-	43,753	35,211	**0.18**	**0.21**
	11-20 employees	**0.08**	**0.08**		**1 0.61**	**0.46**	**0.14**	**0.13**
	21-50 employees	**0.05**	**0.05**	**≤5 employees**	**2 0.20** **0.97**	**0.26** **0.95**	**0.10**	**0.08**
	50+	**0.02**	**0.03**		**3-5 0.16**	**0.23**	**0.06**	**0.06**

Table 1: Moments and comparison between Ulyssea (2018), Emicron (2019) et Alvarez (IMF 2019), (Author)

(*Note: the numbers in thousands reported in the Columbia column are calculated using individual weights in the sample [iweight=F_EXP])*

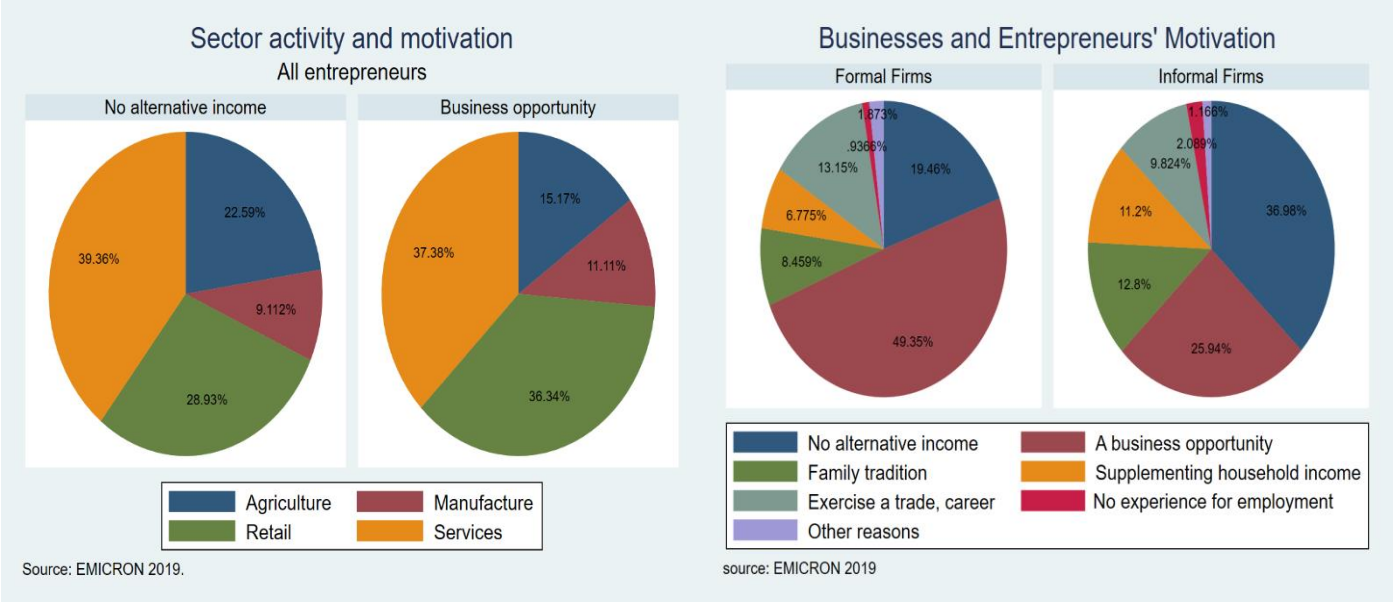
A first finding in this table is that Mexico has a very high share of informal firms; approximately equivalent to Colombia's share and higher than Brazil's. Likewise, looking at the share of informality among employees, 1/3 of employees are informal in Brazil, ¾ in Colombia and ½ in Mexico. We also find that there is a significant intensive margin of informality within Mexican formal firms where 1/5 of workers are informal. That is the double of Colombia's value. Regarding the distribution of formal firms by size, most Colombian firms are microenterprises dominated by independent workers. In Mexico City, 50% are microenterprises and the remaining 50% are small enterprises. As for Brazil, 2/3 are microenterprises and the remaining 1/3 are small. Such findings are related both to the size and economy features and the data types used in the three studies.

4.2.3 Entrepreneurs, workers, motivations and businesses

- **Entrepreneurs, motivations and businesses**

Entrepreneurs' decision to start a business in a particular activity implies that attention must be paid to the main motivations. Figure 6.1 shows the sectors of orientation of entrepreneurs according to their motivations and status (formal or informal). **Figure 6.1** shows the top business by entrepreneurial motivation and status (formal or informal).

Figure 6.1 : Entrepreneurs' Motivation and businesses, (Author)



Half of formal entrepreneurs (49 percent) start their business because they find a business opportunity; while their informal counterparts (37 percent) do not due to a lack of income alternatives. This indicates that individuals do not always choose the informal sector to escape the tax regulations of the formal sector, as the vast literature claims. This is related to economic conditions that often do not provide opportunities for workers to make profits, as is typically the case with unemployment (Todaro and Harris 1970). There is also a trend of service and retail activities for both types of entrepreneurs but with a larger proportion in agriculture (23%) for informal entrepreneurs.

Another point of Colombia's entrepreneurship is the low demand for credit from financial institutions (banks, microcredits, etc.). Indeed, in Colombia, most entrepreneurs, whatever their status (formal or informal), rely on their own savings as start-up funds. **Appendix 7** shows that more than 58% of formal entrepreneurs use their personal savings and more than 61% of informal entrepreneurs do so. The explanation for this phenomenon does not lie in credit

demand constraints as some literature argues (Banerjee and Duflo 2008). According to entrepreneurs, they don't find necessary to apply for credits and in any case statistics show that more than 90% of loans are granted, regardless of status (formal or informal) and credits institution.

- **Women, men and sector of activity**

Figure 6.2 shows the gender distribution across categories of workers and sectors of activity.

Figure 6.2: Distribution of men and women by sectors of activity and categories of workers, (Author)

Statistics indicate that, in the formal sector, men and women are likely to occupy the same professions and similar proportions, excluding services, where women are strongly present (45%) compared with 34% for men. As for informal sector, men are more present in agriculture (51%) and women in services (34%).

In terms of categories of workers, 40% of women are employed as family workers and non-salaried workers, which is very high. In contrast, men are usually employed in salaried jobs. A fact that confirms the wage gaps between men and women identified in developing countries where a large proportion of women occupy poorly paid jobs (Nordman and Wolff 2009) and (Nordman, Robilliard and al 2011).

4.2.4 Regressions on wages: Wage gap between workers

Results of each regression from the baseline equation (E) are reported in Tables 2 and 3 as below:

Table 2: Wage gap in extensive margin of informality, (Jade's calculation)

Table 2: Log(wage) regression over specifications of worker informality between formal and informal firms

	Log(wage)		
	(1)	(2)	(3)
VARIABLES	No Fixed Effect	No Fixed Effect	No Fixed Effect
Social protection *(dummy)*	0.4104***		0.0686***
	(0.024)		(0.021)
Minimum wage *(dummy)*		0.8528***	0.8323***
		(0.019)	(0.020)
	(0.001)	(0.001)	(0.001)
Sexe *(dummy)*	0.1766***	0.1011***	0.1030***
	(0.025)	(0.018)	(0.018)
Time spent in the firm	0.0010***	0.0007***	0.0007***
	(0.000)	(0.000)	(0.000)
Urban (dummy)	0.1148**	0.0593	0.0549
	(0.056)	(0.051)	(0.051)
Age	0.0199***	0.0110**	0.0107**
	(0.005)	(0.005)	(0.005)
Age square	-0.0002***	-0.0001**	-0.0001**
	(0.000)	(0.000)	(0.000)
Observations	19,438	19,438	19,438
R-squared	0.284	0.458	0.459
Firm FE	No	No	No
Geography and sector FE	Yes	Yes	Yes
Sample	All	All	All

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: EMICRON 2019, GEIH 2019. Author's own calculation
Note: Sample includes workers within formal and informal firms. We exclude partners (*socios*) and family (*familiares*) categories, and only consider workers with positive wage (i.e., n=19 438). Residuals are clustered at the firm level (Moulton 2006).

Table 3: Wage gap in intensive margin of informality, (Jade calculation)

	Log(wage)		
VARIABLES	(1) No Fixed Effect	(2) No Fixed Effect	(3) No Fixed Effect
Social protection *(dummy)*	0.2425***		0.0356*
	(0.026)		(0.021)
Minimum wage *(dummy)*		0.6252***	0.6128***
		(0.025)	(0.024)
Owner's hours of work	0.0007	0.0003	0.0004
	(0.001)	(0.001)	(0.001)
Sexe *(dummy)*	0.1210***	0.0744***	0.0749***
	(0.019)	(0.015)	(0.015)
Time spent in the firm	0.0010***	0.0009***	0.0008***
	(0.000)	(0.000)	(0.000)
Urban *(dummy)*	0.0131	-0.0407	-0.0424
	(0.061)	(0.054)	(0.053)
Age	0.0252***	0.0170***	0.0168***
	(0.005)	(0.004)	(0.004)
Age square	-0.0003***	-0.0002***	-0.0002***
	(0.000)	(0.000)	(0.000)
Observations	9,661	9,661	9,661
R-squared	0.226	0.443	0.444
Firm FE	No	No	No
Geography and Sector FE	Yes	Yes	Yes
Sample	All	All	All

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: EMICRON 2019, GEIH 2019. Author's own calculation
Note: Sample includes workers within formal firms following the *Cámara de Comercio* criteria. We exclude partners (*socios*) and family (*familiares*) categories, and only consider workers with positive wage (i.e., n 9661). Residuals are clustered at the firm level (Moulton 2006).

As mentioned above, we measure the wage gap between formal and informal workers in the extensive and intensive margins.

Table 2 shows our regression results in the extensive margin. Under the first specification, we use social security covering criteria to define an informal worker. All variables are statistically significant and the model explains 28% of wage variance. Our results show that workers covered by social protection (formal) earn 41% more than those with no social protection (informal), which indicates a huge wage gap in Colombia. Men generally earn 17% more than women, which also indicates the existence of a "gender wage gap" (Nordman and Wolff 2009). In addition, we find higher wages in urban areas than in rural areas, which is well known in the literature. Age has a positive but small impact (2%) on workers' wage and this effect turns to zero after a specified age. That is typical of the Law of Diminishing marginal. Thus, the more years you live, the more you reach a threshold that makes you less productive for the firm, as you lose in performance due to a depreciation of your physical and mental capacity. In our second specification, we use the minimum wage as an informal worker criteria. Using same observations and variables, we find that R2 increases to 45%. The other variables on the log

wage decreases and the minimum wage criteria indicates a wage gap of 85% between formal and informal workers. In other words, a worker paid below the minimum wage (informal worker) earns less than 85% compared to a worker who is paid at or above the minimum wage. Despite introducing the two criteria, social protection and minimum wage, in the same equation and in fixed effects presence of sectors and geographical areas, the R2 remains unchanged and same for the coefficient of the minimum wage variable. The coefficient of the social protection variable falls drastically. This result shows that the minimum wage criteria, compared to the social protection, is more relevant and robust to define an informal worker. This finding is consistent with the stylized facts showing that the minimum wage is one of many factors explaining the high rates of informality in low- and middle-income countries (OECD 2019).

The same results and trends are observed in Table 3. It remains a wage gap between formal and informal workers within formal firms (intensive margin). We obtain respectively 24% (social protection criteria) and 62% (minimum wage criteria). Furthermore, these differentials are still high.

4.3 **Partial conclusion**

Our analysis on EMICRON 2019 shows that there is a high rate of informality among Colombian micro and small firms and workers. Self-employment is the highest category of business among those micro and small firms. It also appears that the share of informal workers decreases with firm size. The most dominant industries are services and retail. The differential productivity between formal and informal firms are not always driven by their home industries but rather to their own characteristics (Ulyssea 2018). Formal firms are more likely to be managed by high-skilled managers while informal firms are managed by low-skilled managers, which explains the proportion of skilled managers that increases positively with firms size (Áureo and Scheinkman 2010). A significant intensive margin of informality exists in formal firms. The comparative analysis between Colombia, Brazil and Mexico shows a higher informality rate in Mexico than Colombia followed by Brazil, regardless of the informality margin considered (extensive or intensive). The decision to move into the informal sector is not just about avoiding tax laws, it is also related to the opportunities that the market offers in terms of doing profitable businesses. The analysis revealed that women are more likely to work in low-paid or no-paid jobs (Nordman, Robilliard and al 2011). While men are usually in salaried jobs, which explains the gender wage gap (Nordman and Wolff 2009). In

addition, our econometric estimates show the existence of a huge wage gap between formal and informal workers, regardless of the informality margin considered. Finally, our estimates showed that the minimum wage is a good and robust variable to measure informality among workers in Colombia.

5 CONCLUSION

Our study on Colombian micro and small firms via EMICRON 2019 analysis confirmed the stylized facts established in the literature on informality in general and in the Colombian context in particular.

First, it showed that Colombia is not so different from other low- and middle-income countries in terms of informality. Colombia has a significant proportion of informality, including firms that are registered with the authorities. Its business environment also shows a pattern of self-employment, a phenomenon that is common in most developing and emerging countries. But as opposed to its peers, Colombia is among the countries where the minimum wage is very high. Among many factors that can explain the high rate of informality, the minimum wage appears to be the ideal candidate that mostly contributes to the lack of formalization among Colombian firms, including social security coverage. The corporate tax rate (32%) is also a significant determinant.

Second, the results suggest that the dual approach that the literature makes to informality needs to be revisited. Indeed, our findings showed a strong interaction between formal and informal sectors as formal firms exploit a considerable margin of informal workers. This suggests that despite their skills and qualifications, informal workers can provide a similar productivity as formal workers if both types of workers are working under same conditions.

Moreover, the results for Colombia suggest that developing-country public policies should define a minimum wage level that encourages the employment and formalization of small and medium-sized firms. As they are the primary employment source in those countries. Likewise, developing countries should take into account the size and self-financing capacity of small firms in their tax legislation, i.e., establish standards for the characteristics of firms (size, revenues, profits, etc.) when designing national social protection systems and applying tax burdens, specifically corporate and income taxes.

Finally, the link between formal and informal should no longer be seen as a simple binary but rather as a continuum. Hence the necessity to elaborate a new multidimensional indicator of informality that would no longer be dichotomous.

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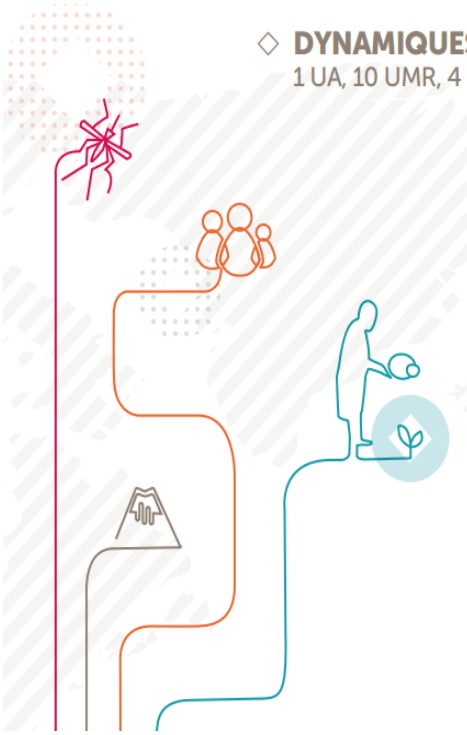
Appendix:

➢ Appendix 1: Research units affiliated with the DISCO Department, source IRD



◇ DYNAMIQUES INTERNES ET DE SURFACE DES CONTINENTS (DISCO)

1 UA, 10 UMR, 4 UMS, 1 ERL

Unité IRD 050 - UMR HSM : HydroSciences Montpellier - SEYLER Patrick (IRD), LACHASSAGNE Patrick (IRD) à partir de sept.2020 - RS* ECOBIO
Unité IRD 082 - UMR GEOAZUR : Géoazur - SOSSON Marc (CNRS)
Unité IRD 113 - UMR CESBIO : Centre d'études spatiales de la biosphère - POLIDORI Laurent (CNRS) - RS* ECOBIO
Unité IRD 144 - UMR LISAH : Laboratoire d'étude des interactions sol-agrosystème-hydrosystème - BAILLY Jean-Stéphane (AgroParisTech) par int. - RS* ECOBIO
Unité IRD 161 - UMR CEREGE : Centre européen de recherche et d'enseignement des géosciences de l'environnement - BELLIER Olivier (AMU)
Unité IRD 163 - UMR LMV : Laboratoire magmas et volcans - LAPORTE Didier (CNRS)
Unité IRD 183 - UMR G-EAU : Gestion de l'eau, acteurs et usages - BARRETEAU Olivier (IRSTEA) - RS* SOC
Unité IRD 219 - UMR ISTerre : Institut des sciences de la Terre - ROUX Philippe (CNRS) par interim - RS* ECOBIO
Unité IRD 221 - UMS OMP (OSU) : Observatoire Midi-Pyrénées - TOPLIS Michael (CNRS) - RS* OCEANS
Unité IRD 222 - UMS OSUG (OSU) : Observatoire des sciences de l'Univers de Grenoble - DIETRICH Michel (CNRS) - RS* OCEANS
Unité IRD 223 - UMS OREME (OSU) : Observatoire de recherche méditerranéen de l'environnement - SERVAT Eric (IRD)
Unité IRD 234 - UMR GET : Géosciences environnement Toulouse - RUELLAN Etienne (CNRS) - RS* ECOBIO
Unité IRD 252 - UMR IGE : Institut des géosciences de l'environnement - BRASSEUR Pierre (CNRS)
Unité IRD 263 - UMS CPST : Coordination Pôle de données et de services pour le Système Terre - HUYHN Frédéric (IRD)
Unité associée 994 - UA LA** - Laboratoire d'aérologie – MARI-BONTOUR Céline (CNRS)
Equipe de recherche labellisée 206 - ERL IMPMC - Minéralogie environnementale (MINENV) et Propriétés des amorphes, liquides et minéraux (PALM) de l'UMR Institut de minéralogie et physique des milieux condensés (IMPMC) – FIQUET Guillaume (CNRS)

➢ Appendix 2: Research units affiliated with the OCEANS Department, source IRD

OCÉANS, CLIMAT ET RESSOURCES (OCEANS)

2 UA, 8 UMR, 3 UMS, 1 US

Unité IRD 065 - UMR LEGOS : Laboratoire d'études en géophysique et océanographie spatiales - GANACHAUD Alexandre (IRD)
Unité IRD 182 - UMR LOCEAN : Laboratoire d'océanographie et du climat : expérimentations et approches numériques - CHARRASSIN Jean-Benoît (MNHN)
Unité IRD 191 - US IMAGO : Instrumentation, moyens analytiques, observatoires en géophysique et océanographie - BOURLES Bernard (IRD) - RS* ECOBIO
Unité IRD 195 - UMR LEMAR : Laboratoire des sciences de l'environnement marin - TITO DE MORAIS Luis (IRD)
Unité IRD 218 - UMS IUEM (OSU) : Institut universitaire européen de la mer - JEAN Frédéric (UBO)
Unité IRD 235 - UMR MIO : Institut méditerranéen d'océanologie - SEMPERE Richard (CNRS)
Unité IRD 240 - UMS PYTHEAS (OSU) : Institut Pythéas - THOUVENY Nicolas (AMU)
Unité IRD 241 - UMR EIO : Ecosystèmes Insulaires Océaniens - SERRE Damien (UPF)
Unité IRD 244 - UMS ECCE TERRA : Observatoire des sciences de l'univers Paris-Centre-Ecce Terra - SEGALEN Loïc (SU) - RS* ECOBIO
Unité IRD 248 - UMR MARBEC : Biodiversité marine, exploitation et conservation - DAGORN Laurent (IRD)
Unité IRD 250 - UMR ENTROPIE : Ecologie marine tropicale des océans Pacifique et Indien - LE CORRE Matthieu (Université de la Réunion)
Unité IRD 254 - UMR LOPS : Laboratoire d'océanograhie physique et spatiale - PAILLET Jérôme (IFREMER)
Unité associée 995 - UA LOG** : Laboratoire d'océanologie et de géosciences - LOISEL Hubert (ULCO)
Unité associée - UA/UMS : IPSL** : Institut Pierre Simon Laplace - VAUTARD Robert (CNRS) - RS* DISCO

➢ Appendix 3: Research units affiliated with the ECOBIO Department, source IRD

◇ ECOLOGIE, BIODIVERSITÉ ET FONCTIONNEMENT DES ECOSYSTÈMES CONTINENTAUX (ECOBIO)

13 UMR

Unité IRD 022 - UMR CBGP : Centre de biologie pour la gestion des populations - VITALIS Renaud (INRAE)
Unité IRD 040 - UMR LSTM : Laboratoire des symbioses tropicales et méditerranéennes - DUPONNOIS Robin (IRD)
Unité IRD 123 - UMR AMAP : Botanique et modélisation de l'architecture des plantes et des végétations - FOURCAUD Thierry (CIRAD)
Unité IRD 186 - UMR IPME : Interactions plantes microorganismes environnement - BENA Gilles (IRD)
Unité IRD 207 - UMR BOREA : Biologie des organismes et écosystèmes aquatiques - MEZIANE Tarik (MNHN) - RS* OCEANS
Unité IRD 210 - UMR ECO&SOLS : Écologie fonctionnelle et biogéochimie des sols et des agro-écosystèmes - COURNAC Laurent (IRD)
Unité IRD 226 - UMR ISE-M : Institut des sciences de l'évolution de Montpellier - GALTIER Nicolas (CNRS)
Unité IRD 232 - UMR DIADE : Diversité, adaptation et développement des plantes - GHESQUIERE Alain (IRD)
Unité IRD 237 - UMR IMBE : Institut méditerranéen de biodiversité et d'écologie marine et continentale - FERNANDEZ Catherine (AMU) - RS* OCEANS
Unité IRD 242 - UMR IEES-Paris : Institut d'écologie et des sciences de l'environnement de Paris - MAIBECHE Martine (SU) - RS* DISCO
Unité IRD 247 - UMR EGCE : Evolution, génomes, comportement et écologie - KAISER-ARNAULD Laure (CNRS) - RS* SAS
Unité IRD 251 - UMR CEFE : Centre d'écologie fonctionnelle et évolutive - NAVAS Marie-Laure (Supagro)
Unité IRD 253 - UMR EDB : Evolution et diversité biologique - HEMPTINNE Jean-Louis (Université Toulouse)

➢ Appendix 4: Research units affiliated with the SOC Department, source IRD

SOCIÉTÉS ET MONDIALISATION (SOC)

4 UA, 3 UMI, 12 UMR

Unité IRD 135 - UMR SEDYL : Structure et dynamique des langues - VASSILAKI Sophie (INALCO)
Unité IRD 151 - UMR LPED : Laboratoire population-environnement-développement - GASTINEAU Bénédicte (IRD)
Unité IRD 196 - UMR CEPED : Centre population et développement - ARVANITIS Rigas (IRD)
Unité IRD 201 - UMR DEVSOC : Développement et sociétés - CUSSÓ Roser (UP1) - RS* SAS
Unité IRD 205 - UMR URMIS : Migrations et société - POTOT Swanie (CNRS)
Unité IRD 208 - UMR PALOC : Patrimoines locaux et gouvernance - de Suremain Charles-Edouard (IRD) - RS* ECOBIO
Unité IRD 209 - UMI UMMISCO : Unité de modélisation mathématique et informatique des systèmes complexes - ZUCKER Jean-Daniel (IRD) - RS* SAS
Unité IRD 215 - UMR PRODIG : Pôle de recherche pour l'organisation et la diffusion de l'information géographique - MAGRIN Géraud (UP1)
Unité IRD 220 - UMR GRED : Gouvernance, risque, environnement, développement - MOIZO Bernard (IRD)
Unité IRD 260 - UMR LEDa : Laboratoire d'économie de Dauphine - ETTINGER David (UPD)
Unité IRD 228 - UMR ESPACE-DEV : Espace pour le développement - SEYLER Frédérique (IRD) - RS* DISCO
Unité IRD 236 - UMI RESILIENCES - MORAND Pierre (IRD)
Unité IRD 243 - UMR IMAF : Institut des mondes africains - SAMSON Fabienne (IRD) et Pennec Hervé (CNRS)
Unité IRD 245 - UMR CESSMA : Centre d'études en sciences sociales sur les mondes africains, américains, asiatiques - NATIVEL Didier (Université Paris 7) - RS* ECOBIO
Unité IRD 262 - UMI IFAECI : Institut franco-argentin d'études sur le climat et ses impacts - SIMIONATO Claudia (UBA)
Unité associée 992 - UA LAM** : Les Afriques dans le monde - DARBON Dominique (IEP de Bordeaux)
Unité associée 993 - UA CES** : Centre d'économie de la Sorbonne - Rusinowska Agnieszka (UP1)
Unité associée 998 - UA CERDI** : Centre d'études et de recherche sur le développement international - ROTA-GRAZIOSI Grégoire (UCA)
Unité associée 999 - UA AMSE** : Aix-Marseille school of economics - VENDITTI Alain (AMU)

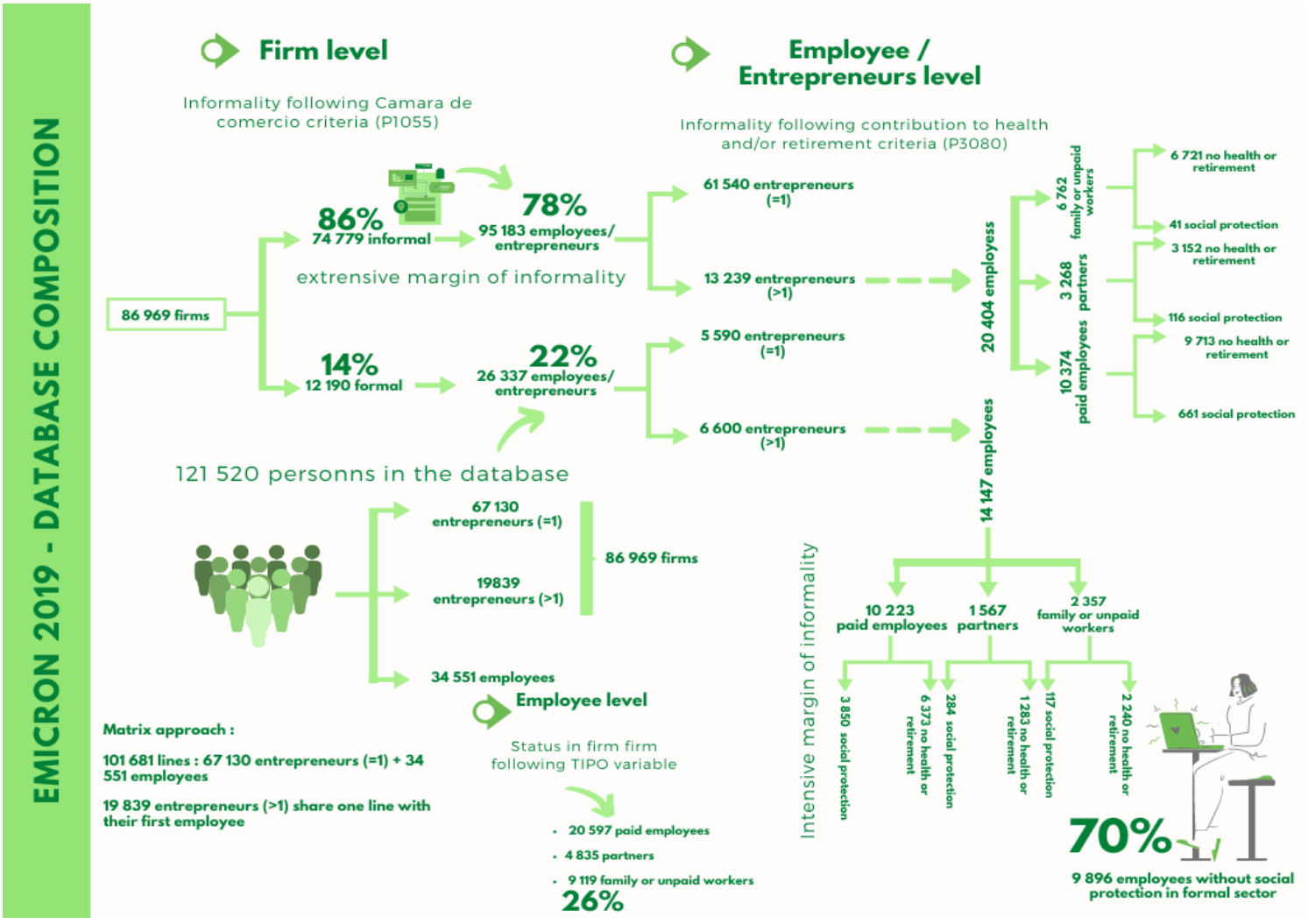
➢ Appendix 5: Research units affiliated with the SAS Department, source IRD

SANTÉ ET SOCIÉTÉS (SAS)

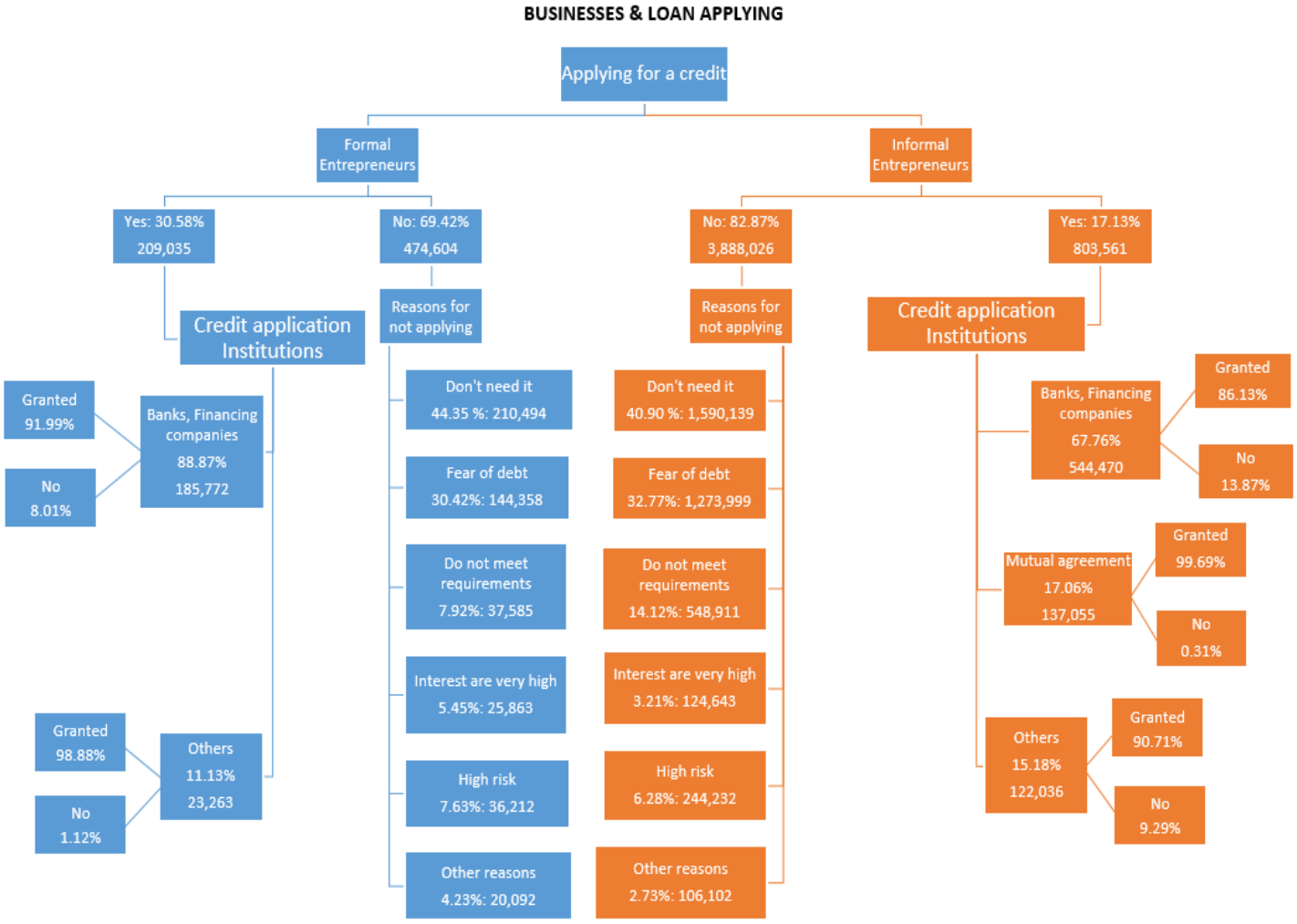
2 UA, 2 UMI, 10 UMR

Unité IRD 152 - UMR PHARMADEV : Pharmacochimie et biologie pour le développement - FABRE Nicolas (Université Toulouse 3)
Unité IRD 174 - UMI PHPT : Prévention et traitement de l'infection à VIH et des cancers associés à des infections virales en Asie du Sud-Est - JOURDAIN Gonzague (IRD)
Unité IRD 177 - UMR INTERTRYP : Interactions hôte-vecteur-parasite-environnement dans les maladies tropicales négligées dues aux trypanosomatidés - SOLANO Philippe (IRD)
Unité IRD 190 - UMR UVE : Unité des virus émergents - DE LAMBALLERIE Xavier (AMU)
Unité IRD 204 - UMR NUTRIPASS : Nutrition et alimentation des populations aux Suds - GUYOT Jean-Pierre (IRD) - RS* ECOBIO
Unité IRD 216 - UMR MERIT : Mère et enfant face aux infections tropicales - GARCIA André (IRD)
Unité IRD 224 - UMR MIVEGEC : Maladies infectieuses et vecteurs : écologie, génétique, évolution et contrôle - SIMARD Frédéric (IRD)
Unité IRD 233 - UMI TRANSVIHMI : Recherches translationnelles sur le VIH et les maladies infectieuses - DELAPORTE Eric (UM) - RS* SOC
Unité IRD 249 - UMR PIMIT : Processus infectieux en milieu insulaire tropical - MAVINGUI Patrick (CNRS)
Unité IRD 257 - UMR VITROME : Vecteurs - Infections tropicales et méditerrannéennes - PAROLA Philippe (AMU)
Unité IRD 258 - UMR MEPHI : Microbes evolution phylogeny and infections - LAGIER Jean-Christophe (AMU)
Unité IRD 259 - UMR SESSTIM : Sciences économiques et sociales de la santé et traitement de l'information médicale - GIORGI Roch (AMU) - RS* SOC
Unité associée 996 - UA IDLIC : Equipe de recherche sur les maladies infectieuses dans les pays à ressources faibles - ANGLARET Xavier (Université Bordeaux)
Unité associée 997 - UA NET : Neuroépidémiologie tropicale - PREUX Pierre-Marie (Université Limoges)

➢ Appendix 6: Infographic on EMICRON 2019 data, (Authors' calculations)



➢ Appendix 7: Entrepreneurs and credit application institutions (Authors' calculations)



Source: EMICRON 2019, Author's calculation

Note: This Figure is made using observation weights [iweight = F_EXP], an expansion factor that gives a total of 5,874,177 entrepreneurs in EMICRON 2019. We don't have informations on 498,948 entrepreneurs (NA).