CEDLAS
Facultad de Ciencias Económicas
UNIVERSIDAD NACIONAL DE LA PLATA

DOCUMENTOS DE TRABAJO

# Labor Informality and Market Segmentation in Senegal

Carlos Rodríguez-Castelán y Emmanuel Vazquez

Documento de Trabajo Nro. 320
Octubre, 2023
ISSN 1853-0168
www.cedlas.econo.unlp.edu.ar

Cita sugerida: Rodríguez-Castelán, C. y E. Vazquez (2023). Labor Informality and Market Segmentation in Senegal. Documentos de Trabajo del CEDLAS Nº 320, Octubre, 2023, CEDLAS-Universidad Nacional de La Plata.

# Labor Informality and Market Segmentation in Senegal[1]

Carlos Rodríguez-Castelán[*]

Emmanuel Vazquez [**]

**Abstract**

Understanding the selection of workers into informality is a policy priority to design programs to increase formalization across Sub-Saharan Africa, where nine out of ten workers are informal. This paper estimates a model of self-selection with entry barriers into the formal sector to identify the extent of involuntary informality in Senegal, a representative country in terms of levels of informality in West Africa and with one of the most rigid labor markets in the world. Results show that the desire of being formal is greater for workers with formal education, married and with a lower proportion of children under the age of 5 living in the household. The individual's preference for the formal sector also grows with age at a decreasing rate. Results also show that labor informality is mainly a voluntary phenomenon with 30 percent of informal workers being involuntarily displaced into the informal sector. Results are robust to different model specifications, definitions of labor informality and heterogenous groups of workers.

JEL: J42, J46, N37
Keywords: Labor informality, segmentation, labor markets, Senegal

[1] The authors wish to thank Besart Avdiu, Rogelio Granguillhome Ochoa, Markus Kitzmuller and Nicholas Woolley for their comments and suggestions. The authors would also like to thank Rogelio Granguillhome Ochoa for providing inputs for the benchmarking section of this paper. The findings, interpretations, and conclusions in this paper are entirely those of the authors. They do not necessarily represent the views of the World Bank Group, its Executive Directors, or the countries they represent.

[*] World Bank, IZA. E-mail: crodriguezc@worldbank.org

[**] Center for Distributive, Labor and Social Studies (CEDLAS), Instituto de Investigaciones Económicas, Facultad de Ciencias Económicas, Universidad Nacional de La Plata. E-mail: evazquez@cedlas.org

# 1. Introduction

Informality is a prevalent issue across developing countries, especially in Sub-Saharan Africa (SSA), where roughly 9 out of 10 individuals are informal as of 2020 (ILO 2020). The current global crisis driven by the COVID-19 pandemic has put an extra pressure to an already fragile labor market lacking the adaptive capacity to absorb exogeneous shocks. This leaves the livelihoods of those at the low-end of the income distribution highly exposed. Lockdown measures may have also destroyed formal jobs in Africa as well as significantly impacting about 325 million informal workers (ILO 2020).

The study of informality in Sub-Saharan Africa has focused in few countries such as South Africa, Kenya, Ghana and Tanzania, or aggregated cross-country analysis, often due to data limitations such as lack of labor force data (Bhorat and Tarp 2016; Golub 2014; Mbaye and Benjamin 2014; Benjamin and Mbaye 2012; Grimm et al. 2012; Falco et al 2011; Haan 2006). Expanding the share of workforce in formal employment is a critical policy objective for developing countries since these types of jobs are typically associated with higher productivity (La Porta and Shleifer 2016; Busso et al. 2012; Benjamin et al. 2012; Hsieh and Klenow 2009, Steel and Snodgrass 2008; Gelb et al. 2009; La Porta and Shleifer 2008) and better quality of jobs (World Bank 2020c; Brummund et al. 2016). As such, policies promoting formal employment can contribute to improve productivity and livelihoods across the region.

This paper studies the current state of informality in Senegal, defined as those that do not contribute to social security or do not have a formal accounting system in their non-agricultural enterprise, and estimates the relative importance of self-selection versus entry barriers. Senegal is an interesting case study since 97 percent of firms and 93.7 percent workers are classified as informal, in line with a 92.4 percent across West Africa (ILO, 2018), and has amongst the most rigid labor market regulations in the world (Golub et al. 2015, World Bank 2020a). Furthermore, Senegal's informal sector generated 42 percent of GDP between 2010 and 2014 (World Bank 2020a). Thus, the question of the relative importance of self-selection versus barriers to formality is key to tackle in this context, since on the short term, relaxing some of these regulations together with complementary policies of improving business climate and critical infrastructure could increase the share of the workforce in formal jobs.

To study this issue, we take advantage of microdata from Senegal's representative 2018-19 Harmonized Survey of Household Living Conditions (*Enquête Harmonisée sur les Conditions de Vie des Ménages*, EHCVM). The EHCVM covers 7,156 households and 36,746 individuals above the age of 15. An advantage of using this survey is that it includes an in-depth labor module that covers social security contributions at the individual level and non-agricultural enterprise characteristics. Then, following Alcaraz, et al. (2015), we estimate a model by maximum-likelihood to measure the size of involuntary informality and its underlying drivers.

The results consistently suggests that the desire of being formal is greater for workers with formal education, married and with a lower proportion of children under the age of 5 living in the household, while the individual's preference for the formal sector grows with age at a decreasing rate. Furthermore, our results also show that labor informality is mainly a voluntary phenomenon in Senegal. Our model estimates that the probability of obtaining a formal job for a worker who prefers a job in the formal sector is slightly below 0.50, which results in 30 percent of informal workers being involuntarily displaced into the informal sector. The magnitude of involuntary informality varies significantly across different types of workers, and it is the lowest for wage earners with positive incomes at 11 percent.

The main findings of the analysis are robust to different models restricting the sample to individuals working either 30 or more, or 35 or more hours per week. Results are also robust to models excluding from the sample 10.8 percent of salaried urban workers reporting zero earnings, as well as other groups such as unpaid workers. As an extra robustness check, we incorporate two alternative definitions of informality. The first is a more stringent legal definition that considers whether firms have a formal accounting system transmitting to the Tax Authority. The second, a more relaxed definition, merely requiring firm registration with the Commercial Registry of the Tax Authority, or just a formal accounting system.

This paper contributes to the literature by expanding the evidence based on the relative importance of self-selection versus exclusion of workers from formal jobs in SSA as in Alcaraz et al (2015), Gunther and Launov (2012), Falco and Haywood (2015) and Garcia (2017). This paper also contributes to the thin literature on profile of informality in West Africa, where the share of informal employment is highest across SSA (ILO 2018).

The main findings of this paper of a high share of voluntary informal workers needs further exploration to better understand the drivers behind these results. Previous studies for developing countries with a high proportion of informality show that high voluntary informality is linked to low valuation of benefits of being formal and workers who prefer higher wages instead of lower wages with certain benefits (Anton 2012; Levy 2008; Maloney 2004; Maloney 1998). From the firm side, literature shows that frail governance, driven by rigid regulations, corruption and inadequate public services (Mbaye and Benjamin 2014; Dabla-Norris et al. 2008; Steel and Snodgrass 2008; Verick 2006; Schneider 2004; Djankov et al. 2002) and lagging economic growth (World Bank 2019; Loayza 2016; Calvés and Schoumaker 2004) are the key drivers of informality. The interlinkages between these factors result in informal firms having little incentives to formalize, thus preventing their employees from accessing the benefits of formalization.

The rest of the paper is structured in the following form. Section 2 describes the data. Section 3 presents stylized facts benchmarking informality in Senegal with respect to regional and global peers, as well as a brief discussion on a recent profile of labor informality in Senegal. Section 4 presents the methodology and results of the analysis on the voluntary informality in Senegal, explores the presence of heterogeneous effects and provides some robustness tests. Section 5 concludes.

## 2. Data

The analysis uses the 2018-19 Harmonized Survey of Household Living Conditions for Senegal (Enquête Harmonisée sur les Conditions de Vie des Ménages, EHCVM) which is nationally representative. The EHCVM was carried out by the West African Economic and Monetary Union[1] (WAEMU) Commission with the support of the World Bank in two collection waves of 3 months each to take seasonality into account. The first wave took place from mid-September to mid-December 2018. The second wave was implemented from April 11 to July 10, 2019. The sample design guarantees representativeness not only

[1] The WAEMU region is composed of Burkina Faso, Côte D'Ivoire, Benin, Guinea Bissau, Mali, Niger, Senegal and Togo. The survey program is a cooperative effort between WAEMU, the World Bank, and the national statistical institutes across the WAEMU member countries. See Regional Program to Harmonize and Modernize Living Conditions Surveys (dashboard), World Bank, Washington, DC, https://projects.worldbank.org/en/projects-operations/project-detail/P153702.

at the national level, but also at the highest administrative division below it (WAEMU, 2020).

Of the 7,176 households sampled (3,588 per wave), 7,156 were validated and maintained in the final database. As a result, microdata from the EHCVM provides information from 7,156 households and 66,120 individuals distributed along urban and rural areas in the country. An advantage of using this survey for responding the main question of this study is that it includes an in-depth labor module that covers social security contributions at the individual level and non-agricultural enterprise characteristics owned by household members. Therefore, the ECHVM provides information of both workers and firms, which can be exploited to obtain a better picture of labor informality.

The definition of labor informality used in this study considers individuals as informal if they do not contribute to social security (IPRES, FNR, retraite complémentaire) nor have a formal accounting system in their non-agricultural enterprise(s) (in case of owning one or more). This definition accounts not only workers without access to social security benefits, but also the long network of family businesses among the self-employed and employers that are beyond the scrutiny of the tax authorities. Two alternative definitions are also analyzed for robustness checks. The first one is a more stringent legal definition that considers as informal those individuals without contributions to social security or a formal accounting system transmitting to the Tax Authority in their non-agricultural enterprise(s). The second is a more relaxed definition, that classifies workers as informal if they do not contribute to social security nor have any non-agricultural enterprise(s) registered in the Commercial Register, or with a fiscal identification, or with a formal accounting system or with some employee registered at the Social Security.

## 3. A profile of labor informality

### *How labor informality in Senegal compares with peer countries?*

Sub-Saharan Africa (SSA) is the region with the highest average rate of informality in the world (89.2 percent).[2] Within the region, Western Africa[3] has the highest informality rate (92.4 percent), compared to Eastern Africa (91.6 percent), Central Africa (91.0 percent) and Southern Africa (40.2 percent). Per ILO estimates, Senegal has a higher rate of informality (91.2 percent) [4] compared to the rest of SSA, yet, performs relatively better compared to its Western African peers, particularly those that are part of the WAEMU region (Figure 1, Panel A). In fact, Senegal has the lowest informality rate within WAEMU, which includes Burkina Faso and Benin, both which have the highest informality rates in the world (94.6 and 94.5 percent respectively). Nonetheless, Senegal's informality rate is high compared to aspirational peers (Figure 1, Panel B).[5] Informality was 5.6 percentage points higher than its closest aspirational peer, Indonesia.

Informality disproportionately affects women in SSA, making them more vulnerable to exogeneous labor market shocks. On average, 92.1 percent of women are employed in the informal sector compared to 86.4 percent for men (ILO 2018). In Senegal, the share of women employed in the informal sector is also greater than that for men at 93.7 percent versus 89.5 percent (ILO 2018). Compared to its closest aspirational peers, Senegal significantly lags in terms of female informality (Indonesia, 87.1 percent and Guatemala, 80.8 percent). However, Senegal outperforms its WAEMU peers having the lowest female informality rate across the region.

Labor market rigidities are commonly attributed to crowding out formal employment into the informal sector (World Bank 2019). Recent evidence shows that Senegal has amongst the most rigid labor markets in the World, resulting in bottlenecks for hiring and

[2] Per the ILO, informal employment is not subject to national labor legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance pay, paid annual or sick leave, etc.). Informality is determined or based on firm operational criteria such as social security contributions by the employer (on behalf of the employee), and entitlement to paid sick leave and paid annual leave. For more information, please refer to ILO 2018.

[3] Western Africa is composed of Benin, Burkina Faso, Cabo Verde, Côte D'Ivoire, Gambia, Ghana, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

[4] This estimate differs from the informality rate per the EHCVM which stood at 93.7 percent in 2018-19.

[5] Aspirational peers were chosen for their similarity regarding the proportion of the economy engaged in international trade, the value of natural resource extraction, the size of the agricultural sector, the state of human capital, and the size. However, these countries achieved a greater GDP per capita growth than Senegal. Based on this approach, Indonesia, Armenia, and Guatemala are categorized as Senegal's aspirational peers. Please refer to World Bank 2018 for more information.

dismissing employees (World Bank 2020b). In 2020, Senegal scored a 0 in terms of the Ease of Hiring Index and 60.0 for the Ease of Redundancy Index.[6] This is further corroborated by Golub et al. (2015)[7], which rank Senegal as the third most highly regulated labor market in the world, and the World Economic Forum's labor market competitive index, where Senegal ranks amongst the 30 least competitive countries in terms of its labor market.[8] A closer look at the data shows that countries with high levels of informality are associated with lower levels of competitive labor markets (Figure 2, Panel A). This is particularly the case for SSA, which has the highest levels of informality and lowest levels of labor market competitiveness in the world. The opposite is true for countries in the Europe and Central Asia, which have a low labor informality rate and are associated with more effective labor markets.

Quality jobs and formality yield higher levels of productivity. This rapport is well documented in the literature (World Bank 2020c; Brummund, et al. 2016; La Porta and Shleifer 2016; Busso et al. 2012; Benjamin et al. 2012; Hsieh and Klenow 2009, Steel and Snodgrass 2008; Gelb et al. 2009; La Porta and Shleifer 2008). Countries with high informality tend to have the lowest levels of worker productivity in the world, as measured by their output per worker (Figure 2, Panel B). This sheds light on the substantial productivity gap between formal and informal firms (World Bank 2019). In Senegal, La Porta and Shleifer (2014) find that the value added per employee of informal firms is 14 percent of formal firms. Therefore, expanding the share of workforce in formal employment is a critical policy objective for developing countries in order to increase productivity.

[6] The lower the score, the least flexible regulation, with 0 being the lowest score possible. The Ease of Hiring Index estimates the availability and maximum length of a fixed-term contract for a task related to the permanent activities of a firm, the probationary period, and the ratio of the minimum wage to value added per worker. The Ease of Redundancy Index estimates characteristics of regulation governing notification and approval requirements, retraining obligations, and priority rules for dismissal and reemployment.

[7] Based on the Doing Business database, the authors create an index of labor market regulations for 2014.

[8] The World Economic Forum's Global Competitiveness Index aims to measure the drivers of total factor productivity (TFP). These drivers are organized into 12 pillars: Institutions; Infrastructure; ICT adoption; Macroeconomic stability; Health; Skills; Product market; Labor market; Financial system; Market size; Business dynamism; and Innovation capability. The labor market pillar aims to assess the flexibility, incentives and merits that of the labor market.

### *A profile on labor informality in Senegal*

Labor informality is a widespread phenomenon in Senegal. The percentage of workers that can be classified as informal with the definition and data used in this study reaches the 93.7%, representing almost 98% of the employed population in rural areas and 89.5% among urban regions. A similar pattern can be seen across the eight WAEMU member countries using their respective 2018-19 EHCVM surveys, with average informality rates of 98.6% and 88.9% in rural and urban areas, respectively (Figure 3)[9]. Informality is not only spread across rural and urban areas in Senegal, but also among different working conditions. Table 1 shows that the informality rate at the national level is almost 100% among unpaid workers, 97.5% within the group of employers and self-employed workers and lower but still very high for wage earners, with informality rates of about 84% nationwide and 80% in urban areas. In rural areas, the proportion of unpaid workers is much higher than in urban areas (32% and 12%, respectively), but even among salaried workers, informality is much higher.

In the Senegalese labor market, most of workers are men, without any formal education and strongly concentrated in the Midwest and Capital regions, with important differences in the composition of the formal and informal populations. Table 2 shows that around 57% of all workers are male, 60% has no formal education (42.5% in urban areas) and most of them live either in the Midwest region (31%) or in the Capital (27%). Formal workers are even more predominantly male than their informal counterparts, as nearly 72% of formal workers are men. Moreover, formal workers are older, much more educated and typically married. While their mean age is almost 42 and more than 80 percent of them have a formal education and are married, the average age within the informal population is 35.6, and only 37% and 59% are formally educated and married, respectively. These socio-demographic differences between the group of formal and informal workers are greater in urban areas than in rural regions — where these two groups are slightly more similar—, smaller in the sample that will be used to estimate

[9] Each survey was carried out independently across WAEMU member countries. The sample size of the surveys is comparable in magnitude and the questionnaire has been harmonized, allowing for comparability as well as the standardization of variables across countries. These estimates differ from the informality rates per the ILO, which are based on a slightly different definition of informality and less-recent data.

involuntary informality in the next section (see Table 3) and consistent with the pattern found in the rest of WAEMU countries (see Table 4).

There are significant heterogeneities in the prevalence of informality within the country. In addition to the differences already mentioned, Table 5 highlights other relevant existing discrepancies by computing the informality rate for different groups of the population. Informality is indeed higher among women, the young and those living outside Dakar, but it is also extremely high in economic activities related to the primary sector, housekeeping, construction, trade and manufacturing, with informality rates well above the 90 percent even in urban areas. In contrast, there are some branches of economic activity in which informality is significantly lower, such as financial services, education and public administration, where only 50 percent of workers are informal. For wage earners, those employed in private and associative companies are rarely entitled to the benefits of social security, while those working for local authorities or public and semi-public companies are mostly formal, with informality rates around 40 percent in these cases. No significant difference is found by the amount of hours worked per week and, as expected, informality rates are lower among the group with the highest household per capita consumption.

While fringe benefits for wage earners are greater among formal jobs, their use as a labor compensation is not widely extended in Senegal. Table 6 shows that benefits such as paid vacations, sick leave, maternity/paternity leave or health insurance paid by the employer are extremely rare among informal jobs, with less than 10% of informal workers accessing these benefits. With the exception of paid vacations and, to a lesser extent, sick leave, these compensations are also unusual within the Senegalese formal market, since only 29% of formal salaried workers have access to maternity and paternity leave and less than 20% enjoy employer-provided health insurance. Compensating wage theory predicts that workers receiving more generous fringe benefits are paid a lower wage than comparable workers who prefer fewer fringe benefits (see Rosen 1986 for a theoretical benchmark and Olsen 2002 for evidence in this direction). While the lack of extension of fringe benefits in Senegal is not sufficient to argue that workers are choosing higher wages in exchange of lower benefits, this piece of evidence is consistent with results found in the section below suggesting that the benefits of being formal are not high enough to make the formal sector attractive.

Beyond the small fraction of salaried workers with access to social security benefits, the profile of labor informality in Senegal is completed with the presence of a long network of family businesses among self-employed and employers that are beyond the control of the tax authorities. As Table 7 shows, the percentage of these non-agricultural enterprises with a formal accounting system is around a 2.8% - of which only a quarter transmits to the Tax Authority-, 97.3% do not have a fiscal identification number and 96.4% are not even registered at the Commercial Register. Tax compliance among these family businesses is almost null, since only 0.5% have their workers registered at Social Security. However, these small firms do not complain about an excess of regulation and taxes as a main obstacle for their business. Even among formal firms, less than a quarter consider that taxes and regulations are a problem for the exercise of their activity. This evidence is consistent with data from larger firms, with at least 5 employees, since 26.5% (30.2%) of these firms consider tax administration (tax rates) as a major or severe obstacle to their growth and operations (World Bank Enterprise Survey 2014). The problem reported by these firms does not seem to be the burden of taxes but the unfair competition from informal firms as the leading constraint for formal businesses.[10] Whether this informality is chosen or involuntary is a key aspect to understand what are the most suitable policies to solve this problem, a matter that will be dealt with in the next section.

## 4. Involuntary informality in Senegal

### *Model to estimate involuntary informality*

To estimate the size of involuntary informality and its underlying drivers the analysis follows the approach in Alcaraz et al. (2015). In this model, there are two sectors in the labor market: formal and informal. The model abstracts from the participation decision and therefore individuals only select in which sector to work. Individuals will prefer a job in the sector that gives them the highest utility conditional on its characteristics, which include those that affect their potential labor income directly, such as education and experience, and those that affect their choice of sector and are not necessarily associated to their labor income, such as household composition or marital status. Once a worker decides in which sector to work, they apply for a job in that sector. All individuals can

[10] More than half of respondents in Senegal find these challenges as major or severe (versus 39 percent in Sub-Saharan Africa) with more than three quarters of the firms declaring to be in direct competition against unregistered or informal companies.

obtain a job in the informal sector if that is their preference. However, if they choose the formal sector, there is an entry barrier and an associated probability δ of being hired. The probability of not getting a formal job and thus being displaced into the informal sector for those who prefer the formal sector is therefore 1- δ, and this group is referred as *involuntary informal workers*, in contrast to those workers who self-select into the informal sector referred as *voluntary informal workers*.

In formal terms, the unobserved net utility of being a formal worker for an individual *i* is given by:

$$u_i^* = X_i\beta + \varepsilon_i, \qquad \varepsilon_i \sim N(0,1) \tag{1}$$

where $X_i$ is a matrix of observable characteristics of the individual *i* that affects the net utility of being a formal worker. As described above,

$$Worker's\ observed\ sector = \begin{cases} formal & if\ u_i^* > 0\ and\ is\ hired \\ informal & if\ u_i^* > 0\ and\ is\ not\ hired\ or\ u_i^* \leq 0 \end{cases}$$

The probability of obtaining a formal job for a worker who prefers a job in the formal sector δ is assumed to be independent of the workers' preferences or characteristics and dependent of the institutional framework of the whole economy. Therefore, the probabilities of being formal and informal are given by:

$$p_i(formal) = P(u_i^* > 0\ and\ is\ hired) = \delta\Phi(X_i\beta) \tag{2}$$

$$\begin{aligned} p_i(informal) &= P[(u_i^* > 0\ and\ is\ not\ hired)\ or\ (u_i^* \leq 0)] \\ &= P(u_i^* > 0\ and\ is\ not\ hired) + P(u_i^* \leq 0) \\ &= (1-\delta)\Phi(X_i\beta) + \Phi(-X_i\beta) \\ &= 1 - \delta\Phi(X_i\beta) \end{aligned} \tag{3}$$

where Φ is the cumulative density of the normal distribution and the parameters δ and $\beta$ can be estimated by maximum likelihood using the following likelihood function:

$$L = \prod_{formal} \delta\Phi(X_i\beta) \cdot \prod_{informal}[1 - \delta\Phi(X_i\beta)] \tag{4}$$

Once the parameter δ is estimated, the proportion of informal workers who are involuntarily employed in that sector can be derived. Let $T$ be the observed total number of workers, $F$ the number of observed formal workers, $M$ the number of workers who prefer to be formal, and $f$ the observed proportion of formal workers among all workers. Using the fact that $F = \delta M$,

$$\frac{Involuntary\ informal\ workers}{Informal\ workers} = \frac{(1-\delta)M}{T-F} = \frac{(1-\delta)\frac{1}{\delta}}{\frac{1}{f}-1} \quad (5)$$

While this methodology allows to obtain an estimate for the percentage of informal workers who were involuntarily displaced into the informal sector, it depends on the following assumptions. First, the participation decision is ignored. This issue is partially mitigated in the analysis by focusing on a sample of male workers between the ages 30 and 60 in urban areas, where the participation rate is around 93%. Secondly, the model is static in nature, with a one-time decision that does not allow changes between sectors. Third, the probability of getting formal job for a worker who prefers a job in the formal sector is assumed to be independent of the workers' preferences or characteristics, an assumption required to obtain specific estimates for the fraction of involuntary informal workers.

***Main results and heterogeneous effects***

Estimates of the size of involuntary informality using the methodology described above suggests that informality in Senegal is more a matter of self-selection into the informal sector than a consequence of entry barriers. Table 8 shows the results of different models of self-selection into the formal sector and consistently suggests that the desire of being formal is greater for workers with formal education, married and with a lower proportion of children under the age of 5 in the household,[11] while the individual's preference for the formal sector grows with age at a decreasing rate. The gender composition in the household may also play a role, but its effect is not statistically significant in urban areas despite it is significant at 1 percent when workers in rural areas are also considered in the estimation sample.[12] The parameter δ, that captures the probability of obtaining a formal job for a worker who prefers a job in the formal sector, is estimated slightly below 0.50, which given the actual formality rates is consistent with around 30% of informal workers being involuntarily displaced into the informal sector.

[11] While preferences for stability and a lower variability in income may play an important role in the preference for formality among married workers and households with a *higher* proportion of children under 5, the fact that the desire of being formal is greater among household with a *lower* proportion of children under 5 could be explained by other factors, such as the greater need of a pension during retirement for older members in these families.

[12] Results available upon request.

The prevalence of voluntary informality in Senegal is confirmed by a series of robustness checks to the sample considered in the estimation. Table 9 shows that the baseline estimates of involuntary informality in all the models considered in this study are almost the same if the sample is restricted to those individuals who work either 30 and more or 35 and more hours per week, therefore excluding part-time workers. Moreover, as wage earners without income account for 10.8% of the total salaried workers in urban areas, removing this particular group from the estimation sample could be important, but Table 9 shows that it does not affect the estimates either. Indeed, the high level of voluntary informality could be the result of the inclusion of individuals who do not work in exchange of a monetary compensation among the population of interest, such as family workers and apprentices who are initially willing to work in order to acquire experience only. However, Table 9 shows that this is not the case, as even excluding wage earners without income and unpaid workers from the estimation sample, the main result remains unchanged.

The size of involuntary informality is heterogeneous across different types of workers. While exploring such heterogeneities imply a reduction in the sample size and therefore more imprecise estimates, results from our preferred specification -model (6)- for the subsamples of wage earners with positive incomes and the self-employed and employers suggest that involuntariness is lower among salaried workers (Table 10). Indeed, while among all the employed individuals in the labor force —including unpaid workers— involuntary informality ascends to a 29.2% of the informal population, only 11% of the group of informal wage earners with positive incomes are involuntarily in that situation according to our preferred specification. On the other hand, the fraction of informal self-employed and employers who is involuntarily in the informal sector is around 28%. These heterogeneities should nonetheless be interpreted with caution, since the sample size is considerably reduced to obtain the estimates.[13]

[13] Other heterogeneities, such as the size of involuntary informality along the consumption distribution, has not being included among the main results of this study because of sample size limitations. Therefore, while an exploratory analysis suggests that involuntary informality has a U-shaped form along the consumption distribution (being higher among the poorest and the richest and lower among the middle class), these results are not included in the document and are left available upon request to those interested.

***Robustness checks***

The result in this paper suggesting that labor informality is mainly a voluntary phenomenon in Senegal is also robust to other definitions of informality. Under the definition used so far, a worker is considered formal if she contributes to social security or has a formal accounting system in her non-agricultural enterprise(s). Table 11 shows that the levels of informality are similar if a more demanding —purely legalistic— definition of formality is used, by which only the firms with a formal accounting system transmitting to the Tax Authority are considered formal, or a broader definition, merely requiring some sort of registration (with the Commercial Registry or the Tax Authority) or a formal accounting system available for an enterprise to be considered as formal.

Table 12 confirms the finding that most of workers self-select into informal jobs because, given their characteristics, it is in their best interest to work in this sector. However, the specific proportion of informal workers that are classified as involuntarily informal with these alternative definitions is closer to the 20% than the 30% estimated with the baseline definition.

## 5. Conclusions and policy options

The informal economy in Senegal is a complex and heterogeneous issue. Thus, understanding the characteristics of informal workers, as well as their motivations and causes behind their potential selection into informality is essential for policy action. This paper studies the current state of informality in Senegal, defined as those that do not contribute to social security or do not have a formal accounting system in their non-agricultural enterprise, and estimates the relative importance of self-selection versus entry barriers. Results also show that labor informality is mainly a voluntary phenomenon, and that 30 percent of informal workers being involuntarily displaced into the informal sector.

In order to foster formal employment across the country a multifaceted formalization strategy is needed and will require a distinction between programs to incentivize formalization of firms, and policies to increase formalization of employment particularly for young workers.

On one hand, programs to incentivize formalization of firms should focus providing direct incentives to firms for formalization through targeted programs including access to finance, technology adoption and access to other relevant business services. Policy

reforms should also aim at increasing flexibility of the labor market as the country ranks amongst the top countries in the world in terms of labor rigidities. Some policy options should include reduction of burdensome regulation, tax policy adjustments, cutting the cost of hiring and firing, and administrative simplification.

On the other hand, policies to increase of formalization of employment would entail improved social security and protection of labor rights. Previous literature has shown that low income workers are likely to prefer immediate labor earnings over long-term benefits (Cunningham and Maloney 2001; Levy 2008; Anton, Hernandez and Levy, 2013). Ensuring a good value proposition of benefits linked to formal jobs thus aligning the services provided with their perceived cost can also encourage formality. However, refining the components of a formalization strategy for Senegal will require more in-depth analysis to unpack the main motivations behind voluntary informality, which should be subject of future research.

## References


Alcaraz, Carlo, Daniel Chiquiar, and Alejandrina Salcedo. 2015. "Informality and Segmentation in the Mexican Labor Market." Banco de México Working Papers No.2015-25.

Anton, Arturo F., Fausto Hernandez, and Santiago Levy. 2012. "The End of Informality in Mexico? Fiscal Reform for Universal Social Insurance." Inter-American Development Bank, Washington D.C.

Bhorat, Haroon and Finn Tarp. 2016. "The Pursuit of Long-Run Economic Growth in Africa: An Overview of Key Challenges." In Bhorat H. and Tarp F. (Eds.), Africa's Lions: Growth Traps and Opportunities for Six African Economies (pp. 1-36). Brookings Institution Press, Washington, D.C.

Brummund, Peter, Christopher Mann and Carlos Rodriguez-Castelan. 2016. "Job Quality and Poverty in Latin America." Policy Research Working Paper 7927, World Bank, Washington, D.C.

Busso, Matías, Victoria Fazio, and Santiago Levy. 2012. "(In)Formal and (Un)Productive: The Productivity Costs of Excessive Informality in Mexico." Inter-American Development Bank Working Paper 341, Washington, D.C.

Calvés, Anne-Emmanuele and Bruno Schoumaker. 2004. "Deteriorating Economic Context and Changing Patterns of Youth Employment in Urban Burkina Faso:1980-2000." World Development 32 (8): 1341-1354.

Dabla-Norris, Era, Mark Gradstein, and Gabriela Inchauste. 2008. "What Causes Firms to Hide Output? The Determinants of Informality." Journal of Development Economics 85, no. 1: 1-27.

De Soto, Hernando. 1989. The Other Path: The Invisible Revolution in the Third World. New York: Harper and Row

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2002. "The Regulation of Entry." Quarterly Journal of Economics 117(1): 1–37.

Falco, Pablo, Andrew Kerr, Neil Rankin, Justin Sandefur, and Francis Teal. 2011. "The returns to formality and ifnormality in urban Africa." Labour Economics 18.

Falco, Paolo and Luke Haywood. 2016. "Entrepreneurship versus Joblessness: Explaining the Rise in Self-Employment." Journal of Development Economics 118, 245–265.

García Gustavo. 2017. "Labor informality: choice or sign of segmentation? A quantile regression approach at the regional level for Colombia." Review of Development Economics 21(4).

Gelb, Alan, Mengistae Taye, Ramachandran Vijaya, Shah, Manju Kedia. 2009. "To formalize or not to formalize? Comparisons of microenterprise data from southern and east Africa." CGD Working Paper No. 175, Washington, D.C.

Golub, Stephen and Faraz Hayat. 2014. "Employment, unemployment, and underemployment in Africa." In Monga C. and Lin J. (Eds.), The Oxford Handbook of Africa and Economics: Volume 1: Context and Concepts. Oxford University Press, Oxford, United Kingdom.

Golub, Stephen, Ahmadour Mbaye, and Hanyu Chwe. 2015. "Labor market regulations in sub-Saharan Africa, with a focus on Senegal." DPRU Working Paper No. 201505

Grimm, Michael, Peter Knorringa, and Jann Lay. 2012. "Constrained Gazelles: High Potentials in West Africa's Informal Economy." World Development Vol.40, No.7.

Günther, Isabel and Andrey Launov. 2012. "Informal employment in developing countries: opportunity or last resort?" Journal of Development Economics 97, 88–98.

Haan, Hans. 2006. “Training for Work in the Informal Micro-Enterprise Sector: Fresh Evidence from Sub-Sahara Africa”. Unesco-Unevoc, Springer, The Netherlands.

Hsieh, Chang-Tai and Peter J. Klenow. 2009. “Misallocation and Manufacturing TFP in China and India,” Quarterly Journal of Economics, Issue 4. Volume 124.

ILO (International Labour Organization). 2018. "Women and men in the informal economy: A statistical picture." ILO, Geneva.

ILO (International Labour Organization). 2020. Impact of lockdown measures on the informal economy A summary." ILO, Geneva.

La Porta, Rafael and Andrei Shleifer. 16. “The Unofficial Economy in Africa.” In Edwards, S., Johnson J, and Weil D. (Eds.), Africa Successes, Volume 1: Government and Institutions. Oxford University Press, Oxford, United Kingdom.

La Porta, Rafael and Andrei Shleifer. 2008. “The Unofficial Economy and Economic Development.” Brookings Papers on Economic Activity,Fall: 275–352.

La Porta, Rafael and Andrei Shleifer. 2014. “Informality and Development.” Journal of Economic Perspectives 28(3): 109–26.

Levy, Santiago.2008."Good Intentions, Bad Outcomes: Social Policy, Informality and Economic Growth in Mexico." Brookings Institution Press, Washington D.C.

Loayza, Norman. 1996. “The Economics of the Informal Sector: A Simple Model and Some Empirical Evidence from Latin America.” Carnegie-Rochester Conference Series on Public Policy 45: 129-62.

Loayza, Norman. 2016. "Informality in the Process of Development and Growth." Policy Research Working Paper 7858, World Bank, Washington D.C.

Maloney, William F. 1998. “Does Informality Imply Segmentation in urban Labor Markets? Evidence from Sectoral Transitions in Mexico,” World Bank Economic Review, 13:275-302, Washington, D.C.

Maloney, William F. 2004. "Informality Revisited" World Development Vol.32, No.7.

Mbaye, Ahmadou and Nancy Benjamin. 2014. "Informality, Growth, and Development in Africa." In Monga C. and Lin J. (Eds.), The Oxford Handbook of Africa and Economics: Volume 1: Context and Concepts. Oxford University Press, Oxford, United Kingdom.

Nancy Benjamin and Ahmadou Mbaye. 2012. "The Informal Sector in Francophone Africa: Firm Size, Productivity and Institutions."Africa Development Forum, World Bank and Agence Française de Développement, Washington, D.C.

Olson, Craig. 2002. “Do Workers Accept Lower Wages in Exchange for Health Benefits?” *Journal of Labor Economics*, 20(S2), S91-S114. doi:10.1086/338675

Rosen, Sherwin. 1986. The Theory of Equalizing Differences. In *Handbook of Labor Economics*, vol. 1, edited by O. C. Ashenfelter and R. Layard, pp. 641–92. Amsterdam: North-Holland.

Schneider, Friedrich G. 2004. "Shadow Economies around the World: What do we really know?" IAW Diskussionspapiere, No. 16, Institut für Angewandte Wirtschaftsforschung (IAW), Tübingen.

Steel, William F. and Donald Snodgrass. 2008. “Raising Productivity and Reducing Risks of Household Enterprises, Diagnostic Methodology Framework.” World Bank, Washington D.C.

UEMOA 2020. Note de communication des résultats de la Première Enquête Harmonisée sur les Conditions de Vie des Ménages (EHCVM). Centre Statistique / Département des Politiques Economiques et de la Fiscalité Intérieure. Juillet 2020.

Verick, Sher. 2008. "The Impact of Globalization on the Informal Sector in Africa." Economic and Social Policy Division, UNECA, Addis Ababa.

World Bank. 2018a. Systematic Country Diagnostic of Senegal. October 4. Dakar, Senegal: World Bank.

World Bank. 2019. Global Economic Prospects: Darkening Skies. World Bank, Washington, D.C.

World Bank. 2020a. Creating Markets in Senegal: Country Private Sector Diagnostic. World Bank, Washington, D.C.

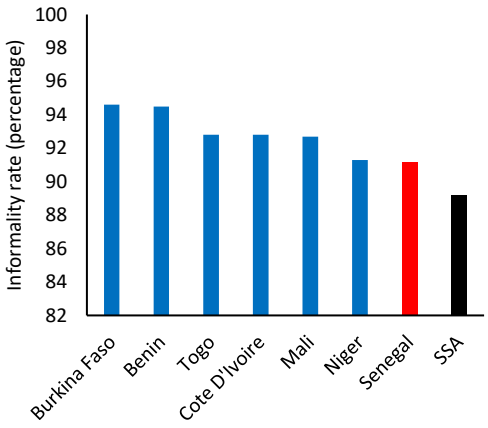
World Bank. 2020b. Doing Business 2020: Comparing Business Regulation in 190 Economies. World Bank, Washington, D.C.

World Bank. 2020c. Informality, Job Quality, and Welfare, in Sri Lanka. World Bank, Washington, D.C.

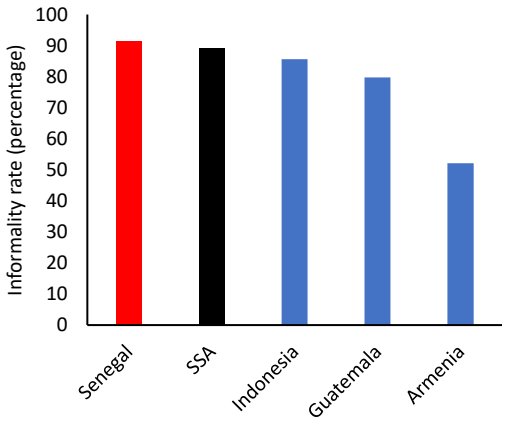
# Figures and Tables

## Figure 1. Informality rate, latest available information

### a. Senegal vs. WAEMU peers




### b. Senegal vs aspirational peers

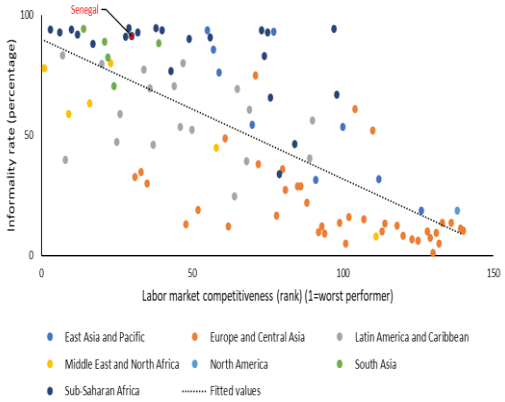



*Source*: ILO 2018.

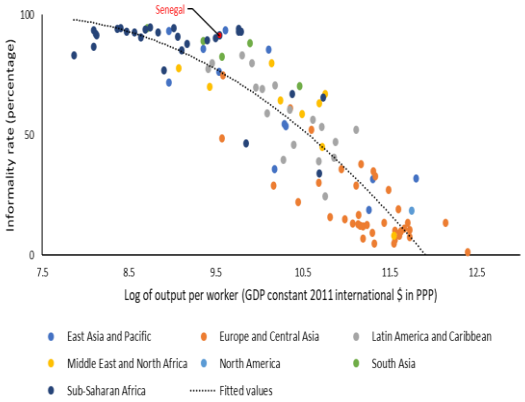
*Notes*: Sub-Saharan Africa includes data from Angola (2009), Benin (2011), Botswana (2009), Burkina Faso (2014), Cabo Verde (2015), Cameroon (2007), Chad (2003), Comoros (2004), Congo, Dem. Rep. (2005), Congo, Rep. (2009), Côte D'Ivoire (2016), Gambia (2012), Ghana (2013), Liberia (2010), Madagascar (2013), Malawi (2013), Mali (2015), Namibia (2016), Niger (2011), Nigeria (2013), Rwanda (2014), Senegal (2015), Sierra Leone (2014), South Africa (2016), Tanzania (2014), Togo (2011), Uganda (2012), Zambia (2014). Data for aspirational peers is from Indonesia (2016), Guatemala (2016) and Armenia (2014).

## Figure 2. Informality rate and labor market indicators

### a. Labor Market Regulations



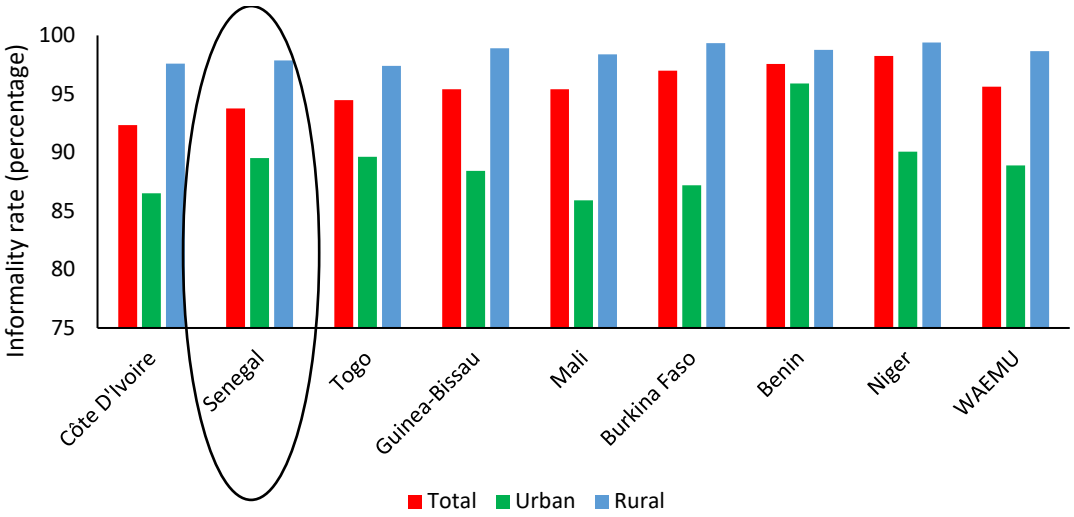

### b. Output per worker




*Source*: World Economic Forum 2019, ILO 2018, ILO 2020.

*Notes*: Labor market efficiency rank is shown in inverse order for easier interpretation. Output per worker is calculated using data on GDP (in constant 2011 international dollars in PPP) derived from the World Development Indicators database of the World Bank. To compute productivity as GDP per worker, ILO modelled estimates for total employment are used.

**Figure 3. Informality rate, 2018-19 EHCVM**




Source: Enquête Harmonisée sur les Conditions de Vie des Ménages (EHCVM) 2018-19.

**Table 1. Labor informality by working condition**

| | Informality rate | Formality rate | Total |
|---|---|---|---|
| **Total** | | | |
| **Wage earners** (30 % of all workers) | 83.6% | 16.4% | 100% |
| **Self-employed workers or employers** (47 % of all workers) | 97.5% | 2.5% | 100% |
| **Unpaid workers** (23 % of all workers) | 99.7% | 0.3% | 100% |
| **Urban** | | | |
| **Wage earners** (44 % of all workers) | 79.6% | 20.4% | 100% |
| **Self-employed workers or employers** (44 % of all workers) | 96.6% | 3.4% | 100% |
| **Unpaid workers** (12 % of all workers) | 99.8% | 0.2% | 100% |
| **Rural** | | | |
| **Wage earners** (18 % of all workers) | 93.5% | 6.5% | 100% |
| **Self-employed workers or employers** (50 % of all workers) | 98.2% | 1.8% | 100% |
| **Unpaid workers** (32 % of all workers) | 99.7% | 0.3% | 100% |

*Notes*: (1) Informal workers are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more). (2) Unpaid workers include both unpaid family workers and unpaid trainees or apprentices.

## Table 2. Characteristics of workers

| | Total | | | Urban | | | Rural | | |
|---|---|---|---|---|---|---|---|---|---|
| | Informal workers | Formal workers | All workers | Informal workers | Formal workers | All workers | Informal workers | Formal workers | All workers |
| **Male** | 56.3% | 72.1% | 57.3% | 54.8% | 73.1% | 56.7% | 57.7% | 67.2% | 57.9% |
| **Mean age (years)** | 35.6 | 41.8 | 36.0 | 36.7 | 42.4 | 37.3 | 34.7 | 39.0 | 34.8 |
| **With formal education** | 37.0% | 83.3% | 39.9% | 53.7% | 89.9% | 57.5% | 22.3% | 51.8% | 22.9% |
| **Married** | 58.9% | 80.4% | 60.3% | 54.2% | 79.4% | 56.8% | 63.1% | 85.2% | 63.6% |
| **Average proportion of females in household** | 51.9% | 48.6% | 51.7% | 51.1% | 49.0% | 50.9% | 52.5% | 46.9% | 52.4% |
| **Average proportion of children in household** | 16.9% | 13.6% | 16.7% | 13.6% | 12.6% | 13.5% | 19.9% | 17.9% | 19.8% |
| **Region (distribution)** | | | | | | | | | |
| Capital | 25.1% | 55.8% | 27.0% | 51.5% | 65.5% | 52.9% | 1.8% | 9.4% | 1.9% |
| North | 8.8% | 5.8% | 8.7% | 8.2% | 5.8% | 8.0% | 9.4% | 5.8% | 9.3% |
| Midwest | 32.1% | 15.8% | 31.1% | 20.7% | 14.0% | 20.0% | 42.2% | 24.0% | 41.8% |
| Mideast | 16.0% | 12.0% | 15.8% | 8.5% | 6.1% | 8.3% | 22.7% | 39.9% | 23.1% |
| Southwest | 16.5% | 9.3% | 16.0% | 10.4% | 7.6% | 10.1% | 21.8% | 17.3% | 21.7% |
| Southeast | 1.4% | 1.4% | 1.4% | 0.6% | 1.0% | 0.7% | 2.2% | 3.6% | 2.2% |

*Notes*: (1) Informal workers are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more). (2) Children: individuals aged 0 to 5.

## Table 3. Characteristics of male workers in the estimation sample

| | Urban | | |
|---|---|---|---|
| | Informal workers | Formal workers | All workers |
| **Mean age (years)** | 41.9 | 43.7 | 42.3 |
| **With formal education** | 56.9% | 89.6% | 63.9% |
| **Married** | 77.0% | 85.4% | 78.8% |
| **Average proportion of females in household** | 46.0% | 45.6% | 45.9% |
| **Average proportion of children in household** | 14.8% | 13.8% | 14.6% |
| **Region (distribution)** | | | |
| Capital | 52.4% | 65.7% | 55.2% |
| North | 8.1% | 6.7% | 7.8% |
| Midwest | 18.7% | 12.7% | 17.4% |
| Mideast | 8.1% | 5.8% | 7.6% |
| Southwest | 12.2% | 8.1% | 11.3% |
| Southeast | 0.6% | 1.0% | 0.7% |
| **Number of observations** | 2524 | 612 | 3136 |

*Notes*: (1) The estimation sample is restricted to male workers aged more than 30 and less than 60. (2) Informal workers are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more). (3) Children: individuals aged 0 to 5.

## Table 4. Characteristics of workers by WAEMU country

| Indicator | Group | Senegal | Benin | Burkina Faso | Côte D'Ivoire | Guinea Bissau | Mali | Niger | Togo | WAEMU |
|---|---|---|---|---|---|---|---|---|---|---|
| Male | *All workers* | 57.3% | 48.4% | 48.8% | 55.0% | 51.1% | 63.8% | 53.8% | 48.4% | 53.8% |
| | *Formal workers* | 72.1% | 77.4% | 68.7% | 73.3% | 75.6% | 79.6% | 72.2% | 69.7% | 73.3% |
| | *Informal workers* | 56.3% | 47.6% | 48.2% | 53.5% | 49.9% | 63.0% | 53.5% | 47.1% | 52.9% |
| Age | *All workers* | 36.0 | 32.7 | 29.6 | 35.0 | 31.8 | 33.5 | 29.5 | 34.6 | 32.5 |
| | *Formal workers* | 41.8 | 38.8 | 39.7 | 40.3 | 41.6 | 40.6 | 41.4 | 40.9 | 40.6 |
| | *Informal workers* | 35.6 | 32.6 | 29.3 | 34.6 | 31.3 | 33.2 | 29.2 | 34.2 | 32.2 |
| Education | *All workers* | 39.9% | 40.9% | 33.4% | 45.1% | 53.0% | 31.6% | 29.8% | 67.6% | 39.0% |
| | *Formal workers* | 83.3% | 87.3% | 73.2% | 83.9% | 85.3% | 78.2% | 78.6% | 87.8% | 81.9% |
| | *Informal workers* | 37.0% | 39.8% | 32.2% | 41.9% | 51.4% | 29.3% | 29.0% | 66.4% | 37.1% |
| Married | *All workers* | 60.3% | 63.3% | 55.0% | 62.6% | 50.1% | 64.7% | 57.8% | 59.2% | 60.0% |
| | *Formal workers* | 80.4% | 86.4% | 74.7% | 77.7% | 70.8% | 87.0% | 88.1% | 78.9% | 80.3% |
| | *Informal workers* | 58.9% | 62.7% | 54.4% | 61.3% | 49.1% | 63.7% | 57.2% | 58.1% | 59.0% |

*Notes*: Informal workers are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more).

## Table 5. Informality rate for different groups of the population

| | | Total | Urban | Rural |
|---|---|---|---|---|
| **By Gender** | | | | |
| | Male | 92.1% | 86.5% | 97.5% |
| | Female | 95.9% | 93.5% | 98.3% |
| **By Age group** | | | | |
| | Younger than 16 | 99.7% | 99.8% | 99.7% |
| | 16-22 | 99.1% | 99.2% | 99.1% |
| | 23-35 | 94.3% | 91.9% | 97.4% |
| | 36-50 | 89.4% | 83.5% | 96.6% |
| | 51 and older | 93.0% | 87.6% | 98.0% |
| **By Agro ecological zone** | | | | |
| | Capital | 87.1% | 87.0% | 89.5% |
| | North | 95.8% | 92.4% | 98.7% |
| | Midwest | 96.8% | 92.7% | 98.8% |
| | Mideast | 95.3% | 92.2% | 96.3% |
| | Southwest | 96.4% | 92.2% | 98.3% |
| | Southeast | 93.8% | 84.7% | 96.5% |
| **By Region** | | | | |
| | Dakar | 87.1% | 87.0% | 89.5% |
| | Ziguinchor | 93.1% | 91.6% | 95.0% |
| | Diourbel | 98.9% | 97.6% | 99.1% |
| | Saint-Louis | 95.0% | 91.8% | 98.4% |
| | Tambacounda | 97.5% | 94.2% | 98.6% |
| | Kaolack | 93.4% | 93.6% | 93.3% |
| | Thies | 94.8% | 92.1% | 98.0% |
| | Louga | 96.7% | 89.4% | 99.0% |
| | Fatick | 96.8% | 88.0% | 98.5% |
| | Kolda | 97.2% | 91.2% | 99.3% |
| | Matam | 97.6% | 94.5% | 99.1% |
| | Kaffrine | 96.9% | 92.0% | 98.0% |
| | Kedougou | 93.8% | 84.7% | 96.5% |
| | Sedhiou | 96.8% | 91.8% | 98.3% |

## Table 5 (cont.). Informality rate for different groups of the population

| | Total | Urban | Rural |
|---|---|---|---|
| **By sector of activity** | | | |
| Primary | 98.7% | 96.4% | 99.0% |
| Secondary | 96.0% | 94.5% | 98.9% |
| Tertiary | 90.6% | 87.8% | 96.1% |
| **By Sector of activity (detailed)** | | | |
| Primary activities | 98.8% | 97.3% | 99.0% |
| Mining | 89.3% | 74.7% | 94.7% |
| Manufacturing | 96.0% | 94.5% | 98.9% |
| Electricity, gas and water supply | 66.0% | 62.3% | 86.7% |
| Construction | 96.7% | 95.6% | 98.6% |
| Trade | 96.6% | 95.4% | 98.6% |
| Restaurants and accomodation | 86.0% | 83.8% | 95.1% |
| Transport and communications | 93.3% | 89.6% | 99.4% |
| Financial services | 49.2% | 48.1% | 79.5% |
| Real estate, renting and business activities | 77.8% | 76.1% | 100.0% |
| Public administration | 51.1% | 50.0% | 56.9% |
| Education | 50.4% | 50.8% | 49.3% |
| Health and social work | 67.6% | 60.1% | 88.8% |
| Sanitation, roads and waste management | 77.7% | 75.8% | 100.0% |
| Community activities | 86.6% | 93.5% | 75.2% |
| Recreational, cultural and sporting activities | 84.7% | 84.1% | 100.0% |
| Personal service activities | 94.0% | 92.0% | 98.0% |
| Households as employers of domestic personnel | 98.7% | 98.8% | 98.6% |
| Activities of extraterritorial organizations | 50.4% | 25.9% | 100.0% |
| **By type of enterprise (wage earners only)** | | | |
| State / local authorities | 41.5% | 39.6% | 48.1% |
| Public / semi-public company | 40.4% | 38.6% | 51.1% |
| Private enterprise | 96.1% | 93.1% | 98.7% |
| Associative company | 97.4% | 95.6% | 99.1% |
| Household as employer of domestic staff | 99.7% | 99.7% | 99.6% |
| International organization /Embassy | 72.7% | 72.0% | 74.9% |
| **By Hours worked** | | | |
| Less than 30 hours per week | 95.0% | 91.0% | 97.6% |
| 30 or more hours per week | 93.3% | 89.1% | 98.0% |
| 35 or more hours per week | 93.2% | 89.1% | 98.0% |
| **By Quintiles of household per capita consumption** | | | |
| Quintile 1 | 98.7% | 96.6% | 99.2% |
| Quintile 2 | 98.1% | 97.0% | 98.6% |
| Quintile 3 | 96.4% | 94.9% | 97.7% |
| Quintile 4 | 95.0% | 93.1% | 97.9% |
| Quintile 5 | 83.3% | 80.9% | 92.6% |
| **By Deciles of household per capita consumption** | | | |
| Decile 1 | 98.7% | 97.4% | 99.0% |
| Decile 2 | 98.6% | 95.8% | 99.3% |
| Decile 3 | 99.1% | 99.7% | 98.9% |
| Decile 4 | 97.1% | 95.3% | 98.2% |
| Decile 5 | 97.2% | 96.5% | 97.8% |
| Decile 6 | 95.7% | 93.5% | 97.5% |
| Decile 7 | 95.2% | 93.2% | 97.9% |
| Decile 8 | 94.8% | 93.1% | 97.8% |
| Decile 9 | 90.5% | 88.9% | 94.4% |
| Decile 10 | 77.1% | 75.3% | 89.2% |

*Note*: Informal workers are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more).

## Table 6. Fringe benefits by informality condition.

| | Wage earners | |
|---|---|---|
| | Informal | Formal |
| **Total** | | |
| Paid vacations | 7.3% | 82.5% |
| Sick leave | 8.3% | 47.2% |
| Health insurance paid by employer | 1.3% | 19.7% |
| Maternity/paternity leave | 2.4% | 29.2% |
| **Urban** | | |
| Paid vacations | 9.0% | 81.8% |
| Sick leave | 8.7% | 46.5% |
| Health insurance paid by employer | 1.8% | 21.2% |
| Maternity/paternity leave | 3.0% | 29.4% |
| **Rural** | | |
| Paid vacations | 3.6% | 88.2% |
| Sick leave | 7.7% | 52.3% |
| Health insurance paid by employer | 0.2% | 8.1% |
| Maternity/paternity leave | 1.2% | 28.3% |

*Note*: Informal workers are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more).

## Table 7. Description of non-agricultural enterprises

| | Total | Urban | Rural |
|---|---|---|---|
| **% of enterprises** | | | |
| Without formal accounting system | 97.2% | 96.7% | 98.1% |
| With formal accounting system and no transmission to Tax Authority | 2.1% | 2.4% | 1.5% |
| With formal accounting system and transmission to Tax Authority | 0.7% | 0.9% | 0.4% |
| With fiscal identification number | 2.7% | 3.7% | 1.3% |
| Registered at the Commercial Register | 3.6% | 4.8% | 1.8% |
| With workers registered at Social Security | 0.5% | 0.8% | 0.1% |
| Complaining for excess of regulations and taxes | 9.2% | 11.4% | 5.9% |
| Complaining for excess of regulations and taxes (formal firms) | 22.6% | 27.2% | 10.2% |
| **Number of enterprises** | 7814 | 4755 | 3059 |

*Notes*: (1) Non-agricultural enterprises include the following activities done by household members: (a) make donuts, grill meat beef, mutton, or chicken, make juice from fruits (ginger, bissap), make beer from corn or millet, make bread or cakes, to resell for own account; (b) run, at home or elsewhere, a small clothing company (tailor), a sandal or other footwear manufacturing; (c) run, at home or elsewhere, a company working in the field of construction of houses (masonry, electricity, plumbing) or in carpentry (manufacture of furniture, beds, doors, windows) of wood or metal such as iron or aluminum; (d) run, at home or elsewhere, a trading company (shop, sale of building materials, computer hardware, phone cards, cigarettes on the edge of the road, sale of agricultural and livestock products); (e) exercise a liberal profession (doctor, traditional practitioner, lawyer, architect owning his firm or being a partner, pharmacist with his own dispensary, translator or interpreter working as his own boss, engineer with his own design office, etc.); (f) run an enterprise providing another service; taxis, motorcycle taxis, other transport, repair and maintenance (cars, motorcycles, radios, computers, TV, fridge, air conditioners, etc.); car washing; shoe shine; real estate agent / direct seller; telephone booth, word processing, photocopies, etc. (g) run a restaurant, a bar, maquis; a hotel, hostel / rented residence; sell drinks; (h) rent chairs, tables, tarpaulins, sound systems; (i) run any other non-agricultural business, even if it is a small activity exercised at home or in the street (example: manufacture and sale of handicrafts, rugs, jewelry, braiding mats, etc.), braiding hair, barber shop, etc. (2) The % of enterprises complaining for excess of regulations and taxes are the fraction of non-agricultural enterprises responding affirmatively to the following question: During the last 12 months, did the enterprise encounter that an excess of regulations and taxes was a problem for the exercise of its activity? (3) Formal firms are those with a formal accounting system.

## Table 8. Maximum Likelihood Estimation Results - urban areas

*Model of self-selection into the formal (vs. informal) sector with an entry barrier*

| Variables | Model | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| With formal education | | 1.853*** | 1.702*** | 1.652*** | 1.630*** | 1.605*** |
| | | (0.320) | (0.208) | (0.205) | (0.199) | (0.199) |
| Age | | | 0.222*** | 0.144** | 0.139* | 0.150** |
| | | | (0.080) | (0.073) | (0.072) | (0.073) |
| Age squared | | | -0.002** | -0.001* | -0.001* | -0.002* |
| | | | (0.001) | (0.001) | (0.001) | (0.001) |
| Married | | | | 0.739*** | 0.740*** | 0.801*** |
| | | | | (0.157) | (0.153) | (0.158) |
| Proportion of females in household | | | | | -0.357 | -0.185 |
| | | | | | (0.235) | (0.244) |
| Proportion of children in household | | | | | | -0.959** |
| | | | | | | (0.393) |
| Constant | 0.096 | -0.925*** | -6.386*** | -5.116*** | -4.857*** | -5.026*** |
| | (27.950) | (0.200) | (1.731) | (1.583) | (1.557) | (1.562) |
| Region dummy | YES | YES | YES | YES | YES | YES |
| Observations | 3,136 | 3,136 | 3,136 | 3,136 | 3,136 | 3,136 |
| δ | 0.467 | 0.381*** | 0.435*** | 0.469*** | 0.478*** | 0.484*** |
| | (9.638) | (0.053) | (0.052) | (0.060) | (0.061) | (0.064) |
| **Involuntary informal workers / Informal workers:** | **31.3%** | **44.7%** | **35.6%** | **31.1%** | **30.0%** | **29.2%** |

*Notes*: (1) *** p<0.01, ** p<0.05, * p<0.1. (2) Standard errors in parenthesis. (3) The sample is restricted to male workers aged more than 30 and less than 60 living in urban areas. (4) The dependent variable is a dummy equal to 1 if the worker is formal (with contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more)). (5) The coefficients represent the effect of each variable in the individual's preference for the formal sector. (6) δ is the probability of obtaining a formal job for a worker who prefers a job in the formal sector.

## Table 9. Robustness of the estimated percentage of involuntary workers to different subsamples

| Sample | Model | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Whole sample | 31.3% | 44.7%*** | 35.6%*** | 31.1%*** | 30%*** | 29.2%*** |
| Individuals who work 30 or more hours per week | 31.5% | 45.7%*** | 32.9%*** | 27.9%*** | 28.1%*** | 26.5%*** |
| Individuals who work 35 or more hours per week | 31% | 46.3%*** | 34.9%*** | 30.7%*** | 30.4%*** | 29.8%*** |
| Excluding wage earners without income | 30.1% | 42.7%*** | 35.8%*** | 31.6%*** | 30.9%*** | 31.2%*** |
| Excluding wage earners without income and unpaid workers | 29.7% | 43.8%*** | 37.4%*** | 32.5%*** | 31.9%*** | 32.3%*** |

*Notes*: (1) The columns in this table correspond to the specifications shown in Table 7. (2) *** p<0.01, ** p<0.05, * p<0.1. (3) The sample is restricted to male workers aged more than 30 and less than 60 living in urban areas. (4) Unpaid workers include both unpaid family workers and unpaid trainees or apprentices.

## Table 10. Maximum Likelihood Estimation Results for different types of workers

*Model of self-selection into the formal (vs. informal) sector with an entry barrier in urban areas*

| Variables | All workers | Wage earners with positive incomes | Self-employed and employers |
|---|---|---|---|
| With formal education | 1.605*** | 1.285*** | 0.900*** |
| | (0.199) | (0.362) | (0.246) |
| Age | 0.150** | 0.167* | 0.010 |
| | (0.073) | (0.100) | (0.162) |
| Age squared | -0.002* | -0.002 | -0.000 |
| | (0.001) | (0.001) | (0.002) |
| Married | 0.801*** | 0.587*** | 0.456 |
| | (0.158) | (0.203) | (0.326) |
| Proportion of females in household | -0.185 | 0.080 | -0.386 |
| | (0.244) | (0.249) | (0.596) |
| Proportion of children in household | -0.959** | -0.748 | -0.573 |
| | (0.393) | (0.505) | (0.856) |
| Constant | -5.026*** | -5.511** | -0.831 |
| | (1.562) | (2.197) | (3.448) |
| Region dummy | YES | YES | YES |
| Observations | 3,136 | 1,323 | 1,445 |
| δ | 0.484*** | 0.819*** | 0.206*** |
| | (0.064) | (0.287) | (0.041) |
| **Involuntary informal workers / Informal workers:** | **29.2%** | **11.2%** | **27.6%** |

*Notes*: (1) *** p<0.01, ** p<0.05, * p<0.1. (2) Standard errors in parenthesis. (3) The sample is restricted to male workers aged more than 30 and less than 60 living in urban areas. (4) The dependent variable is a dummy equal to 1 if the worker is formal (with contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more)). (5) The coefficients represent the effect of each variable in the individual's preference for the formal sector. (6) δ is the probability of obtaining a formal job for a worker who prefers a job in the formal sector.

## Table 11. Informality under different definitions

| | Informality (baseline definition) | Informality (legalistic definition) | Informality (registration definition) |
|---|---|---|---|
| **Total** | 93.8% | 94.4% | 92.7% |
| **Wage earners** (30 % of all workers) | 83.6% | 83.7% | 84% |
| **Self-employed workers or employers** (47 % of all workers) | 97.5% | 98.7% | 95% |
| **Unpaid workers** (23 % of all workers) | 99.7% | 99.8% | 100% |
| **Urban** | 89.5% | 90.5% | 87.9% |
| **Wage earners** (44 % of all workers) | 79.6% | 79.6% | 80% |
| **Self-employed workers or employers** (44 % of all workers) | 96.6% | 98.7% | 93% |
| **Unpaid workers** (12 % of all workers) | 99.8% | 99.8% | 100% |
| **Rural** | 97.9% | 98.2% | 97.4% |
| **Wage earners** (18 % of all workers) | 93.5% | 93.6% | 93% |
| **Self-employed workers or employers** (50 % of all workers) | 98.2% | 98.7% | 97% |
| **Unpaid workers** (32 % of all workers) | 99.7% | 99.9% | 100% |

*Notes*: (1) Informal workers (baseline definition) are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more). (2) Informal workers (legalistic definition) are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system transmitting to the Tax Authority in her non-agricultural enterprise(s) (in case of owning one or more). (3) Informal workers (registration definition) are those without contributions to social security (IPRES, FNR, retraite complémentaire), without any non-agricultural enterprise(s) (in case of owning one or more) registered in the Commercial Register, or with a fiscal identification, or with a formal accounting system or with some employee registered at the Social Security. (4) Unpaid workers include both unpaid family workers and unpaid trainees or apprentices.

## Table 12. Robustness to the definition of informality

*Model of self-selection into the formal (vs. informal) sector with an entry barrier in urban areas*

| Variables | Definition of informality | | |
|---|---|---|---|
| | Baseline | Legalistic | Registration |
| With formal education | 1.605*** | 1.520*** | 1.152*** |
| | (0.199) | (0.369) | (0.204) |
| Age | 0.150** | 0.133 | 0.108* |
| | (0.073) | (0.083) | (0.060) |
| Age squared | -0.002* | -0.001 | -0.001* |
| | (0.001) | (0.001) | (0.001) |
| Married | 0.801*** | 0.663*** | 0.609*** |
| | (0.158) | (0.209) | (0.139) |
| Proportion of females in household | -0.185 | -0.066 | -0.154 |
| | (0.244) | (0.212) | (0.189) |
| Proportion of children in household | -0.959** | -0.868** | -0.620** |
| | (0.393) | (0.442) | (0.316) |
| Constant | -5.026*** | -4.997*** | -3.846*** |
| | (1.562) | (1.788) | (1.263) |
| Region dummy | YES | YES | YES |
| Observations | 3,136 | 3,136 | 3,136 |
| δ | 0.484*** | 0.585** | 0.641*** |
| | (0.064) | (0.243) | (0.155) |
| **Involuntary informal workers / Informal workers:** | **29.2%** | **17.3%** | **18.1%** |

*Notes*: (1) *** p<0.01, ** p<0.05, * p<0.1. (2) Standard errors in parenthesis. (3) The sample is restricted to male workers aged more than 30 and less than 60 living in urban areas. (4) The dependent variable is a dummy equal to 1 if the worker is formal. (5) Informal workers (baseline definition) are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system in her non-agricultural enterprise(s) (in case of owning one or more). (6) Informal workers (legalistic definition) are those without contributions to social security (IPRES, FNR, retraite complémentaire) or a formal accounting system transmitting to the Tax Authority in her non-agricultural enterprise(s) (in case of owning one or more). (7) Informal workers (registration definition) are those without contributions to social security (IPRES, FNR, retraite complémentaire), without any non-agricultural enterprise(s) (in case of owning one or more) registered in the Commercial Register, or with a fiscal identification, or with a formal accounting system or with some employee registered at the Social Security. (8) The coefficients represent the effect of each variable in the individual's preference for the formal sector. (9) δ is the probability of obtaining a formal job for a worker who prefers a job in the formal sector.