Inter-American Development Bank

Financial Disincentives to Formal Employment and Tax-Benefit Systems in Latin America

A Focus on the Andean Region

María Cecilia Deza
H. Xavier Jara
Nicolás Oliva
Javier Torres

Country Department Andean Group

TECHNICAL NOTE Nº IDB-TN-1907

May 2020

Financial Disincentives to Formal Employment and Tax-Benefit Systems in Latin America

A Focus on the Andean Region

María Cecilia Deza
H. Xavier Jara
Nicolás Oliva
Javier Torres

May 2020

IDB
Inter-American Development Bank

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library
Financial disincentives to formal employment and tax-benefit systems in Latin America / María Cecilia Deza Delgado, H. Xavier Jara, Nicolás Oliva, Javier Torres.
p. cm. — (IDB Technical Note ; 1907)
Includes bibliographic references.
1. Informal sector (Economics)-Andes Region. 2. Income tax-Andes Region. 3. Revenue-Andes Region. 4. Income distribution-Andes Region. 5. Social security-Andes Region. I. Deza Delgado, María Cecilia. II. Jara, H. Xavier. III. Oliva Pérez, Nicolás. IV. Torres, Javier. V. Inter-American Development Bank. Country Department Andean Group. VI. Series.
IDB-TN-1907

http://www.iadb.org

Financial Disincentives to Formal Employment and Tax-Benefit Systems in Latin America: A Focus on the Andean Region

María Cecilia Deza Delgado, H. Xavier Jara, Nicolás Oliva, and Javier Torres

Abstract*

The aim of this paper is twofold. First, it provides a comprehensive assessment of the financial cost informal workers would incur if they entered formal employment in five countries in the Andean region: Bolivia, Colombia, Ecuador, Peru, and Venezuela. Then, it analyzes the extent to which formalizing informal workers would contribute to increase fiscal capacity in the region and assess the distributional implications of counterfactual entries to formal employment. The results show a wide variation in financial disincentives to enter formal employment, with formalization tax rates ranging between 8.5 percent in Venezuela and 65 percent in Colombia. Formalization tax rates are particularly high for self-employed informal workers in all countries, and mainly driven by the high costs associated to social insurance contribution payments for this group. It further shows that potential entries to formal employment would raise tax revenue in all countries, but mainly through the effect of increased social insurance contribution payments, whereas personal income tax revenue would only increase marginally except in Bolivia and Venezuela. Interestingly, potential formalization of informal workers with the highest probability of being formal would allow capturing a substantial share of the additional tax revenue lost due to informality. In implementing formalization strategies, governments need to evaluate these potential fiscal gains against increased hiring costs for firms. In any case, there is evidence that these strategies have positive effects in productivity and long-term growth.

Keywords: taxes, informality, fiscal capacity, inequality, microsimulation
JEL classification: D13, H24, I32, I38

* The results presented herein are based on the following three projects: (i) LATINMOD, a project sponsored by the Centro Estratégico Latinoamericano de Geopolítica (CELAG), funded by The Venezuelan Economic and Social Development Bank (BANDES) and with the collaboration of EUROMOD; (ii) ECUAMOD v1.4. ECUAMOD is developed, maintained, and managed by UNU-WIDER in collaboration with the EUROMOD team at the Institute for Social and Economic Research (ISER) the Southern African Social Policy Research Institute (SASPRI), and local partners in selected developing countries (Ethiopia, Ghana, Mozambique, Tanzania, Zambia, Ecuador and Viet Nam) in the scope of the SOUTHMOD project. The local partner for ECUAMOD is the Instituto de Altos Estudios Nacionales (IAEN); and (iii) COLMOD v1.2, a project developed and managed by the Faculty of Economics at Universidad Externado de Colombia. The authors are indebted to the many people who have contributed to the development of LATINMOD, SOUTHMOD, ECUAMOD, and COLMOD, as well as to David Rodriguez for his helpful assistance and comments. The results and their interpretation presented in this publication are solely the authors' responsibility.

Acronyms

FTR	Formalization tax rate
IDB	Inter-American Development Bank
LAC	Latin American and Caribbean
PIT	Personal income tax
SIC	Social insurance contribution

1. Introduction

Tax revenue in countries in the Andean region remains low compared to other countries in the Latin American and Caribbean (LAC) region and to those with developed economies (OECD countries). In 2015, the average tax-to-GDP ratio was 20.9 percent in Andean countries compared to 22.8 percent on average for the entire region and up to 34.3 percent on average for OECD countries (OECD et al., 2017). These differences can be partially explained by the lower contribution of income taxes to total tax revenue. In 2015, taxes on income and profits represented 27.1 percent of total tax revenue in the Andean countries (similar to the LAC average) compared to 33.7 percent in OECD countries. Moreover, in 2014, the share of personal income tax (PIT) was extremely low in LAC countries compared to PIT in OECD countries, at 8.7 and 24 percent respectively. The main drivers that explain the region's modest contribution include, among others, high levels of informality, the generosity of thresholds for which income is exempted from tax payments, and the presence of generous tax deductions.

The aim of this paper is twofold. First, it provides a comprehensive assessment of the financial cost informal workers would incur if they entered formal employment in five countries in the Andean region: Bolivia, Colombia, Ecuador, Peru, and Venezuela. Financial disincentives to formal employment are measured by formalization tax rates (FTRs), which capture the percentage of earnings in informality that would be lost due to increased social insurance contributions and income tax payments or benefit withdrawal. Then, it analyzes the extent to which formalizing informal workers would contribute to increase fiscal capacity in the region—at a time when fiscal budgets are under pressure—and assesses the distributional implications of counterfactual entries to formal employment. The analysis makes use of multi-country tax-benefit microsimulation models based on nationally representative household survey data: COLMOD (Colombia), ECUAMOD (Ecuador), PERUMOD (Peru), and LATINMOD (Bolivia and Venezuela). The models have been developed within the EUROMOD framework to ensure cross-country comparability through data and modelling language harmonization (Sutherland and Figari, 2013).

Our results show a wide variation in financial disincentives to enter formal employment implied by the tax-benefit system, with FTRs ranging between 8.5 and 65 percent (in Venezuela and Colombia, respectively). These rates are particularly high for self-employed informal workers in all five countries, and are mainly driven by the high costs associated to social insurance contribution payments for this group. Our simulations of counterfactual entries to formal employment show that the potential to increase social insurance contribution (SIC) revenue would be substantial under a fully formalized economy. The additional revenue from PIT would be high in Bolivia and Venezuela, whereas the effect of a fully formalized

economy would be limited in this respect in Colombia, Ecuador, and Peru. Interestingly, our results show that a formalization of informal workers with the highest probability of being formal (i.e., 10 percent of the total informal workers) would enable to capture a substantial share of the additional tax revenue lost due to informality. Moreover, this group of workers generally face very low financial disincentives to enter formal employment, and their potential entry would have a positive effect in inequality reduction due to an increased redistributive effect of PIT.

The work herein contributes to the literature on potential factors influencing workers decisions to enter formal employment, with a strong focus on the role of the design of the tax-benefit system as a whole. From a policy perspective, understanding the incentives to formal employment inherent to this system is essential to implement formalization strategies aimed at increasing fiscal capacity and providing long-term social protection to workers. Cross-country comparative analysis offers the additional advantage of learning from the design of different tax-benefit policies to consider potential reforms aimed at creating incentives to formalization.

The paper is organized as follows. Section 2 provides a brief overview of informal employment in the five Andean countries. Section 3 presents the models and data used in the analysis. Section 4 presents the results of our empirical analysis, and Section 5 concludes with a discussion of policy implications.

2. Informal Employment in Latin America

This section provides an overview of the definition and causes of labor informality, followed by a review of the extent to which labor markets in the countries under study are affected by the presence of informal employment.

2.1. Brief Review of Informal Employment

High and persistent labor informality has been a major problem for developing countries, especially those in the LAC region, where, on average, 60 percent of the labor force works in the informal sector (IDB, 2018).[1] In the Andean region in particular, informal employment accounts for 70 percent of total employment.[2] A similar phenomenon is observed in terms of

[1] According to the IDB's definition of labor informality, informal workers are those who do not contribute to social security (e.g., old-age pensions and health insurance). Specifically, informality is defined as the percentage of employed workers not contributing to old-age pensions. For a more detailed discussion, see Alaimo et. al (2016) and Bosch, Melguizo and Pagés (2013).
[2] Based on the average for 2018 (see the IDB Database: Labor Markets and Social Security Information System, available at https://www.iadb.org/en/sector/social-investment/sims/home).

firm informality (La Porta and Shleifer 2014)[3], which accounts for half of the economic activity. The incidence of informality is one of the most persistent, negative, and worrisome characteristics of the labor markets in the LAC region, where about 140 million of the 263 million workers work in the informal market.

To study labor informality, it is important to understand the origin of its definition. The concept first appeared in 1972 in a publication describing the employment situation in Kenya (Guerguil, 1988; ILO, 1972),[4] and since then, there have been many other published definitions.[5] In general, all definitions can be summarized in two main approaches used by the International Labour Organization. The first is the productivity view, which defines informality according to the characteristics of the firm—usually the size—where the individual works. Small firms are considered to be of low productivity and therefore part of the informal sector.[6] The second is the legalistic view, which characterizes informal workers as those without access to the social security or pension systems (Saavedra and Chong, 1999).[7] This paper uses the legalistic view—non-affiliation to any type of social security regime—to define labor informality, as information about affiliation to social security is reported in the data used in the analysis.

The causes of labor informality are widely argued in the pertinent literature. Some works claim that informal firms provide refuge for the poor against excessive government regulations (De Soto, 2000), while other authors look at the informal employment activity as a way of avoiding taxes and regulations, for both workers and firms (Levy, 2008). Another point of view is that informality is correlated with poverty (Harris and Todaro, 1970; Rauch, 1991). These studies show differences between the formal and informal firms, where formal entrepreneurs usually have higher education levels, run larger businesses, and are able to pay taxes and adhere to government regulation, with the benefits of increasing customers, raising capital, and accessing public goods, among others. In contrast, informal entrepreneurs tend to have lower education levels, run smaller businesses, and have less productivity.

[3] Different perspectives can be applied to the study of firm informality. One of the most common approaches relates informality to the size of the firm (in terms of workers), while others relate it to the incorporation of a firm as a legal entity; see Levy (2018) for a discussion on firm informality in Mexico. Another perspective comes from La Porta and Shleifer (2008), who define informal firms as those that are not registered with the government.
[4] In the LAC region, the concept of the informal sector was first promoted by the Regional Employment Program in Latin America and the Caribbean (PREALC) of the International Labour Organization.
[5] See, for example, Perry et al. (2007).
[6] La Porta and Shleifer (2008) analyze the size and productivity of formal and informal firms in poor countries, finding that an average formal firm employs 126 people, while an average informal firm employs only 4.
[7] These two views of labor informality can overlap but do not necessarily cover the same set of workers in the informal sector (Gasparini and Tornarolli, 2009).

2.2. Informal Employment in the Andean Region

Since 2007, LAC countries have experienced decreasing rates of labor informality (Salazar-Xirinachs and Chacaltana, 2018. However, the evolution shows heterogeneity among countries due to the implementation of different formalization policies (ILO, 2014). In the Andean region in particular, Ecuador has had a marked reduction in informality (14 percentage points between 2007 and 2018) as a result of active formalization policies and employment surveillance, whereas decreases in Bolivia, Colombia, and Peru have been lower (about 6 percentage points in the same period) (Table 1). Venezuela's evolution is harder to portray due to a lack of data for the most recent years.

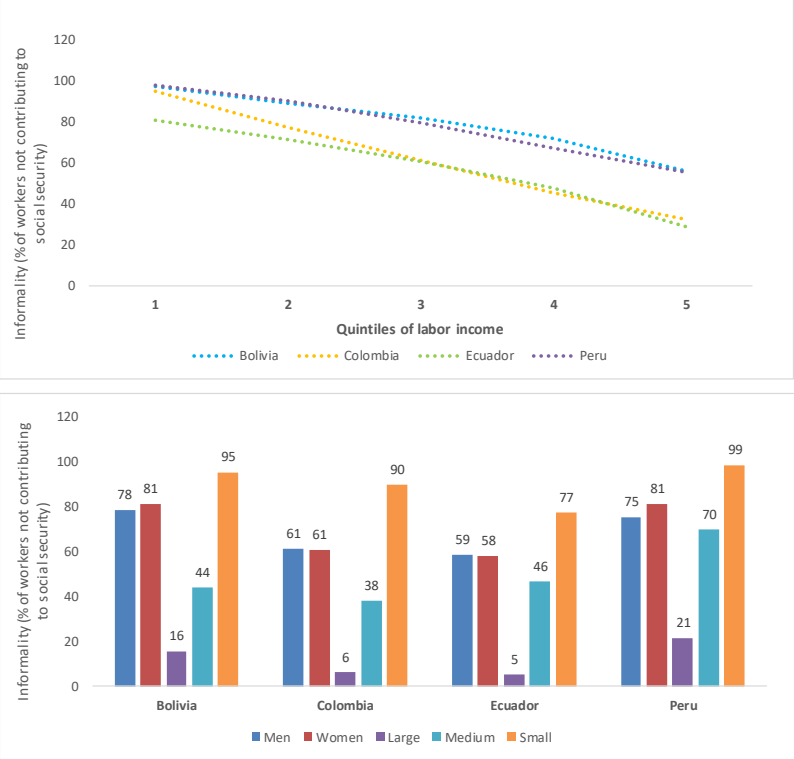
Table 1. Evolution of Informal Employment in the Andean region, 2007–18 *(in percent of workers)*

	2007	2010	2015	2018
Bolivia	85.4	n.d.	81.1	79.7
Colombia	66.8	68.5	62.3	61.1
Ecuador	72.8	64.8	53.4	58.4
Peru	84.0	82.8	79.0	78.2
Venezuela [a]	65.7	63.2	61.4	NA

Source: Authors' elaboration using information from the IDB's Labor Market and Social Security Information System, available at https://www.iadb.org/en/sector/social-investment/sims/home, which is based on official household surveys.
[a] 2015 data corresponds to 2014.

Figure 1 provides additional information about the characteristics of informal employment in Bolivia, Colombia, Ecuador and Peru in 2018, specifically comparing firm size, gender ratio, and quintiles of labor income. As expected, informality was higher among employees of small firms, especially in Peru and Bolivia, while in larger firms, incidences were between 5 and 20 percent. Informality was higher among female workers in Bolivia and Peru, equal in Colombia, and lower in Ecuador. Finally, informality was negatively associated with labor income, as expected. Informality was strikingly high in the first quintile of labor income, ranging between 80 and 100 percent, compared to 30 to 60 percent in the top quintile of the distribution of labor income.

Figure 1. Characteristics of Informal Employment, 2018 *(in percent of workers)*



Source: Authors' elaboration using information from the IDB's Labor Market and Social Security Information System, available at https://www.iadb.org/en/sector/social-investment/sims/home, which is based on official household surveys.
Note: Data for Venezuela are not available.

3. Methodology

The analysis makes use of tax-benefit microsimulation models for LAC countries, based on nationally representative household survey data. The models are harmonized computer programs performing the computation of taxes and social contribution paid, and benefits received, by each household in the underlying data depending on its income and demographic characteristics.

3.1. Data and Microsimulation Models

Our analysis makes use of harmonized, multi-country tax-benefit microsimulation models for LAC countries based on nationally representative household survey data: COLMOD (Colombia), ECUAMOD (Ecuador), PERUMOD (Peru), and LATINMOD (Bolivia and Venezuela).[8] Tax-benefit microsimulation combines country-specific coded policy rules with

[8] The model for Ecuador, ECUAMOD, has been developed and is maintained as part of the SOUTHMOD project. For more information see Jara and Varela (2019) and https://www.wider.unu.edu/project/southmod-simulating-tax-and-benefit-policies-development. The model for Colombia, COLMOD, is developed and maintained by the Faculty of Economics at Universidad Externado de Colombia. For more information see Rodriguez (2019) and https://www.uexternado.edu.co/economia/colmod-el-primer-modelo-de-microsimulacion-en-colombia/. The models for Bolivia and Venezuela have been developed as part of the LATINMOD project. LATINMOD is a regional tax-benefit microsimulation model for six Latin American countries (Argentina, Bolivia, Mexico, Paraguay, Uruguay

representative household microdata to simulate direct taxes, social insurance contributions, and cash transfers, among other transactions, for the household population in each country. All models are static in the sense that tax-benefit simulations abstract from individuals' behavioral reactions and no adjustments are made for changes in the population composition over time. For the purpose of these simulations, the analysis makes use of detailed information on household and personal characteristics, employment, earnings, income from capital and property, private transfers, cash transfers, pensions, and expenditures. Table 2 summarizes the information about the microsimulation models and data used in the analysis.[9]

Table 2. Data Sources and Microsimulation Models

Country	Data Source	Year of data collection	Number of individuals	Number of households	Microsimulation model
Bolivia	Encuesta Nacional de Hogares (EH)	2015	37,364	10,171	LATINMOD-Bolivia
Colombia	Encuesta Nacional de Calidad de Vida (ENCV)	2014	67,332	20,141	COLMOD
Ecuador	Encuesta Nacional de Ingreso y Gastos de Hogares Urbanos y Rurales (ENIGHUR)	2011-2012	153,341	39,617	ECUAMOD
Peru	Encuesta Nacional de Hogares (ENAHO)	2018	126,673	37,462	PERUMOD
Venezuela	IV Encuesta Nacional de Presupuestos Familiares (ENPF)	2009	158,840	37,122	LATINMOD-Venezuela

Source: Authors' elaboration based on SOUTHMOD, LATINMOD, COLMOD and PERUMOD documentation.

The present analysis uses as 2015 policies (as on June 30th) as the starting point in all five countries. When the data year does not match the policy year, market incomes and non-simulated tax-benefit variables are adjusted to 2015 levels using source-specific updating factors (Jara et al., 2019).

Scope of the Simulations and Assumptions

Our analysis focuses on the concept of disposable income, defined as market income minus direct taxes and social insurance contributions plus cash benefits and pensions.[10] In all five

and Venezuela). For more information, see Arancibia et al. (2019) and Oliva (2018). The model for Peru, PERUMOD, has been developed as part of the project "Simulating Tax Policy Reforms and Fiscal Gains in the Andean Region," which is funded by the Inter-American Development Bank.

[9] Data adjustments for the use in the microsimulation models are kept to a minimum. In particular, a minimum number of observations for domestic workers living in their employer's household have been dropped, as it is not possible to link them with information about their own households. An important shortcoming of the survey in Venezuela is that information about the household members' relationship to the head of the household is not released. Therefore, we have imputed information on mother and father identifiers for children that are less than 18 years old based on information about age, gender, and education level of adult household members.

[10] Market income is defined as the sum of employment and self-employment income, bonuses, in-kind income, own consumption from self-employment activities, capital and property income, inter-household payments, private transfers, minus alimony payments. Imputed rent is not included as part of market income.

countries, the main policy components of disposable income have been simulated, including employee and self-employed SICs, PIT, and the main cash transfer programs of each country.[11] Due to data limitations, some tax-benefit instruments cannot be simulated and are included directly from the data as part of disposable income. For example, contributory benefits such as public pensions and severance payments cannot be simulated due to the lack of data on contributions; disability benefits, due to insufficient information on the severity of the disability; and property taxes and motor vehicle taxes, due to the absence of information on value in both cases. With the exception of contributory pensions, all other non-simulated instruments represent a minor part of disposable income in the countries under study.

To account for the presence of informal employment in the analysis of the Andean countries, we use a harmonized approach to simulate SIC and PIT payments under partial compliance. More precisely, in all countries, employee and self-employed SICs are simulated only for workers reporting affiliations to social security in the survey. In Peru, only health insurance contributions are simulated for the self-employed, assuming that these individuals do not contribute to a pension fund (neither public nor private). In Venezuela, voluntary self-employed contributions are simulated for those individuals reporting affiliations to social security, but it is assumed that they pay the minimum (based on the minimum wage) independently from their income levels.[12] For the simulation of PIT, we follow a similar approach and assume that only workers affiliated to social security pay taxes. In countries such as Ecuador and Venezuela, where SICs are voluntary for the self-employed, our assumption could be considered stringent, as some of the self-employed workers not affiliated to social security could in fact be paying income tax. In Bolivia, this assumption is relaxed for the self-employed, where PIT is simulated also for those registered in the general or simplified tax regimes.

3.2. Measuring Financial Disincentives to Formal Employment

To quantify the financial cost of formalization, we follow Jara and Rodriguez (2019) and perform counterfactual simulations consisting of moving informal workers in the data into formal employment and comparing their household disposable income before and after the transition. Transitions to formal employment are simulated for all those in the dataset between

[11] The following cash transfers are simulated in our models: *Bono Juancito Pinto*, *Bono Juana Azurduy* and *Renta Dignidad* in Bolivia; *Familias en acción* and *Colombia Mayor* in Colombia; *Bono de Desarrollo Humano* and *Bono Joaquín Gallegos Lara* in Ecuador; *Juntos* in Peru; *Misiones educativas: Robinson (I y II), Ribas y Sucre* and *Gran Misión en Amor Mayor Venezuela* in Venezuela.

[12] In Venezuela, the social security law establishes the voluntary contribution of self-employed workers with a tax rate of 13 percent of declared income. In this case, the declared income is self-defined by workers but cannot be less than the minimum wage. Although no public information is available, assuming all affiliated self-employed contribute on the basis of the minimum wage seems a realistic assumption given the low SIC revenue in Venezuela.

the ages of 18 and 60 currently working and reporting non-affiliation to social security (i.e., informal workers), excluding full-time students or retirees.

More formally, our approach to simulate transitions from informal to formal employment consists of the following steps. First, household disposable income is calculated for all informal workers in the dataset before any transition is simulated. Then, for each informal worker in the household, we impose affiliation to social security in the dataset and assume that his or her earnings remain the same under the new status of formal workers.[13] Finally, our tax-benefit models simulate the amount of SICs and PIT the worker would be liable to pay according to the legislation in force in 2015, as well as his or her corresponding household disposable income under formalization. We simulate transitions to formal employment for each informal worker in household member separately, assuming that the status of any other informal workers remains unchanged.

This simulation makes it possible to analyze budgetary and distributional effects of entries to formality and quantify the financial incentives to formalization implied by the tax-benefit system, which we measure with FTR (Koettl, 2013; Koettl and Weber, 2012; Weber 2015). We follow Koettl and Weber (2012), and define FTR as the proportion of earnings in informal employment that would be taxed away after entry to formality. More precisely, we define FTR of individual i as:

$$\mathrm{FTR_i} = \frac{\mathrm{y^1_{h,i} - y^0_{h,i}}}{\mathrm{w_i}} \tag{2}$$

where w_i represents worker i's earnings in informal employment and $y_{h,i}$ represents household disposable income for worker i. The superscripts 1 and 0 represent time —that is, before and after simulated formalization takes place.

Different from previous studies that use hypothetical data to measure the burden of formalization implied by the tax-benefit system in European countries (Koettl 2013; Koettl and Weber 2012; Weber 2015), our models make it possible to calculate these indicators using household survey data from LAC countries (Jara and Rodriguez. 2019). As such, we are able characterize the distribution of FTRs across populations and sub-populations, as well as select different categories of individuals for specific transitions into formal employment.

[13] Note that this assumption follows the original approach proposed by Koettl and Weber (2012), where earnings in formality are implicitly assumed to remain the same upon entry to formal employment. Jara and Rodriguez (2019) propose a different approach, whereby the earnings informal workers would face upon entry to formality are estimated based on the distribution of earnings of formal workers in the data. Potential changes in earnings upon entry to formal employment could be considered for future extensions of our work.

4. Empirical Results

This section presents the results of our evaluation in two steps. First, it provides a comprehensive comparative analysis of the distribution and composition of FTR, as well as the variation of financial disincentives to formal employment across population subgroups in each of the five countries under analysis. Second, we simulate a number of counterfactual distributions where a fraction of informal workers would enter formal employment and assess the implications of such entries on PIT and SIC revenue, the number of taxpayers, and SIC payers and income inequality.

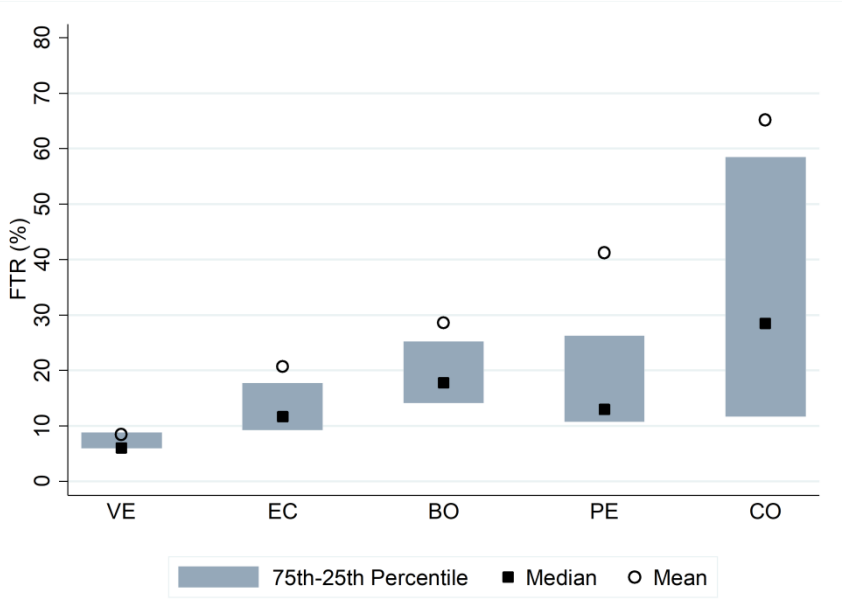
4.1. Financial Disincentives to Formal Employment

In this section, we use household representative data to calculate financial incentives to formal employment, allowing us to characterize the distribution of FTR at the population level of informal workers in each of the five countries and compare indicators across different subgroups. We focus on the contribution of different tax-benefit components to FTR. Based on this analysis and the heterogeneity in the data, we assess whether particular population subgroups face higher disincentives to enter formal employment. In particular, we distinguish between salaried employees and self-employed informal workers who have presented contrasting patterns (Jara and Rodriguez, 2019). We also distinguish informal employees in firms of different sizes (i.e., micro, small, medium, and large). As they might face the lowest financial disincentives to formality in large firms, informal employees in those firms are also more likely to make the transition to formality. To broaden the analysis, we study the distribution of FTR across economic activities.

Distribution of FTRs

Figure 2 presents mean and median FTRs, as well as the inter-quartile range between the 25th and 75th percentile of FTR. The results show a large variation in financial incentives to enter formal employment across countries. The highest average FTR is in Colombia, where 65 percent of earnings in informality would be taxed away upon entry to formal employment as a result of increased SICs and tax payments or reduced benefits, and the lowest (8.5 percent) is in Venezuela. In between are Ecuador with 20.7 percent, Bolivia with 28.6 percent, and Peru with 41.2 percent.

Figure 2: Distribution of FTR in 2015



Source: Authors' calculations based on microsimulation models.
Note: Countries are ordered by mean FTR.

The results further show that countries with higher values of average FTR are also characterized by a more dispersed distribution, depicted by the inter-quartile range. Venezuela shows very little variation of FTRs, while in Colombia inter-quartiles range between 11.7 percent (25th percentile) and 58.5 percent (75th percentile). In all countries, except Venezuela, the distribution of FTR is skewed to the right, with means higher than the 75th percentile.

The differences in the distribution of FTR across countries can be explained by differences in: (i) the composition of the informal population and (ii) the design of tax-benefit policies. The following section provides further insights into the role of tax-benefit policies and population characteristics by analyzing the contribution of different policy instruments on FTRs across populations at different income levels.

Decomposition of FTRs

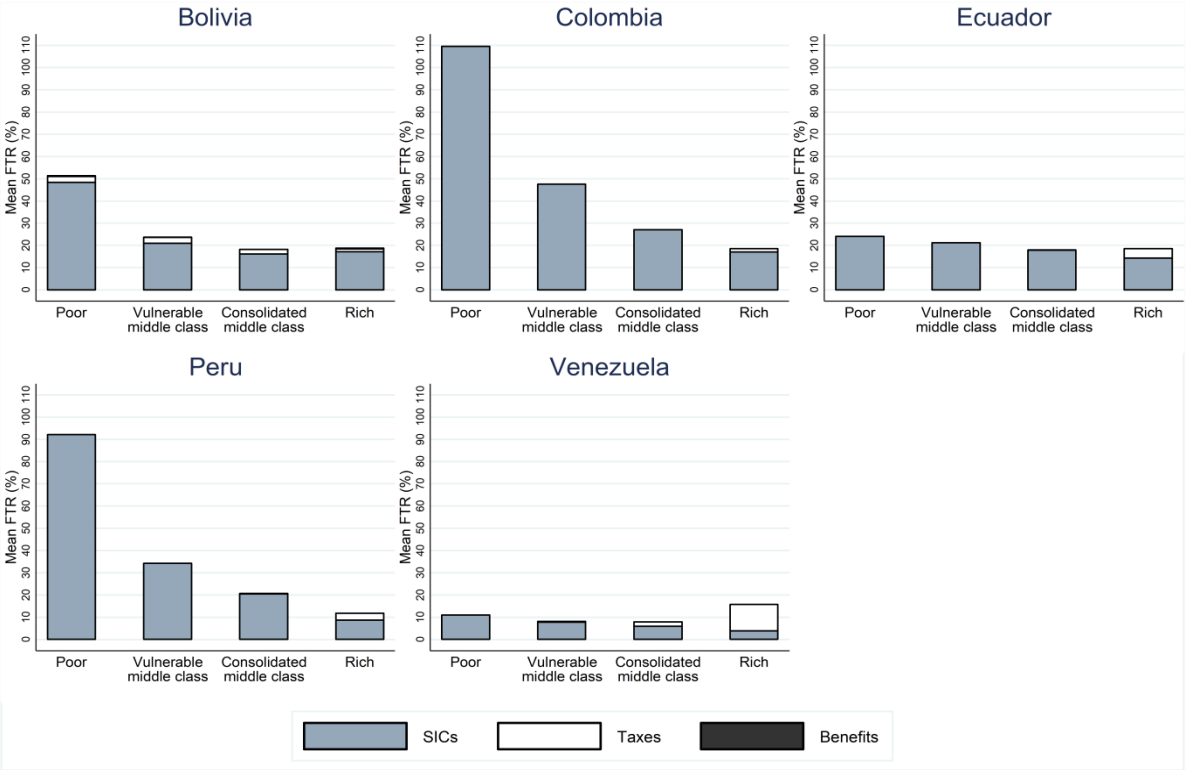
The distribution of FTR is determined by the design of specific tax-benefit instruments. We would expect that SICs contribute the most to FTR, as entry to formal employment implies affiliation to social security. Minimum and maximum SIC payments, or the presence of different contribution rates for specific categories of workers, would affect the distribution of FTRs. PIT would also influence financial disincentives to formal employment. The extent to which it would contribute to FTRs depends on parameters such as the level of the exempted threshold, the structure of the tax schedule, and the presence of tax deductions. Given the generosity of the design of the PIT in the countries under analysis, we do not expect it to have a large contribution to the FTR

and to the decisions regarding potential formalization. Finally, cash transfers would also affect FTRs if entitlement to the benefit is linked to (non-)affiliation to social security.

In addition to the design of tax-benefit policies, the characteristics of the population in each country will also determine the distribution of FTRs. For instance, countries where informal workers' earnings are particularly low would present higher FTRs in case SICs require minimum payments above the level of their earnings.[14] An overrepresentation of self-employed workers in informality would also induce higher FTRs if the SIC rate is higher for this group compared to the rate for formal employees.

Figure 3 presents a decomposition of mean FTR. To account for the role of individual instruments at different points of the income distribution, the figure provides the decomposition across four socio-economic categories: poor, vulnerable middle class, consolidated middle class, and rich. The categories are defined based on household disposable income per capita and the income thresholds specified by the Inter-American Development Bank (IDB, 2020) included in the Appendix of this paper (Table A2).

Figure 3: Mean FTR Decomposition in Andean Countries by Socio-economic Category, 2015



Source: Authors' calculations based on microsimulation models.
Note: Countries are ordered by mean FTR.

[14] Our analysis assumes workers would enter formality preserving the same level of earnings to capture the effects of the design of tax-benefit policies on financial incentives to formalization. For informal employees, an alternative assumption would consist in assuming they would enter formal employment earning at least the minimum wage. This assumption has little impact in practice, as most informal workers with low earnings are self-employed.

Our results show that in all countries except Venezuela, mean FTR decreases with income and SICs contribute the most to FTR. Financial disincentives to formal employment are particularly high for poor informal workers in Colombia and Peru, with FTR above 90 percent. This reflects mainly lower average earnings in this population group compared to earnings for the same group in other Andean countries,[15] as well as relatively high self-employed SICs, with rates of 28.5 or 30.5 percent in Colombia, and fixed health insurance contribution payments depending on age in Peru.[16]

Second, in general, direct taxes play only a minor role in determining FTR. In Colombia, Ecuador, and Peru, direct taxes contribute to FTR of wealthy informal workers only. Direct taxes represent 1.4, 4.2, and 3.1 percentage points of average FTR for Colombia, Ecuador, and Peru, respectively. In Venezuela, they play a larger role than SICs for the rich, contributing with 11.8 percentage points to their average FTR (15.7 percent) and, to a lesser extent, for the consolidated middle class. In the case of Venezuela, the misalignment between the evolution of prices and wages and the parameters of the PIT (the *Unidad Tributaria*) make its structure similar to that in more developed countries in terms of progressivity, which explains the larger contribution of taxes to FTR. In fact, it is due to the role of direct taxes that FTRs are U-shaped in income, rather than presenting the decreasing pattern observed in other countries.

Bolivia is the only country where direct taxes contribute to FTR throughout the income distribution. In Bolivia, PIT is part of the *Régimen Complementario del Impuesto al Valor Agregado* (RC-IVA), which allows the value added tax (VAT) paid on purchases to be deducted from the income tax liability. Since the parameters of the standard and VAT deductions are the same across income distribution, the income tax is not progressive. On the contrary, it slightly favors individuals with higher incomes whose VAT purchases are higher. Another reason is the tax on self-employed workers, where no exempted income threshold applies. The contribution of direct taxes remains, however, modest in all five countries, which is due to two main characteristics of design of PIT in LAC countries, in which the Andean region is not an exception. In all countries, except Bolivia, PIT is characterized by the presence of high non-taxable thresholds, meaning that in the event of entering formal employment, most informal workers would not fall into the tax brackets that would make them liable to pay income taxes. Moreover, deductions from personal expenditures can be made from taxable income, which reduce the volume of taxpayers. Finally, the contribution of cash transfers to FTRs is extremely limited (or

[15] The monthly gross labor income of informal workers in the poor segments in Peru and Colombia is estimated at COL 300,000 and PEN 376, equivalent to US$95 and US$110, respectively. On the other hand, monthly labor income in Bolivia and Ecuador amounts to US$150 and US$212, respectively.

[16] This information is based on legislation in force as of 2015. Minimum self-employed SIC rates equal 20.5 percent in Ecuador, 14 percent in Bolivia, and 13 percent in Venezuela.

null) because eligibility to social benefits in these countries is based on composite welfare indexes (i.e., proxy means-testing), which do not directly depend on affiliation to social security.[17]

Heterogeneity across Population Subgroups

The previous section pointed to the interaction between the design of tax-benefit policies and the characteristics of the population—namely income—in determining FTR. This section exploits the advantage of using representative household survey data to assess whether indicators of FTR vary across different population subgroups, such as by gender, age, skill level, employment status, region, and economic activity. Figure 4 compares the distribution of FTR distinguishing between informal employees and informal self-employed workers. This comparison is interesting because the prevalence of self-employment varies across countries (see Table A1 in the Appendix) and, at the same time, the rules of social insurance contributions are specific to each of these employment statuses. Our results show that the wide variation in the overall distribution of FTR across the five countries (see Figure 2) is mainly driven by the distribution of FTR of the self-employed. In fact, mean FTRs for employees vary minimally across countries, ranging between 7.3 percent in Venezuela and 14.3 percent in Colombia. On the contrary, important differences are observed in terms of financial disincentives to formal employment for self-employed workers, who face on average higher FTRs than employees in all countries. FTRs are particularly high for self-employed workers in Colombia, for whom 91 percent of their earnings in informality would be taxed away upon entry to formal employment. Self-employed workers in Peru also face high FTR (63.5 percent). In Ecuador and Bolivia, this category of workers faces similar FTRs on average, 30 and 35 percent respectively. Venezuela is the only country where the FTR of the self-employed remains low (12 percent). Looking at the distribution of FTR for employees versus self-employed workers, there is a wide variation in terms of inter-quartile ranges, driven mainly by the dispersion of FTR observed for the self-employed.

The large financial disincentives to formal employment observed for self-employed workers in Colombia and Peru can be explained by three factors. First, the proportion of informal self-employed workers is large in these countries. Self-employed workers account for 66.1 and 58.1 percent of total workers in informality in Colombia and Peru, respectively (see Table A1 in the appendix). Only Bolivia shows a higher prevalence of self-employed informal workers (70.1), whereas the levels are much lower in Ecuador (41.1) and Venezuela (26.5). Second, labor income is low in Colombia and Peru compared to the other Andean countries. According to our estimates, monthly labor income is US$209 in Colombia compared to

[17] In Ecuador, eligibility to social benefits (i.e., *Bono de Desarrollo Humano*) for the elderly and the disabled depends on non-affiliation to social security. However, these groups are not included in our sample of analysis.

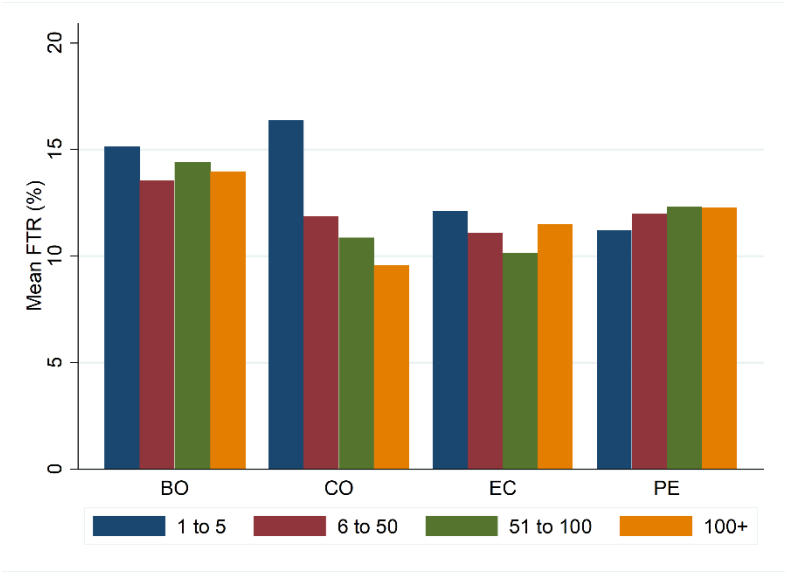
US$392 in Bolivia and US$478 in Ecuador. In Peru, the average monthly salary in self-employment is US$360, which is lower than in Bolivia and Ecuador. Finally, as explained earlier, Colombia and Peru present higher self-employed contribution rates than the other countries under analysis. In any case, the pattern of high FTR among the self-employed is expected since these workers tend to earn less than their salaried counterparts and their earnings are more volatile.

Figure 4: Distribution of FTR by Employment Status, 2015

Source: Authors' calculations based on microsimulation models.
Note: Countries are ordered by mean FTR.

To explore more deeply the differences in financial disincentives to formal employment among employees, Figure 5 presents mean FTRs by the size of the firm in which employees work in all countries except Venezuela (due to lack of data). In Bolivia, Colombia, and Ecuador, employees working in firms with 1 to 5 workers present higher FTR than employees in larger firms. The pattern is consistent with the idea mentioned of the relationship between firm size and productivity, which might regroup low-skilled and low-paid workers. Colombia shows a clear decreasing pattern of FTR by firm size, with a gap pf around 7 percentage points in mean FTR of employees in small firms (1 to 5 workers) compared to big firms (more than 100 workers). Peru presents a contrasting pattern, with a slightly lower mean FTR in small firms compared to larger ones. The relatively minor differences in FTR observed are explained by the fact that the design of employee SICs does not vary across firm size. The differences are mainly due to the varied composition of the workforce across firms.

Figure 5: Mean FTR of Employees by Number of Workers in the Firm, 2015



Source: Authors' calculations based on microsimulation models.
Note: Data for Venezuela are not available.

In addition to differences in FTRs between salaried employees and the self-employed workers—which are related to the composition of the labor market, wage structure, and design of SICs—there could be other patterns for population subgroups based on varying characteristics of gender, age, skill level, location, economic activity, and income (Table 3).

Table 3: Mean FTRs by Population Subgroups, 2015

	Bolivia	Colombia	Ecuador	Peru	Venezuela
All	28.6	65.2	20.7	41.2	8.5
Male	26.0	50.2	14.6	30.4	8.0
Female	33.4	88.8	30.4	55.3	9.3
Age (<30)	21.6	62.9	17.3	30.7	7.6
Age (30–50)	28.9	62.1	21.1	41.6	8.7
Age (50+)	38.3	78.2	25.5	54.4	9.7
Low-skilled	37.1	85.8	20.0	75.3	8.6
Medium-skilled	23.3	56.0	22.0	35.2	8.1
High-skilled	20.7	34.0	18.7	13.6	10.0
Employee	14.6	14.3	11.8	11.5	7.3
Self-employed	34.8	91.1	30.3	63.5	12.1
Rural	44.1	104.3	15.3	76.9	8.8
Urban	21.4	51.1	23.2	31.9	8.5
Agriculture and fishing	51.1	88.2	10.2	64.9	7.9
Mining, manufacturing, and utilities	24.3	66.4	24.3	55.1	8.5
Construction	15.9	34.2	12.9	13.7	10.0

Retail, wholesale, hotels, and restaurants	24.9	65.3	29.0	41.6	8.8
Transport and communication	19.1	49.9	19.0	18.4	8.7
Financial intermediation, real estate, and business activities	17.5	60.7	22.5	24.7	8.8
Other industry sectors	21.6	62.1	25.8	25.8	7.8
Income Q1	67.2	147.0	24.1	101.8	10.2
Income Q2	28.6	71.0	21.5	40.8	8.2
Income Q3	23.7	53.6	21.7	28.4	7.7
Income Q4	20.6	35.3	19.3	22.9	7.3
Income Q5	17.8	25.0	16.7	16.6	9.5

Source: Authors' calculations based on microsimulation models.

A clear gender divide in financial disincentives to enter formal work is observed in all five countries. Female informal workers present higher FTRs than their male counterparts. The gap in FTRs is the largest in Colombia, representing a 38.6 percentage point difference (88.8 percent versus 50.2 percent), followed by Peru, where female informal workers face an FTR 24.8 points higher than male informal workers (55.3 percent versus 30.4 percent). The differences in FTR between male and female workers are driven by the characteristics of these groups. On average, there is a higher prevalence of low-skilled, self-employed female workers, which most likely leads to lower incomes. Table 3 confirms that these characteristics are associated with higher levels of FTR.

The results also show pronounced differences between workers in rural and urban areas. In all countries, except Ecuador, informal workers in rural areas face higher FTRs than those in urban areas. The gap is the largest in Colombia, where rural informal workers face an FTR twice as big as their urban counterparts (51.1 percent versus 104.3 percent). The gap is also wide in Peru, representing 45 percentage points difference (31.9 percent versus 76.9 percent). A contrasting pattern is observed in Ecuador, where rural informal workers face an FTR 7.9 points lower than their urban counterparts (15.3 percent versus 23.2 percent). The rural–urban pattern observed in Ecuador relates to the presence of *Seguro Campesino* in Ecuador, a social insurance regime for self-employed rural workers with lower contribution rates than the general regime. Under *Seguro Campesino*, the amount of SICs paid by members of this regime is equal to 2.5 percent of 22.5 percent of the minimum wage, compared to a 20.5 percent contribution rate on gross employment income for other categories of self-employed workers.

Differences in financial disincentives to formal employment are also observed across economic activities. In Bolivia, Colombia, and Peru, mean FTRs are the largest in the

agriculture and fishing sector. The results are consistent with the patterns observed between informal workers in rural and urban areas, as agriculture and fishing activities are mainly located in rural regions. Consistent with this pattern, mean FTRs for agriculture and fishing are the lowest in Ecuador, again mainly due to the presence of *Seguro Campesino*, which covers rural workers in these sectors of activity. Both the mining, manufacturing, and utilities sector and the retail, wholesale, hotels, and restaurants sector present higher FTR than other industries, especially in Peru. The lowest mean FTRs are observed in the construction sector in Bolivia, Colombia, and Peru. In Ecuador, the construction sector, along with the agriculture and fishing sector, present low mean FTRs. In Venezuela, the results do not show a clear pattern, with similar mean FTRs across sectors.

To analyze the association between individual characteristics and financial disincentives to formal employment, we regress mean FTRs on the set of characteristics discussed above. Table 4 confirms the observed patterns. FTRs are higher for women, the self-employed, and rural workers, except in Ecuador. FTRs decrease with age, education, and income. Controlling for all other variables, working in the agriculture and fishing sector is associated with a higher FTR in Bolivia and lower FTR in Ecuador. In Colombia and Peru, working in the mining, manufacturing, and utilities sector is associated with a higher FTR. In Bolivia, the retail, wholesale, hotels, and restaurant sector is associated with a lower FTR, and same holds for the transport and communication sector in Peru.

Table 4: OLS Regression Estimates of FTRs

	Bolivia	Colombia	Ecuador	Peru	Venezuela
Female	10.24***	54.82***	10.51***	26.26***	1.266***
	(0.771)	(1.894)	(0.365)	(1.256)	(0.0713)
Age	-1.240***	-6.291***	-0.685***	-3.466***	-0.0750***
	(0.187)	(0.470)	(0.0932)	(0.311)	(0.0204)
Age^2	0.0165***	0.0761***	0.00902***	0.0416***	0.00131***
	(0.00238)	(0.00600)	(0.00120)	(0.00395)	(0.000265)
Middle-skilled	-1.094	-6.965***	-0.574	-10.23***	0.0325
	(0.709)	(1.886)	(0.360)	(1.484)	(0.0716)
High-skilled	1.349	-14.25***	-5.091***	-20.66**	1.808***
	(1.182)	(3.462)	(0.563)	(9.779)	(0.125)
Rural	3.137***	28.81***	-2.865***	7.455***	0.421***
	(0.947)	(1.986)	(0.411)	(1.355)	(0.133)
Self-employed	10.93***	85.38***	16.78***	54.04***	4.662***
	(0.741)	(1.753)	(0.352)	(1.168)	(0.0771)
Mining, manufacturing, and utilities	-10.87***	14.93***	13.62***	16.10***	0.245
	(1.276)	(3.174)	(0.603)	(2.165)	(0.153)

Construction	-11.33***	-6.478*	10.22***	0.0811	-0.283**
	(1.279)	(3.478)	(0.601)	(2.341)	(0.126)
Retail, wholesale, hotels, and restaurants	-13.49***	-0.403	11.69***	-12.21***	-0.544***
	(1.208)	(2.587)	(0.531)	(1.694)	(0.147)
Transport and communication	-12.67***	2.960	9.966***	-23.22***	0.0822
	(1.366)	(3.377)	(0.675)	(2.192)	(0.147)
Financial intermediation, real estate, and business activities	-8.624	1.053	14.47***	-12.00***	-0.431**
	(6.302)	(4.072)	(0.975)	(3.408)	(0.208)
Other industry sectors	-12.05***	4.591	15.54***	-10.50***	-1.361***
	(1.553)	(3.279)	(0.615)	(2.089)	(0.143)
Income Q2	-27.88***	-66.28***	-4.760***	-50.10***	-1.873***
	(1.203)	(2.345)	(0.530)	(1.586)	(0.113)
Income Q3	-30.41***	-79.36***	-7.946***	-57.88***	-2.290***
	(1.201)	(2.460)	(0.526)	(1.731)	(0.111)
Income Q4	-33.56***	-93.10***	-11.09***	-60.17***	-2.587***
	(1.211)	(2.662)	(0.538)	(1.843)	(0.111)
Income Q5	-36.60***	-105.2***	-14.84***	-65.84***	-0.738***
	(1.207)	(3.145)	(0.582)	(2.042)	(0.112)
Constant	-10.87***	14.93***	13.62***	16.10***	0.245
	(1.276)	(3.174)	(0.603)	(2.165)	(0.153)
Number of observations	7,580	16,443	30,765	32,524	31,147
R^2	0.277	0.306	0.187	0.181	0.171

Source: Authors' calculations based on microsimulation models.
Notes: Standard errors in parenthesis; significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2 Assessing the Distributional and Budgetary Implications of Formalization

Informality is usually discussed in the literature as a barrier to increase fiscal capacity and boost long-term growth in developing countries. Yet, little is known about the budgetary and, in particular, distributional implications of potential entries to formal employment. In this section, we simulate a number of counterfactual distributions where a fraction of informal workers would enter formal employment. We then assess the implications of such entries on tax revenue, the number of taxpayers, and income inequality. The analysis is static, in the sense that it does not consider behavioral responses due to potential entries to formal employment, neither does it consider the fact that the structure of wages might change as a result of entries to formality. In this sense, the results should be interpreted as first round effects with the aim of providing insight into the effects of potential transitions from informal to formal employment, with a focus on the characteristics of the labor force and design of tax-benefits systems.

It is important to acknowledge that the probability of entering formal employment is not uniformly distributed across all informal workers. As suggested in the previous section, some population subgroups face overly high FTRs and therefore could be less likely to move to

formal employment. From the demand-side, low-skilled workers could face difficulties finding work in the formal sector. For this reason, our approach works in two steps. First, we rank workers in informal employment by their probability of being formal. Then, we simulate counterfactual distributions where a fraction of informal workers would enter formal employment based on their probability of being formal.

The counterfactual simulations work as follows. First, the 10 percent of informal workers with the highest probability of being formal are moved into formal employment by means of tax-benefit microsimulation. Then, cumulatively, the next 10 percent of informal workers with the highest probability of being formal are moved to formality, until we assess the effect of moving all informal workers to formal employment. For each of these counterfactual distributions, we assess the additional tax revenue and number of taxpayers due to transitions to formality, as well as the effect of such transitions on income inequality.

Probability of Being in Formal Employment

We use a probit model to estimate the probability of being in formal employment. The dependent variable takes the value one if the person is in formal employment (is affiliated to social security) and zero otherwise. Variables traditionally used in the literature discussing the determinants of formality are used as regressors and include the following: gender (male), age and age squared, education (skill levels), marital status (married), number of children, rural area, employment status (self-employed), and the logarithm of earnings. Table 5 presents the results of the estimation.

Table 5: Probit Estimates of the Probability of Being in Formal Employment

	Bolivia	Colombia	Ecuador	Peru	Venezuela
Male	0.172***	0.0918***	-0.136***	-0.148***	-0.0923***
	(0.0401)	(0.0292)	(0.0167)	(0.0180)	(0.0142)
Age	0.0397***	0.0440***	0.0228***	0.0740***	0.00877*
	(0.0110)	(0.00805)	(0.00459)	(0.00520)	(0.00457)
Age^2	-0.000372***	-0.000467***	-0.000148**	-0.000727***	2.14e-05
	(0.000142)	(0.000104)	(5.91e-05)	(6.55e-05)	(5.87e-05)
Middle-skilled	0.380***	0.400***	0.196***	0.534***	0.218***
	(0.0425)	(0.0332)	(0.0166)	(0.0296)	(0.0157)
High-skilled	0.828***	0.684***	0.394***	1.063***	0.196***
	(0.0582)	(0.0450)	(0.0244)	(0.0758)	(0.0246)
Married	0.218***	0.0722**	0.257***	0.396***	0.137***
	(0.0354)	(0.0287)	(0.0146)	(0.0178)	(0.0146)
Number of children	-0.0573***	-0.0403***	-0.0432***	-0.0369***	-0.0251***
	(0.0120)	(0.0103)	(0.00475)	(0.00671)	(0.00466)

Rural	0.0231	0.0695**	0.259***	-0.378***	-0.202***
	(0.0517)	(0.0316)	(0.0180)	(0.0224)	(0.0309)
Self-employed	-0.976***	-1.294***	-1.084***	-0.685***	-0.765***
	(0.0386)	(0.0272)	(0.0182)	(0.0177)	(0.0208)
Log(earnings)	0.370***	0.746***	0.429***	0.254***	0.213***
	(0.0237)	(0.0199)	(0.00938)	(0.00891)	(0.0107)
Constant	-4.264***	0.334***	-0.0421**	-0.261***	0.105***
	(0.255)	(0.0477)	(0.0194)	(0.0432)	(0.0246)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes
Number of observations	11,368	23,449	51,639	46,840	47,829
Pseudo R^2	0.422	0.482	0.323	0.359	0.153

Source: Authors' calculations based on microsimulation models.
Notes: Standard errors in parenthesis; significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Our results show that, controlling for other variables, being male increases the probability of being formal in Bolivia and Colombia but it decreases it in Ecuador, Peru, and Venezuela. The probability of being formal increases with age at a decreasing rate, except in Venezuela, where the coefficient of age squared is positive and not significant. As expected, the probability of being formal increases with education level and earnings. In all five countries, being self-employed is associated with a lower probability of being formal. In terms of family characteristics, being married increases the probability of being formal, whereas the probability decreases with the number of children, probably capturing the fact that low income families where informality of more prevalent have a larger number of children on average. Finally, we find no particular pattern for rural area. Controlling for all other factors, living in a rural area increases the probability of being formal in Colombia and Ecuador, it decreases it in Peru and Venezuela, and it is not significant in Bolivia.

Budgetary Implications of Transitions to Formal Employment

Based on the coefficients estimated in Table 5, we predict the probability of being formal for all informal workers in our data. We then select the 10 percent with the highest probability of being formal and create groups, adding the next 10 percent of informal workers with the highest probability of being formal, until we cover the whole informal population.[18] As expected, those with the highest probability of being formal have, on average, higher education levels and earnings.

[18] See Table A3 in the Appendix for the characteristics of the 10 percent with the highest probability of being formal.

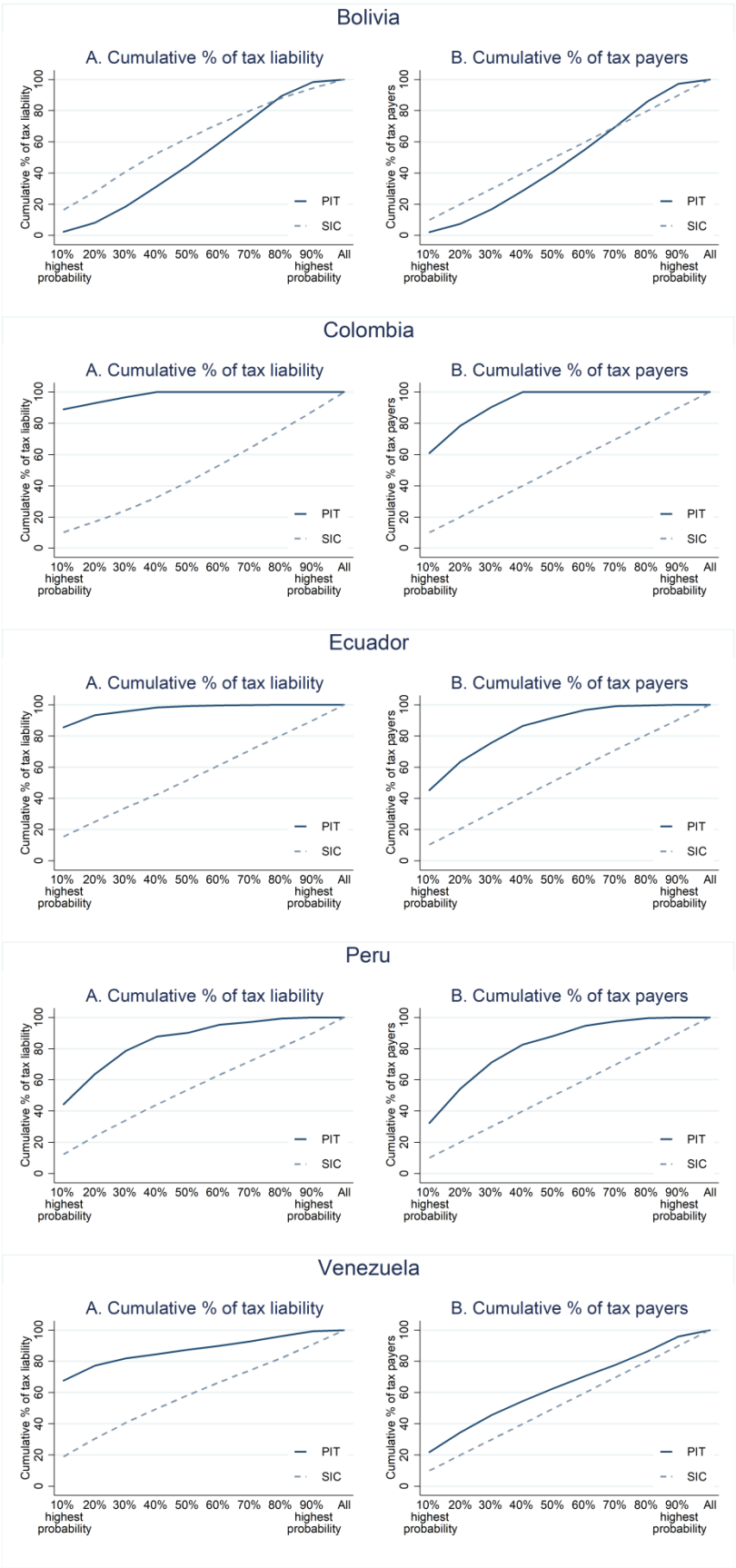
Table 6 and Figure 5 present the results of our simulations. Table 6 presents tax revenue under the baseline scenario (official statistics) and additional tax revenue under our counterfactual where all informal workers would enter formal employment. Panel A in Figure 5 presents the simulated cumulative percentage of tax liability, starting from individuals with the highest probability of being formal until the whole informal population is covered. Results distinguish between PIT and SICs, as the pattern differs between these two instruments.

Table 6: Tax Revenue under the Baseline and Counterfactual Scenarios *(in percent)*

	Bolivia	Colombia	Ecuador	Peru	Venezuela
Baseline tax revenue (% GDP)[a]					
PIT	0.22	0.80	1.03	1.45	0.80
SICs	4.32	9.28	2.51	2.07	0.48
Additional tax revenue (% GDP)[b]					
PIT	0.55	0.02	0.16	0.10	1.31
SICs	4.84	2.33	1.99	2.03	0.85

Source: Authors' elaboration based on own simulations and official sources.
[a] Baseline results for Venezuela are based on our own simulations due to lack of official information on tax revenue.
[b] Authors' calculations based on microsimulation models. The counterfactual scenario corresponds to one with full formalization of informal workers.

Figure 5: Cumulative Share of Tax Liability and Tax Payers by Probability of Being Formal



Source: Authors' calculations based on microsimulation models.

In terms of PIT, our counterfactual of a fully formalized economy would have varying effects across countries. In Bolivia and Venezuela, PIT revenue as a percent of GDP would more than double, from 0.22 to 0.55 percent and 0.80 to 2.11 percent, respectively. The effect of a fully formalized labor force would be the smallest in Colombia, representing a 2.5 percent increase in PIT revenue with respect to the baseline scenario. In Ecuador and Peru, the effect would also be limited with an increase in PIT revenue of 15.5 percent and 7 percent, respectively.

Note that although the literature usually refers to informality as a barrier to increase fiscal capacity, our results show that this seems to be the case in Bolivia and Venezuela, but to a much lesser extent in Colombia, Ecuador, and Peru. Moreover, the potential tax revenue from PIT under a fully formalized economy remains low compared to tax revenue collected currently from this source in OECD countries, which represented on average 8.3 percent of GDP in 2015 (OECD, 2020). As discussed before, the high exempted thresholds and presence of generous tax deductions—and in the case of Bolivia, the little progressivity and collection capacity of PIT—limit the potential to increase fiscal capacity as a result of entries to formal employment.

Figure 5 shows that in all countries except Bolivia, a transition of the 10 percent with the highest probability of being formal would be enough to capture a large share of the additional PIT potential liability. In Colombia and Ecuador, over 80 percent of the additional PIT liability would be captured following a transition of the 10 percent with the highest probability of being formal. In Peru and Venezuela, the share of PIT liability captured by those with the highest probability would amount to 43 and 65 percent, respectively. In Bolivia, the pattern of the cumulative tax liability differs namely because of the design of PIT, which is proportional with a rate of 13 percent for salaried employees and 15.5 percent for the self-employed workers.

In terms of SICs, Bolivia, Peru, and Venezuela would see their revenue more than double under a fully formalized economy. The effect would also be large in Ecuador, where SIC revenue would increase by 80 percent. In Colombia, however, the effect would be smaller, representing an increase of 25 percent of SIC revenue. The pattern of the cumulative SIC liability by probability of being formal is similar in all countries, given that in all countries SICs are proportional to income. The share of the additional SIC revenues captured by those with the highest probability of being formal would range between 10 percent in Colombia and 20 percent in Venezuela.

Table 7 and Panel B in Figure 5 show the results of our simulations in terms of additional number of taxpayers. Under a fully formalized economy, the additional number of PIT payers would be the highest in Bolivia and Venezuela, representing 23 percent and 14.6

percent of the active population, respectively. The increase would be smaller in Bolivia, Ecuador, and Peru, representing 0.36, 0.89 and 2.47 percent of the active population, respectively. The effect would be much larger in terms of SIC payers across countries, with the additional number of payers ranging between 38 (Ecuador) and 47 percent (Peru) of the active population. The pattern of cumulative number of taxpayers follows closely that of tax revenue (Figure 5).

Table 7: Additional Number of Taxpayers *(in % of active population)*

	Bolivia	Colombia	Ecuador	Peru	Venezuela
PIT	23.29	0.36	0.89	2.47	14.60
SICs	42.35	43.34	38.05	47.04	41.15

Source: Authors' calculations based on microsimulation models.

Distributional Implications of Transitions to Formal Employment

Figure 6 presents the effect of potential entries to formal employment on income inequality. The figure depicts the percentage change in the Gini coefficient by the probability of being formal, where the zero percent line represents the baseline Gini coefficient in each country in 2015.[19]

Our results show that an entry to formality of the 10 percent of informal workers with the highest probability of being formal would decrease inequality in all countries, except in Peru, where the Gini coefficient would remain broadly the same. The decrease on income inequality, as a result of this counterfactual transition, is driven by the fact that those with the highest probability of being formal are mainly high earners. Inequality drops as they enter formality, because this group of workers would start paying PIT (see effect on Figure 5), which would improve the redistributive effect of the tax-benefit system.

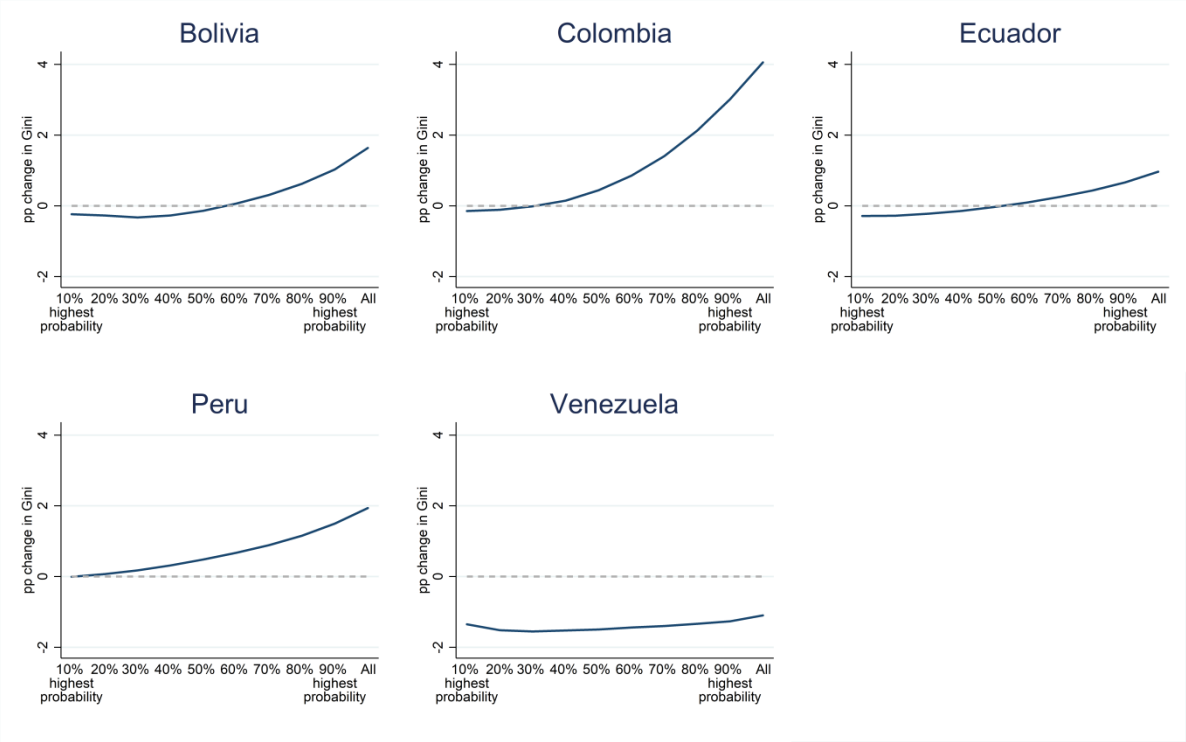
As more individuals with a lower probability of being formal enter formality, income inequality starts increasing. In Colombia, the increase in income inequality under a fully formalized economy would be the largest, amounting to a 4 percentage points increase in the Gini coefficient (from 56.4 to 60.4 percent). The increase in income inequality as more informal workers (with a lower probability of being formal) enter formality is due to the fact that most informal workers are low earners and a move to formal employment would represent an additional cost in the form of SIC payments. As discussed in the previous section, the cost of entering formal employment (FTR) is the largest for individuals at the bottom of the income

[19] Bolivia: 48.4 percent, Colombia: 56.4 percent, Ecuador: 46.4 percent, Peru: 48.2 percent, and Venezuela: 47.0 percent).

distribution, meaning that inequality will increase, as low earners (which represent the majority of informal workers) would face SIC payments.

The only exception to the increasing pattern in inequality is Venezuela, where inequality would decrease even under the counterfactual of a fully formalized economy, although the decrease would still be larger for entries of groups with a higher probability of being formal. The contrasting pattern observed in Venezuela is explained by the fact that the decrease of income inequality due to increased taxes paid by informal high earners (those with the highest probability) dominates the effect of increasing inequality due to SIC payments of informal low earners. As seen earlier in Figure 3, financial costs of entering formal employment are in general low for informal workers at the bottom of the income distribution in Venezuela. However, a point of caution has to be made regarding the impact of the macroeconomic distortions in prices and wages in Venezuela that made the income tax payments particularly high for the consolidated middle class and the rich, as mentioned previously.

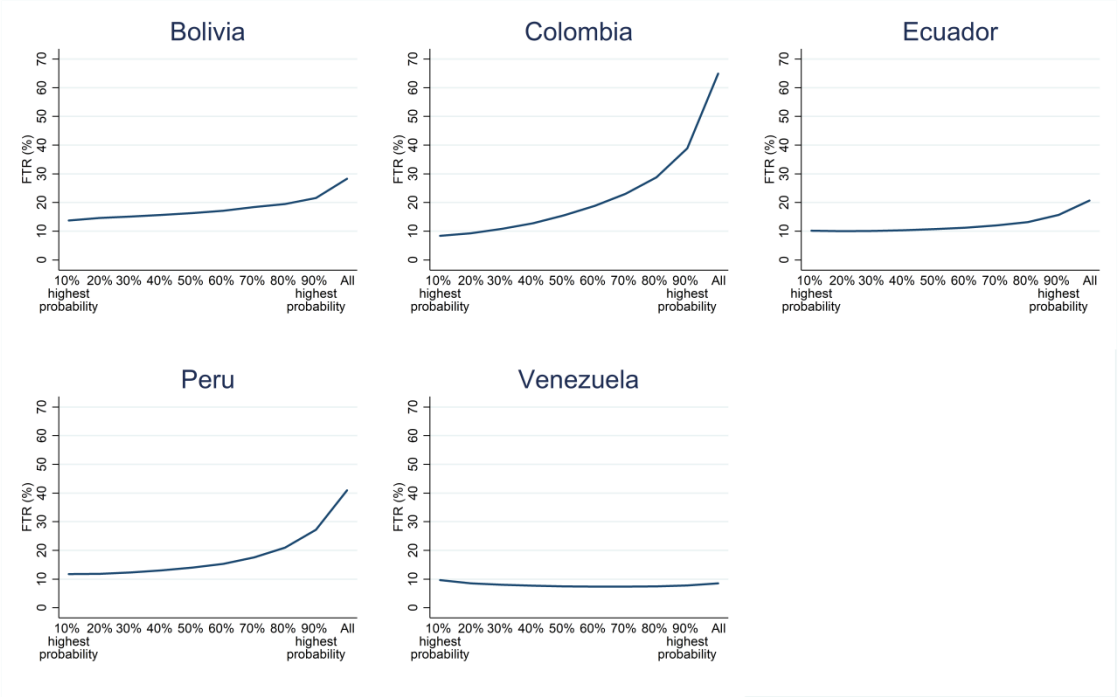
Figure 6: Change in the Gini Coefficient by Probability of Being Formal *(in percentage points)*



Source: Authors' calculations based on microsimulation models.
Note: The dashed horizontal line corresponds to the baseline level of inequality measured by the Gini coefficient: Bolivia: 48.4 percent, Colombia: 56.4 percent, Ecuador: 46.4 percent, Peru: 48.2 percent, and Venezuela: 47.0 percent).

To confirm the point made about the pattern of inequality by probability of being formal and the costs of entering formal employment, Figure 7 presents the pattern of FTR by the probability of being formal. Our results show that the financial cost of entering formal employment is low for informal workers with the highest probability of being formal (around 10 percent). In all countries except Venezuela, FTRs increase as the probability of being formal decreases. In Venezuela, FTRs are broadly similar for workers with different probabilities of being formal, which is in line with the pattern observed in terms of inequality.

Figure 7: Formalization Tax Rates by Probability of Being Formal



Source: Authors' calculations based on microsimulation models.

Conclusions

Informality is deeply rooted in the economic systems of LAC countries, and the Andean countries discussed herein are not the exception. Working at the margin of the tax and social security systems compromises fiscal resources, which some countries urgently needed. More importantly, however, it puts a limit on long-term growth and the perspectives of achieving convergence to more developed economies. Despite the governments' efforts to tackle both workers and firm informality, this phenomenon still accounts for two-thirds of the workforce and roughly half of the firms, although information on the latter is scarce.

In this paper, we attempt to make a contribution to the literature by examining the incentives that workers have to work formal or informally. More precisely, we use harmonized microsimulations models based on the information provided in official household surveys to construct indicators of financial (dis)incentives to formality implied by the design of the tax-benefit systems in Bolivia, Colombia, Ecuador, Peru, and Venezuela. Our indicators of FTRs

capture the percentage of earnings in informality that would be lost due to increased social insurance contributions and income tax payments or benefit withdrawal.

Our analysis provides a number of interesting results. First, we find that financial disincentives to formal employment are higher and more volatile among self-employed workers, whereas salaried employees show lower and more stable formalization costs, which would make them more likely to make the transition to formality, especially those working in medium-sized and large firms. The higher FTRs of self-employed workers, compared their salaried counterparts, are explained by higher SIC rates applied to this group, as well as by the requirement for employers to pay salaried employees at least the minimum wage, whereas many self-employed workers earn less.

Our results also show that the fiscal capacity of governments would improve following the potential entry of newly formalized workers who would start contributing to social security. On the other hand, given the generous design of the PIT systems in the Andean region, we estimate that its contribution to the fiscal space would only be marginal, even in a scenario of a fully formalized labor force. Interestingly, there appears to be no need to consider the unlikely scenario of full formalization to harvest important fiscal gains. A strategy that pursues formalization of informal workers with the highest probability of being formal—that is, those 10 percent with the highest probability of becoming formal—would be sufficient to capture a substantial share of the additional tax revenue lost due to informality, with positive impacts of inequality reduction.

In terms of economic policy, these gains should be netted out from any potential behavioral changes that workers and firms might take given the additional costs that they will have to assume. Thus, in implementing formalization strategies, governments need to evaluate these potential fiscal gains against increased hiring costs for the firms. In any case, there is ample evidence that formalization has positive effects in terms of salaries, social protection, productivity, and long-term growth (IDB, 2010; Carpio and Pagés, 2009; La Porta and Schleifer, 2008; Santa María and Rozo, 2008). The comparative perspective herein provides insights into strategies that Andean governments could adopt to reduce the financial burden to formalization of certain population groups. For instance, the *Seguro Campesino* in Ecuador offers social insurance coverage to self-employed workers in rural areas, with lower contribution rates than their counterparts in the general regime. Similar schemes could be implemented to target different categories of self-employed workers in the region, with the aim of reducing their financial disincentives to enter formal employment.

There are some avenues for further research. One consists on revising the assumption that the income received in formality remains the same upon entry into formal employment. Likely, the income perceived by employees in formality would be at least the minimum wage in the case of lower earners, and other informal workers might experience a change in

earnings in the event of entering formal employment (Jara and Rodriguez, 2019). It is also important to stress that our analysis focuses on the financial disincentives to formal employment implied by the tax-benefit system. However, the decision to enter formal employment is also affected by other factors. In particular, some categories of workers (e.g., low skilled-workers) might be limited in the job opportunities available for them, pointing to the need to further analyze this issue from the perspective of a labor supply model with demand-side constraints. Finally, we have examined financial incentives to formal employment from with a short-term perspective in which SICs are considered as a cost. However, within a dynamic setting, it would be useful to study the future benefits of formalization (e.g., access to contributory old-age pensions). All of these extensions represent promising directions for future research.

References

Alaimo, V., M. Bosch, D. Kaplan, C. Pagés, and L. Ripani. 2016. Jobs for Growth. Washington, DC: Inter-American Development Bank. Available at: https://publications.iadb.org/en/jobs-growth.

Arancibia, C., M. Dondo, X. H. Jara, D. Macas, N. Oliva, R. Riella, D. Rodriguez, and J. Urraburu. 2019. Income Redistribution in Latin America: A Microsimulation Approach. WIDER Working Paper 2019/1. Helsinki: UNU-WIDER.

Bosch, M., A. Melguizo, and C. Pagés. 2013. Better Pensions, Better Jobs: Towards Universal Coverage in Latin America and the Caribbean. Washington, DC: Inter-American Development Bank. Available at: https://publications.iadb.org/en/publication/17407/better-pensions-better-jobs-towards-universal-coverage-latin-america-and.

Carpio, S. and C. Pagés. 2009. Informality, Productivity and Resource Misallocation in Brazil. Unpublished. Washington, DC: Inter-American Development Bank.

Duryea, S. and M. Robles. 2017. Social Pulse in Latin America and the Caribbean 2017: Family Legacy, Breaking the Mold or Repeating Patterns? Washington, DC: Inter-American Development Bank. Available in: https://publications.iadb.org/en/social-pulse-latin-america-and-caribbean-2017-family-legacy-breaking-mold-or-repeating-patterns.

EUROMOD. 2018. EUROMOD Modelling Conventions. EUROMOD Technical Note EMTN 1.1. Colchester, UK: Institute for Social and Economic Research, University of Essex.

Gasparini, L. and L. Tornarolli. 2009. Labor Informality in Latin America and the Caribbean: Patterns and Trends from Household Survey Microdata. Revista Desarrollo y Sociedad, 63(1): 13–80.

Guerguil, M. 1988. Some Thoughts on the Definition of the Informal Sector. *Cepal Review*, 35: 57–65.

Harris, J.R., and M.P. Todaro. 1970. Migration, Unemployment, and Development: A Two-Sector Analysis. *American Economic Review*, 60(1): 126–42.

IDB (Inter-American Development Bank). 2010. The Age of Productivity: Transforming Economies from the Bottom Up. Washington, DC: IDB. Available at: https://publications.iadb.org/en/la-era-de-la-productividad-como-transformar-las-economias-desde-sus-cimientos.

--------. 2018. Creciendo con productividad: una agenda para la Región Andina. Washington, DC: IDB. Available at: https://publications.iadb.org/es/creciendo-con-productividad-una-agenda-para-la-region-andina.

--------. 2020. Cómo impulsar el crecimiento y fortalecer la clase media en América Latina. Washington, DC: IDB.

ILO (International Labour Office). 1972. Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya. Research Paper. Geneva: ILO.

--------. 2014. Recent Experiences of Formalization in Latin America and the Caribbean. Notes on Formalization. Geneva: ILO.

Jara, H.X. and D. Rodriguez. 2019. Financial Disincentives To Formal Work: Evidence From Ecuador And Colombia. WIDER Working Paper 2019/14. Helsinki: UNU-WIDER.

Jara, H.X. and M. Varela. 2019. Tax-Benefit Microsimulation and Income Redistribution in Ecuador. *International Journal of Microsimulation*, 12(1): 52–82.

Jara, H.X., M. Varela, P.C. Lee, and L. Montesdeoca. 2019. UNU-WIDER SOUTHMOD Country Report: ECUAMOD v1.4, 2011-2018. UNU-WIDER SOUTHMOD Country Report Series. Helsinki: UNU-WIDER.

Koettl, J. 2013. Does Formal Work Pay in Serbia? The Role of Labor Taxes and Social Benefit Design in Providing Disincentives for Formal Work. In C. Ruggeri Laderchi and S. Savastano (eds), *Poverty and Exclusion in the Western Balkans*. New York, New York: Springer.

Koettl, J. and M. Weber. 2012. Does Formal Work Pay? The Role of Labor Taxation and Social Benefit Design in the New EU Member States. In S.W. Polachek and K. Tatsiramos (eds), *Informal Employment in Emerging and Transition Economies*. Bingley: Emerald Group Publishing.

La Porta, R. and Shleifer, A. 2014. Informality and Development. *Journal of Economic Perspectives*, 28(3): 109–26.

Levy, S. 2008. Good Intentions, Bad Outcomes: Social Policy, Informality, and Economic Growth in Mexico. Washington, DC: Brookings Institution Press.

--------. 2018. Under-Rewarded Efforts: The Elusive Quest for Prosperity in Mexico. Washington, DC: Inter-American Development Bank. Available at: https://flagships.iadb.org/en/Under-Rewarded-Efforts.

OECD (Organization for Economic Cooperation and Development). 2020. Tax on Personal Income (indicator). https://doi.org/10.1787/76e12892-en.

OECD, Economic Commission for Latin America and the Caribbean (ECLAC), Inter-American Center of Tax Administrations (CIAT), and Inter-American Development Bank (IDB). 2017. Revenue Statistics in Latin America and the Caribbean 1990–2015. Paris, France: OECD Publishing. Available at: https://publications.iadb.org/en/revenue-statistics-latin-america-and-caribbean-1990-2015.

Oliva, N. 2018. LATINMOD: un microsimulador regional de políticas fiscales en América Latina. Caracas, Venezuela: Banco de Desarrollo Económico y Social de Venezuela (BANDES) and Centro Estratégico Latinoamericano de Geopolítica (CELAG).

Perry, G.E., W.F. Maloney, O. Arias, P. Fajnzylber, A. Mason, and J. Saavedra-Chanduvi. 2007. Informality: Exit and Exclusion. Washington, DC: World Bank.

Rauch, J.E. 1991. Modeling the Informal Sector Formally. *Journal of Development Economics*, 35(1): 33–47.

Rodríguez, D. 2019. Política fiscal, pobreza y desigualdad: un modelo de microsimulación para Colombia. *Ensayos de Economía*, *29*(54): 53–88. https://dx.doi.org/10.15446/ede.v29n54.76499.

Saavedra J. and A. Chong. 1999. Structural Reform, Institutions and Earnings: Evidence from the Formal and Informal Sectors in Urban Peru. *Journal of Development Studies,* 35: 95–116.

Salazar-Xirinachs, J.M. and J. Chacaltana. 2018. Políticas de formalización en América Latina: avances y desafíos. Lima, Peru: Organización Internacional del Trabajo. Available at https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/documents/publication/wcms_645159.pdf.

Santa María , M. and S. Rozo. 2008. Informalidad empresarial en Colombia: alternativas para impulsar la productividad, el empleo y los ingresos. Documento de Trabajo de N. 40. Bogota, Colombia: Fedesarrollo. Available at: https://www.repository.fedesarrollo.org.co/handle/11445/1207.

Sutherland, H. and P. Figari. 2013. EUROMOD: The European Union Tax-Benefit Microsimulation Model. *International Journal of Microsimulation*, 1(6): 4–26.

Weber, M. 2015. Measuring Disincentives to Formal Work. IZA World of Labor 213. Bonn, Germany: IZA Institute of Labor Economics. Available at: https://wol.iza.org/uploads/articles/213/pdfs/measuring-disincentives-to-formal-work.pdf.

Appendix

Table A1: Descriptive Statistics of Workers in Informal Employment

	Bolivia	Colombia	Ecuador	Peru	Venezuela
Number of observations	7,505	16,160	29,961	31,751	30,870
Population (no. of informal workers, in thousands)	2,158	10,478	2,957	7,761	5,858
Population (% of all workers)	61.8	67.3	57.5	64.6	64.0
% female	34.8	39.3	39.2	43.9	38.4
% age (<30)	26.6	28.0	29.3	26.0	29.4
% age (30–50)	55.9	54.9	54.7	54.6	56.6
% age (50+)	17.5	17.1	16.0	19.4	14.0
% low-skilled	41.4	38.3	47.2	15.4	40.5
% medium-skilled	49.5	51.8	41.1	84.3	49.6
% high-skilled	9.0	9.9	11.6	0.3	9.9
% self-employed	70.1	66.1	41.1	58.1	26.5
% rural	33.9	27.1	32.0	21.6	6.3
% earning Q1	21.9	25.3	21.3	21.3	25.1
% earning Q2	23.7	30.5	28.0	26.1	23.9
% earning Q3	21.2	21.7	21.9	23.8	18.1
% earning Q4	19.2	12.7	17.6	19.0	15.5
% earning Q5	14.0	9.8	11.2	9.7	17.4

Source: Authors' calculations based on microsimulation models.

Table A2: Income Thresholds for Socio-economic Categories, 2015 *(in local currency units at current prices)*

	Poor	Vulnerable middle class	Consolidated middle class	Rich
Bolivia	<533.3	533.3 – 1,333.2	1,333.2 – 6,665.9	>6,665.9
Colombia	<205,329.7	205,329.7 – 513,324.2	513,324.2 – 2,566,620.8	>2,566,620.8
Ecuador	<96.0	96.0 – 240.0	240.0 – 1,200.0	>1,200.0
Peru	<269.6	269.6 – 674.0	674.0 – 3,370.1	>3,370.1
Venezuela	<2,546.2	2,546.2 – 6,365.6	6,365.6 – 31,828.0	>31,828.0

Source: Authors' elaboration based on IDB (2020).
Note: This classification follows the international lines of the World Bank for extreme poverty and its multiples (1.6, 4, and 20 times, respectively). A household belongs to the vulnerable middle class if it lives with an income between US$5 and US$12.4 per day; and the consolidated middle class corresponds to a range of income between US$12.4 and US$62 per day. The definition of the thresholds that separate the vulnerable middle class from the consolidated middle class is based on the concept of economic security. According to Duryea and Robles (2017), the probability of falling back into poverty increases for incomes below US$12.4 per day, which supports the use of this threshold. The threshold of US$62 is supported by several studies and exercises that define socioeconomic status based on self-reported information.

Table A3: Descriptive Statistics of 10 Percent of Workers in Informal Employment with the Highest Probability of Being Formal

	Bolivia	Colombia	Ecuador	Peru	Venezuela
Number of observations	793	1,151	2,953	2,218	2,905
Population (no. of informal workers, in thousands)	216	1,049	296	776	586
% female	34.3	43.1	40.2	50.8	56.5
% age (<30)	33.6	29.4	30.5	27.1	19.0
% age (30–50)	56.1	58.6	54.9	56.2	62.6
% age (50+)	10.4	12.0	14.6	16.7	18.3
% low-skilled	10.6	3.2	14.5	0.1	2.7
% medium-skilled	52.2	59.5	44.2	97.8	55.0
% high-skilled	37.2	37.3	41.3	2.1	42.4
% self-employed	11.4	11.4	8.1	27.5	0.1
% rural	15.4	5.4	26.8	0.7	0.6
% earning Q1	3.2	0.0	1.3	1.0	1.5
% earning Q2	22.9	4.0	16.0	13.2	6.6
% earning Q3	31.3	23.5	26.6	29.8	12.6
% earning Q4	23.1	32.6	26.3	30.4	22.7
% earning Q5	19.5	40.0	29.8	25.6	56.6

Source: Authors' calculations based on microsimulation models.