Andemic Informality

Assessing Labor Informality, Employment, and Income Risk in the Andes

EDWIN A. GOÑI PACCHIONI

IDB

INTER-AMERICAN DEVELOPMENT BANK

Andemic Informality

Assessing Labor Informality, Employment, and Income Risk in the Andes

Edwin A. Goñi Pacchioni

Inter-American Development Bank

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Goñi Pacchioni, Edwin A.
Andemic Informality. Assessing labor informality, employment, and income risk in the Andes / Edwin A. Goñi Pacchioni.

p. cm.
Includes bibliographical references.
ISBN 978-1-59782-168-1

1. Informal sector (Economics)—Andes Region. 2. Labor market—Andes Region. 3. Manpower policy— Andes Region. 4. Employment (Economic theory)—Andes Region. 5. Income—Andes Region. I. Inter-American Development Bank.

HD5756.G66 2013

IDB-BK-117

About the Author

Edwin A. Goñi Pacchioni, a Peruvian national, is a senior economist in the Andean Group Country Department of the Inter-American Development Bank (IDB). Before joining the IDB, Goñi Pacchioni worked in the World Bank Research Department and Office of the Chief Economist for the Latin American Region. He also served as an economist in the Research Department of Peru's Superintendency of Banking, Insurance and Private Pension Funds. Goñi Pacchioni's current research examines informality in labor markets from static, dynamic, and causal perspectives in various Latin American economies. He has also studied the differentiated effects of innovation on productivity and growth according to distinct stages of development, as well as the redistributive effects of fiscal policy, in developed and developing countries. Goñi Pacchioni's research has been published in a number of academic journals. He holds a Masters of Research and a PhD in Economics from the European University Institute and the European Doctoral Program of Quantitative Economics.

Contents

Acknowledgments

This book is the result of a combined effort of many economists. Background papers on policy evaluation were prepared for Part III by Valentina Calderón Mejía, Martín Gonzalez-Rozada, Freddy Llerena Pinto, and Ioana Marinescu. A background paper on regulatory framework was prepared by José Montes. Invaluable research assistance during different stages of the project was provided by Gisella Aragón, Roberto Asmat, and Ricardo Montero. The book also greatly benefited from the revision of Mariano Bosch and Marcela Meléndez and the comments and suggestions of Arturo Galindo.

Foreword

The past decade has been one of prosperity in most countries in Latin America, specifically those of the Andean region. As economies have grown and employment levels have improved, the quality of life appears to be improving throughout the region. Nonetheless, a huge step remains to be taken in order to best exploit the benefits of economic growth: improving the quality of the labor markets.

The performance of labor markets can be rated not only in terms of how low unemployment rates are, but in terms of the extent to which employed workers have appropriate job arrangements. Good jobs, meaning jobs that enhance productivity and avoid future macroeconomic costs, are those that are bound by contracts, pay social security benefits, take place in appropriate working conditions, etc. Informal arrangements that take place in the underground economy, do not comply with regulations, are not subject to monitoring, and usually convey (if any) much poorer concessions than formal arrangements.

Unfortunately, the informal sector is the most likely destination for workers in the developing world. Within Latin America, the Andean countries have the highest shares of informal and socially unprotected labor forces. Further, informality is a dynamic phenomenon as workers transit across jobs and across employment states frequently. These dynamics exert an influence over pre- and post-retirement welfare of workers. Informality is a major barrier for productivity improvements in the region, and today is considered by many to be one of the greatest problems of the Andean economies.

This book addresses labor informality from an empirical perspective using recent inputs and techniques. Its contributions include: standardization in the static measurement and characterization of labor informality, allowing cross-country comparability for the Andean region; providing a comprehensive study of the dynamics and risks of informality, exploiting recent panel datasets in the Andean countries; and assessing the impact of some recent

policies on the size and dynamics of labor informality in selected Andean countries.

The book is intended to benefit applied researchers and policymakers interested in a documented description and study of the informal sector in the Andean labor markets. It aims to provide policy lessons on how to strengthen the quality of jobs, and through it, the quality of life in the Andean region—an endeavor to which the Inter-American Development Bank is fully committed.

Arturo J. Galindo
Regional Economic Advisor
Andean Country Group
Inter-American Development Bank

INTRODUCTION

Why Is Labor Informality in the Andean Countries Important?

Twenty years ago, most active academic and policy-oriented debate on labor economics centered around the stark contrast worldwide between labor institutions—and their impact on economic growth—in the most developed clusters of the Western Hemisphere. While the United States was praised for its flexibility and its "consequent" strong job creation and hiring rates, the euro zone was constantly questioned about institutional rigidities that to some extent caused higher levels of unemployment and constrained job creation. *Euroesclerosis* is in fact a phenomenon that encompasses many dimensions of study: high unemployment with sluggish mobility rates amidst rigidities imposed by disputed institutional arrangements. These dimensions are often revisited in Europe, an intensively studied part of the world where a strong assumption of compliance with the rule of law is naturally taken as implicit.

This book is about comparable dimensions of a quite conventional problem in a less conventional part of the world—a region where legal enforcement of the rule of law is far weaker than in the developed world and where firms and workers, voluntarily or otherwise, have devised mechanisms to meet outside the scope of the formal market and at a frequency that systematically surpasses the rate of formal matching. The book is about the characteristics and evolution of an intermediate state of (un)employment called informality, about job dynamics (ins and outs) of formal and informal employment, about the implications of such dynamics on income risk, and about labor institutions fostering or inhibiting the existence of this intermediate state and the flows nurturing (or draining) it in the Andean labor markets.

Latin America employs 66% of its labor force under informal arrangements,[1] more than other emerging regions such as the Middle East, North Africa, or Central Asia (WDI, 2012). Within Latin America, the Andean group leads the ranking of economies with the most informal labor markets: pooling informal salaried and informal independent workers, informal labor constitutes about 70% of the labor market in Colombia and Venezuela and between 80% and 90% in Ecuador, Bolivia, and Peru.[2] In other words, for every 10 jobs in the Andean countries, only two involve social security. This evidence is symptomatic of a different kind of atrophy: endemic informality in the Andes—or what we call An*d*emic *in*formality.

Figures on informality are striking and not limited to an approximation based on the participation of workers in pension schemes. Regardless of the definition used to approximate labor informality,[3] the figures across the region are consistently high and symptomatic of structural and institutional flaws. Countless labor-intense micro and small firms,[4] paired with a low-skilled labor supply,[5] make the underground market privately profitable but at socially suboptimal conditions. And poor monitoring and weak enforcement mechanisms—coupled with a lack of coordination between the public agencies in charge of supervising, regulating, and promoting formal entrepreneurship and employment—actually (and paradoxically) end up working to the detriment of formality.

Even worse, informality transcends the spectrum of informal employment and is pervasive, as it extends to general economic activities ranging from compliance with environmental, safety, and quality regulations in the production of goods or the provision of services to income-tax compliance among individuals and firms. Approximately 47% of the economic activity of the Andean countries takes place off the records of the formal ("legal") market.[6]

---

[1] Consistent with the legalistic definition of labor informality adopted by the mainstream literature, work arrangements are considered informal if they do not provide social benefits to workers, and in particular if they do not entail contributions to worker pension funds.
[2] National figures (using the "coverage by pension scheme" definition of formality) based on WDI (2012) and on own computations drawing from labor surveys.
[3] Measures used in this study to proxy labor informality include (1) workers' participation in a pension program by virtue of their job arrangements (preferred definition); (2) workers' participation in a health insurance program by virtue of their job arrangements; and (3) the existence of a contract defining the work relationship.
[4] Most of them operating with marginal incomes far below minimum legal marginal costs (wage and nonwage).
[5] These workers not only hinder productivity but also ignore the importance of pension insurance.
[6] Economic activity as measured by GDP, according to Schneider's (2005) country estimates for 2000.

Such massive participation of the labor force in informality has caught the attention of policymakers and academics devoted to understanding Latin American labor markets, because no matter the way in which it manifests itself, informality is considered a symptom of underdevelopment. High informality drags economic growth: the poor quality of productive factors translates into low productivity,[7] which prevents redistribution and endogenous gains from growth. Latin America's productivity is about half of its potential (IDB 2010) and 77% behind the technical frontier.[8] Lagging productivity encumbers immediate growth, disarticulates informal firms from the more dynamic and sustainable value chain, and confines them into suboptimal scales. It also delays the absorption of newer technologies and more efficient methods of production. Even worse, it inhibits the creation of such new technologies. High informality also perpetuates inefficiencies. It erodes the tax base, constrains fiscal redistribution,[9] and makes redistribution inefficient and ineffective, as it relies on cross-subsidies by formal contributors to informal beneficiaries of social assistance.[10] Finally, it truncates the social security system, making it accessible mostly to (less-vulnerable) formal workers (Levy 2008). In this last sense, high levels of informality exacerbate vulnerabilities by promoting high job turnover rates and their corresponding effects on income risk.

Since high informality drags economic growth, perpetuates inefficiencies, and exacerbates vulnerabilities, and since informality is rampant in the region, a comprehensive understanding of the dynamics of informality is necessary to prescribe sustainable policies to address the problem in a way that incorporates the assessment of risks and vulnerabilities of different groups of workers. In this sense, interest in the topic is growing because of the magnitude of the problem and also because of the evolution of the informal sector and its implications.[11] Concerns about the effectiveness of policies and interventions

---

[7] Symptomatic of the extensive microentrepreneurial sector in Andean countries (IDB 2010),

[8] Goñi-Pacchioni and Maloney (2012) estimate that respective quality-adjusted total factor productivity (TFP) for Bolivia, Colombia, Ecuador, Peru, and Venezuela is about 17%, 25%, 16%, 19%, and 40% of the highest quality-adjusted TFP measured worldwide at the beginning of the 2000s, Thus, the average Andean country has TFP equivalent to 23% of the highest TFP worldwide,

[9] Goñi-Pacchioni, López, and Servén (2011) show that, compared to more developed and formal European economies, Latin America has a very thin tax base: direct taxation is the weakest source and the transfer system is ill-funded and poorly targeted.

[10] For example, according to own estimates, these subsidies accounted for 9% of informal earnings in Colombia in 2010.

[11] Namely, high exposure to income risk, poor accumulation of human capital, low factor productivity, exclusion from credit markets, etc.

aimed at improving workers' social protection are also gaining more and more attention in the debate.

Another distinctive feature of Andean labor markets is the long list of protections and benefits to which formal workers are entitled—at least normatively—but which paradoxically tend to hinder formal job creation. According to the World Bank's 2010 Doing Business Index,[12] Andean entrepreneurs perceive that Bolivia, Venezuela, and Ecuador are among the economies where it is most difficult to (formally) hire workers.[13]

Stricter protections, together with ever-fewer protected workers, explain why arguments over the countervailing effects of protective labor regulations (that often increase payroll wedges and inhibit formal hiring) or the distortive incentives of social protection programs (that prompt moral hazard among workers benefiting from such programs)[14] are part of the ongoing debate about informality and the effectiveness of measures taken to cope with it in Latin America.

In this sense, there is especially strong interest in the Andean countries, where labor regulations with immediate causal effects on decisions—such as whether to join the informal sector, stay unemployed, transit from one job to another, or stay small rather than grow—have been put in place during recent years or are in the pipeline of upcoming labor reforms.

For instance, flexibility in labor contracts was eliminated in Bolivia in 2006, and regulations to more strictly protect workers have been continuously strengthened on an annual basis since then (e.g., dismissals are prohibited with very few exceptions, private labor contracts regardless of length are subject to benefits mandated by the General Employment Law, etc.). Major pension reforms were also implemented in Colombia between 2006 and 2007, when the Unified Pension and Health System Law started to be enforced. The law requires contributions to the pension and health plans through a unified system that makes it impossible to contribute differently to one plan versus the other,

---

[12] This index is composed of 19 indicators grouped in five categories: difficulty of hiring, rigidity of hours, rigidity of redundancy, rigidity of employment, and redundancy costs.

[13] Bolivia is ranked 183rd, Venezuela 181st, Ecuador 160th, Peru 112th, and Colombia 63rd.

[14] On the supply side, those benefits give workers incentives to maintain low-productivity jobs (Levy 2008) because neither the graduation mechanisms from these benefit and protection programs nor the temporary nature of these incentives are clearly defined. On the demand side, there is similar behavior among firms that enroll in micro and small enterprise programs looking for big sales to institutional clients (typically the government). Such programs usually involve one-shot events rather than sustainable incorporation into the formal value chain. Besides misplacing incentives, such protections introduce significant administrative and allocative rigidities.

hence making the contributions (and consequently, formal arrangements) more expensive. At the end of 2012, a reform aimed at reducing the costs of formal hiring through the elimination of some labor taxes (*parafiscales*) was approved in Colombia. In Ecuador, a new constitution in 2008 with clear mandates on worker protection, along with invigorated labor regulation enforcement mechanisms, most likely predisposed labor markets to observe formal arrangements. Contrary to this regional wave of labor protectionism, Peru enacted a law in 2008 that amounted to deregulation of micro and small firms. Among other incentives to promote hiring, the law reduces vacations from 30 to 15 days and cuts mid- and end-year bonuses by half. To date, the law has succeed only modestly in its goal to formalize firms (understood in a fundamental way and not just looking at the increase in registration of such firms), and new codes to promote and regulate entrepreneurial activity and employment are under way.

In this context, recent studies of Latin American labor markets have focused on analysis of the determinants, evolution, and implications of increasing informal arrangements between workers and employers.[15] This book adds to that tradition with a refreshed dynamic and causal perspective that exploits novel panel data sets, recent methodological advances, and identification strategies after recent policy reforms in Andean countries. The book is aimed at contributing to the policy debate in three ways: (1) By updating knowledge about the composition of the labor force in the countries of the Andean Group, with special attention to Bolivia, Colombia, Ecuador, Peru, and Venezuela (Chapters 1 and 2 provide a detailed assessment of labor informality for the five countries for 2010); (2) By deepening the analysis of allocation and re-allocation of the labor force across labor sectors and the study of wage setting and income risk across these markets by exploiting novel panel data sets and recent developed techniques (Chapters 3 and 4 postulate some explanations on the dynamics that drove the evolution of allocations and remunerations across the different labor sectors during the last decade); and (3) By evaluating policy through measurement of the effect of recent changes in labor regulations on the size and dynamics of the (in)formal sector (Chapter 5 presents the main results of case studies evaluating the impact of recent labor reforms with debatable results on informality in Colombia and Ecuador).

---

[15] See Pagés, Pierre, and Scarpetta (2009) and Perry et al. (2007) for surveys of works related to this topic.

The ultimate aim of these contributions is to deepen knowledge of the Andean labor market and provide this technical assessment as a reference to Andean policymakers during the design of effective and sustainable labor reforms to tackle the issue of informality. The sections below distill the main messages that emerge from all the chapters.

Framing Informality

In labor markets, informality exists along several dimensions and margins on the supply side (workers) and the demand side (firms). The study of informality in this book is focused on the supply side (labor informality) based on contributions to pension plans.

Informality is an elusive concept that can be used in several contexts with various meanings. In labor markets, informality usually refers either to lack of registration, which puts firms into the underground economy (firm informality), or to the lack of social benefits, which leaves workers unprotected from risks (labor informality) either in the short run (minimum wages, severance payment, unemployment insurance, etc.) or in the long run after retirement (pensions).

Informality also exists at different layers and depths. The most superficial one is simply registration in tax records (on the firm side) or social insurance records (worker side) due to exogenous mandates. The deepest layer has to do with endogenous and sustainable participation in the redistribution of surpluses (firm side) and in consumption-smoothing mechanisms (worker side).

Overall, there are three distinguishable layers of informality. On the firm side, the most superficial is registration (firms in public records). The deepest is the use of technologies and practices that enable a business to be economically sustainable and financially sound, and that allow it to comply with regulations and distribute its surpluses as a result of its performance and not just because of exogenous enforcement of the law (see Figure 1.1). This is an important notion that policymakers should bear in mind: while enrollment in public registries is important, as it grants access to financial markets, the local and international formal value chain, etc., formalization is not just about promoting registration. Many formalization initiatives in the region have put significant efforts into only improving registration, when more registration in fact does not guarantee either the survival or success of firms or their compliance with regulations (such as payment of workers' social benefits). Likewise, several Ministries of Labor, aiming to improve coverage against risks of the labor force,

are more concerned with how to increase the enforcement of social regulations than with how to expand voluntary coverage of the provisional system through incentive-compatible mechanisms. Some attempts at expanding coverage through more novel approaches have been made in countries like Ecuador, where the Social Security Institute has a bank that offers mortgage loans under competitive terms to qualifying workers who have contributed regularly to the pension fund.

Policies aimed at formalizing labor markets should first target the formalization of firms (by improving such fundamentals as productivity and competitiveness); otherwise there is no sustainable basis for labor formalization.

A key message of this book is about the sequence of formalization. We argue that policies aimed at formalizing labor markets should first target the formalization of firms, as otherwise there is no sustainable basis for labor formalization. While micro firms absorb an important portion of the Andean labor force (about 47%), they sustain most of the entrepreneurial support (about 85%). On the other hand, while big firms absorb a significant 33% of the labor force, they only account for about 4% of Andean firms. With such a distribution of firms and workers, the policy design of formalization strategies should be mindful of the significant amount of resources that would be necessary to enforce labor regulations that are not incentive-compatible for those being regulated (for instance, the costs of monitoring micro firms that number in the millions and are unstable and often shut down, merge, or otherwise change in some way). Strategies aimed at strengthening the productivity or competitiveness of micro and small enterprises, particularly at the very micro level, are better suited to build support for a sustainable formal sector than those targeting mere registration, or likely-unstable enforced compliance through just labor regulation. That said, labor regulation is also an important ingredient for sustainable formal interactions, at least when those regulations are designed to be economically incentive-compatible mechanisms and not just legal mandates that oftentimes end up inhibiting formal hiring.

A big challenge to achieve formalization is that small entrepreneurs and the self-employed make up the dominant group of informal firms/workers, and their economic rationale blends risk taking and opportunistic behavior in the short run with the need for consumption smoothing at retirement age.

A reading of the empirical margins of informality in the region shows that, even within big firms (where firm informality is nil), labor informality is present. The general pattern observed across all countries in the region

suggests that labor informality is seen in micro firms populated by both independent entrepreneurs and independent workers; small firms absorbing mainly informal salaried workers; and medium-sized and large firms that hire most of the formal salaried workforce but also hire informal salaried and self-employed workers. This overall picture reveals not only that the highest exposure lies at the less traceable end of firm distribution—think, for example, about the millions of itinerant self-employed street vendors in many urban areas of the Andean countries—but also in a sector compounded by agents whose economic rationale blends firm and worker/consumer behavior.[16] A big challenge remains to better understand the self-employed sector, as many of the policies aimed at prompting labor formality have been focused on protecting informal salaried workers, and such policies may not have the same impact on independent small entrepreneurs.

Assessing Exposure to Labor Informality in Andean Countries

Labor informality is high: three of every four Andean workers do not contribute to a pension system.

Latin America employs 66% of its labor force under informal arrangements.[17] While this figure is certainly higher than that observed in the developed world, it lies at the middle of the distribution of informal labor arrangements in the developing world. Latin America is more informal than the developing areas of Europe and Central Asia, not much more informal than developing areas of the Middle East and North Africa, and much less informal than sub-Saharan Africa or South Asia, where more than 90% of the workforce does not contribute to a pension system (see panel A of Figure I.1). Similarly, self-employed and unpaid workers in Latin America account for about a third of the labor force, a figure that is doubled in South Asia and sub-Saharan

[16] Self-employed workers account for a significant amount of the Andean labor force: about 40% of the urban labor force of Bolivia, Peru, and Venezuela is self-employed (Figure I.2). Contrary to informal salaried workers (who may prefer the social protection that a formal status conveys), self-employed workers prefer not to participate in the contributory system. If the self-employed voluntarily opt out of the formal sector and constitute the majority group in the workforce, reforms aimed at significantly enhancing the contributory base must rethink the incentives for the self-employed to voluntarily opt in (for example, mortgages associated with the contributory fund have been used in Ecuador).

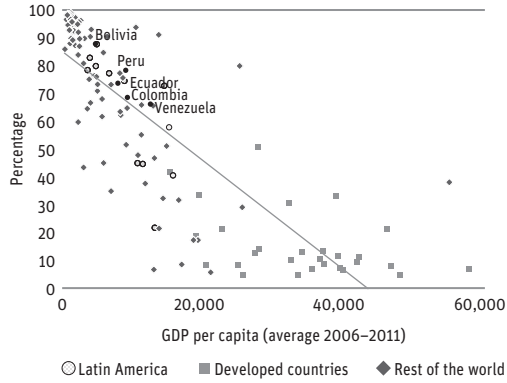
[17] Estimate based on WDI (2012) data on pension noncontributors as a percentage of the labor force.

FIGURE I.1 | **Labor Informality in the World**
(As a percentage of the labor force)

A. Average Pension Noncontributors by Region (%)

Developed Countries	15.2
Europe and Central Asia	43.3
Middle East & North Africa	64.5
Latin America & Caribbean	65.6
East Asia and Pacific	73.6
Andean Countries	***74.9***
Sub-Saharan Africa	91.5
South Asia	92.0
World	59.6

B. Average Pension Noncontributors by Region Controlling by Development Level

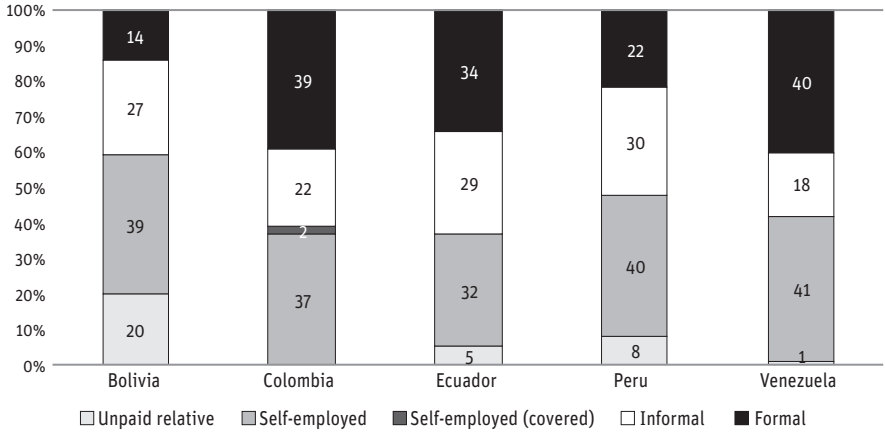


Source: WDI (2012).
Note: Based on latest available year per country as reported by the WDI. Countries are grouped in regions according the World Bank classification of developing countries.

Africa, but not that notable when compared to other emerging areas of the world (see panel B of Box Table 2.1.1). However, informality in the Andean region is surpassed only by that of sub-Saharan Africa and South Asia, with three-quarters of the labor force not contributing to a pension system. Controlling by development level (see panel B of Figure I.1), the Andean countries exhibit levels of informality higher than those expected given their level of output per capita. These figures are of concern not only because informality exposes workers to risks (at episodes of health problems, unjustified layoffs and temporary unemployment), but especially because after retirement informal workers are less likely to be able to hedge income risks and hence may impose financial and social burdens on younger generations of formal compliers.

Labor informality can be observed among both salaried and self-employed workers. These groups have observable differences during pre-retirement age. Labor informality can manifest itself in several ways and with distinct intensities according to the specific characteristics of workers. In the Andean countries, unpaid workers who are relatives, salaried informal workers, and nonsalaried (i.e., independent) informal workers are the three main types of informal workers (Figure I.2). Each type of informal employment displays distinctive features,

FIGURE I.2 | **Size of Labor Informality (Urban Areas), 2010**
(Structure of the employed labor force in percent)



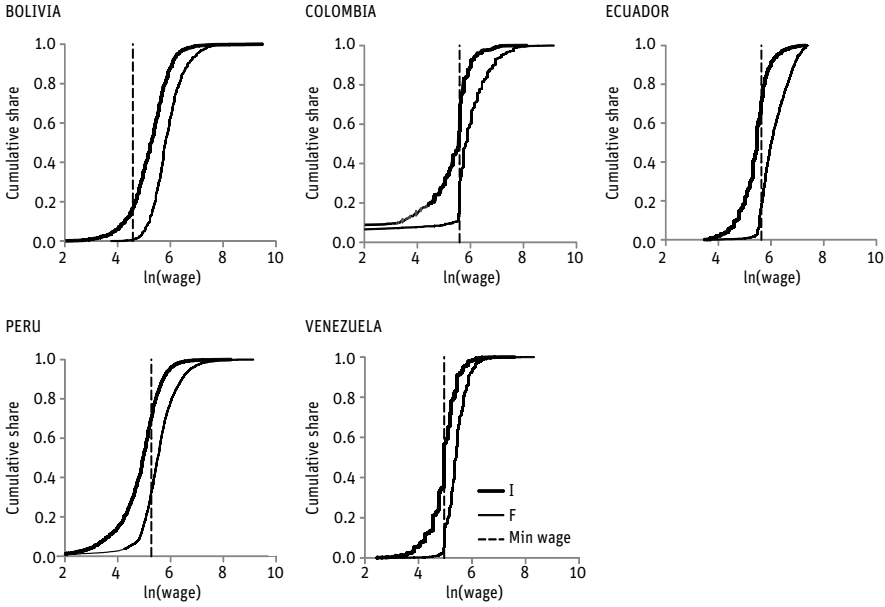
Source: National labor surveys. For details see Box 1.1.

the most salient of which is the degree of hedging or risk-pooling that workers can do through their employers (family, firms, or neither, depending on the type of labor). The intensity of labor informality in each of its manifestations varies according to the specific characteristics of the workers. For example, nonsalaried informality increases with age and salaried informality is highest among younger workers and the less educated. This book provides a full-fledged static characterization of the informal state of employment for distinct groups of workers in the Andean countries and thus identifies the populations most vulnerable to income insecurity after retirement.

Informal salaried workers not only face insecurity after retirement age (lack of pensions), they are exposed to significant pre-retirement income insecurity. At least 60% of the informal salaried workforce earns the minimum wage or less in the Andean countries.

Labor informality as conventionally defined (lack of pensions) is not the only source of concern. The characterization presented in this book also allows us to recognize that the population most vulnerable to post-retirement income risk is also the most vulnerable to pre-retirement income insecurity. The unconditional exposure of salaried informal workers to pre-retirement income insecurity—measured by the concentration of informal workers below the national minimum wage—is very high. No less than 70% of informal salaried

FIGURE I.3 | Cumulative Distribution Functions



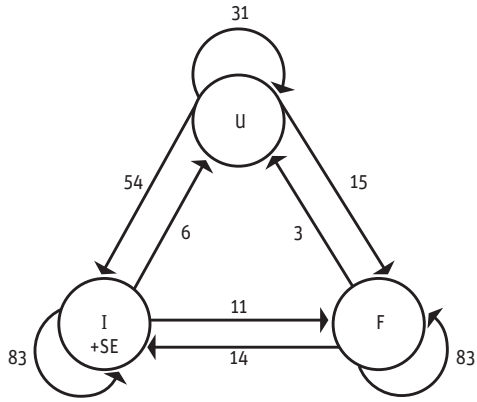
Source: National labor surveys. For details see Box 1.1
Note: The figures report the cumulative distribution function for the log wages of the principal activity of formal and informal salaried workers at the latest available section (2010). I and F denote informal and formal wages, respectively.

workers earn wages less than or equal to the legal minimum in Colombia, Ecuador, and Peru (see Figure I.3). Vulnerable workers are very unlikely to channel part of their current income away from current consumption. At this low end of the income distribution, a pension securing a minimum consumption level could actually improve the expenditure capacity that a full replacement pension would yield. In other words, for this most vulnerable population, the goal of pension reform should be not precisely to smooth consumption but to prevent poverty at post-retirement age, either through a universal minimum pension or targeted transfers to the elderly population (as exists in some Andean countries; see Chapter 1).

Labor Informality and Employment Mobility Risk

Insecurity is not just due to current low incomes or lack of post-retirement social insurance. At pre-retirement age there is also uncertainty about what lies next

FIGURE I.4 **Markov Chain of an Employment System with Three States: Regional Simple Average of Annual Transitions 2009–2010**
(Percentage of state's total outflow)



Source: Prepared by the author based on National labor surveys. For details see Box 1.1.

for workers in terms of the labor market. Formal workers can be shifted toward the informal sector or toward unemployment at nontrivial rates.

Labor informality is very dynamic and far from being an absolute absorbing state. That is, labor informality is persistently high, but informal workers are not always the same. Worker transitions—that is, entries and exits to and from different labor states—are observed in every country across the region and at nontrivial rates. Figure I.4 provides a graphic representation of the dynamics governing transitions in the Andean labor markets. It shows that Andean workers stayed in their employment sectors with a probability of 83% during 2009 and 2010. Considering that just 20% of the employed labor force in the region is formal, such high levels of persistence are not necessarily good news. For example, 31% of those who were unemployed in 2009 remained unemployed in 2010. More interestingly, intense inflows and outflows suggest more transient rather than absorbing states. Outs from unemployment (job finding rates) are almost four times more intense in the informal than in the formal sector, whereas job separations are twice as intense: unemployed workers find jobs in the (in) formal sector with a probability of (54%) 15%, while employed (in)formal workers lose their jobs with a probability of (6%) 3%. It becomes apparent that separations from the formal sector are not exclusively directed toward unemployment. In fact, there are more formal workers going to informality

than to unemployment, and it is also the case that the ins to formality from informality are less intense than the reciprocal outflows. Thus, on average, the informal sector is not only the largest sector across the Andean labor markets but dynamic forces reshuffling workers across states of employment are also fueling that informality.

Worker dynamics across employment states is not exclusive to the region. Indeed, mobility is a natural feature of labor markets. The problem in emerging countries is that the informal state is a common destination for job movers.

Comparable patterns of mobility are observed across different regions in the world, including significant transitions across labor states, active informal job finding, and job separation (Table I.1). In fact, worker mobility across employment states is a natural feature of labor markets either because it reflects the degree of economic activity at different phases of the cycle or because it reflects adaptive learning and re-optimization of firms and workers who re-match after updating their respective priors. Thus, a call on how good or bad high mobility is depends on the context. Voluntary job-to-job transitions prompted by re-matching opportunities after firms and workers have learned about their true needs and characteristics are healthy and allow efficiency gains. On the other hand, unexpected or undesired job-to-job replacements usually affect pre-retirement incomes and, more importantly, endanger post-retirement pensions: workers continuously switching on and off from the formal sector may not be able to accumulate the minimum number or amount of contributions that would entitle them to a pension. In the same way, voluntary temporary transitions toward unemployment can help workers look for better matches or gain skills and qualify for better jobs. However, involuntary long spells in unemployment can depreciate the human capital of workers and force them to look for jobs that may be socially suboptimal in the long run. Thus, risks due to intense transitions across labor states not only affect pre- and post-retirement income distribution, they also affect the worker's pre- and post-retirement welfare as well as the welfare of society in general. It is in this sense that we claim that transitions across employment states reflect *employment mobility risks*. That's why a better understanding of worker dynamics is worthwhile.

Compared to other regions of the world, employment mobility risk in the Andes is higher: there is a shorter duration of formal employment, more active informal job finding rates, and more active transitions from formal to informal employment (Table I.1).

TABLE I.1 | Annual Labor Transitions around the World

	Bolivia	Colombia	Ecuador	Peru	Venezuela	Chile[1]	Argentina[2]	Mexico[3]	Albania[4]	Georgia[4]	Hungary[4]	Poland[4]	Russia[4]	Ukraine[4]	Korea[5]	US[6]	UK[7]	EU[8]
Persistence in each state (measured as the elements of the main diagonal of Pij)																		
Out of Labor Force	0.89	0.75	0.85	0.62	0.78	0.62	0.75	0.75	0.75	0.78	0.84	0.90	0.76	0.76	0.75	0.68	0.79	0.87
Unemployed	0.27	0.25	0.16	0.19	0.23	0.29	0.21	0.22	0.29	0.51	0.39	0.67	0.34	0.33	0.11		0.45	0.39
Self-employed	0.73	0.58	0.67	0.74	0.70	0.37	0.61	0.65	0.69	0.52	0.63	0.86	0.18	0.50	0.82	0.70	0.91	0.94
Informal Salaried	0.60	0.39	0.50	0.55	0.41	0.82	0.53	0.59	0.48	0.46	0.40	0.49	0.43	0.47	0.83	0.93	0.92	
Formal Salaried	0.81	0.75	0.85	0.79	0.77		0.87	0.84	0.83	0.89	0.86	0.90	0.82	0.86				
Outflows from unemployment toward different states (measured as a percentage of the initial unemployment)																		
Out of Labor Force	0.35	0.24	0.32	0.31	0.26	0.26	0.28	0.30	0.34	0.24	0.23	0.14	0.19	0.25	0.36	0.68	0.17	0.25
Unemployed	0.27	0.25	0.16	0.19	0.23	0.29	0.21	0.22	0.29	0.51	0.39	0.67	0.34	0.33	0.11		0.45	0.39
Self-employed	0.16	0.15	0.14	0.16	0.23	0.04	0.11	0.09	0.15	0.12	0.04	0.03	0.03	0.03	0.06	0.04	0.04	0.36
Informal Salaried	0.18	0.19	0.28	0.25	0.14	0.34	0.25	0.22	0.16	0.06	0.11	0.10	0.23	0.13	0.48	0.28	0.34	
Formal Salaried	0.04	0.16	0.10	0.08	0.15		0.14	0.17	0.06	0.07	0.23	0.06	0.21	0.26				
Inflows to unemployment from different states (measured as a percentage of each initial labor sector)																		
Out of Labor Force	0.02	0.08	0.03	0.10	0.05	0.18	0.07	0.29	0.05	0.07	0.06	0.06	0.06	0.10	0.03	0.68	0.07	0.04
Unemployed	0.27	0.25	0.16	0.19	0.23	0.29	0.21	0.22	0.29	0.51	0.39	0.67	0.34	0.33	0.11		0.45	0.39
Self-employed	0.02	0.06	0.02	0.03	0.04	0.13	0.03	0.02	0.02	0.03	0.05	0.06	0.08	0.11	0.01	0.05	0.02	0.02
Informal Salaried	0.05	0.10	0.05	0.05	0.06	0.06	0.05	0.04	0.05	0.04	0.14	0.16	0.09	0.08	0.02	0.04	0.03	
Formal Salaried	0.02	0.07	0.01	0.03	0.03		0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.04				

(continued on next page)

TABLE I.1 | Annual Labor Transitions around the World (*continued*)

	Bolivia	Colombia	Ecuador	Peru	Venezuela	Chile[1]	Argentina[2]	Mexico[3]	Albania[4]	Georgia[4]	Hungary[4]	Poland[4]	Russia[4]	Ukraine[4]	Korea[5]	US[6]	UK[7]	EU[8]
Outflows from formal salaried toward different states (measured as a percentage of the initial formal salaried)																		
Out of Labor Force	0.03	0.06	0.03	0.03	0.05	0.04	0.03	0.04	0.05	0.03	0.06	0.03	0.02	0.06	0.11	0.04	0.04	0.04
Unemployed	0.02	0.07	0.01	0.03	0.03	0.06	0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.04	0.02		0.03	0.02
Self-employed	0.03	0.04	0.04	0.07	0.07	0.02	0.02	0.02	0.04	0.04	0.01	0.00	0.02	0.01	0.05	0.03	0.01	0.94
Informal Salaried	0.11	0.09	0.07	0.08	0.07	0.82	0.06	0.08	0.06	0.03	0.03	0.02	0.10	0.03	0.83	0.93	0.92	
Formal Salaried	0.81	0.75	0.85	0.79	0.77		0.87	0.84	0.83	0.89	0.86	0.90	0.82	0.86				
Inflows to formal salaried from different states (measured as a percentage of each initial labor sector)																		
Out of Labor Force	0.00	0.03	0.02	0.02	0.04	0.13	0.03	0.04	0.02	0.02	0.06	0.01	0.07	0.09	0.18	0.28	0.13	0.09
Unemployed	0.04	0.16	0.10	0.08	0.15	0.34	0.14	0.17	0.06	0.07	0.23	0.06	0.21	0.26	0.48		0.34	0.36
Self-employed	0.01	0.07	0.05	0.03	0.07	0.16	0.05	0.04	0.04	0.07	0.13	0.03	0.46	0.12	0.09	0.25	0.04	0.94
Informal Salaried	0.07	0.18	0.16	0.12	0.19	0.82	0.17	0.12	0.14	0.26	0.23	0.25	0.31	0.32	0.83	0.93	0.92	
Formal Salaried	0.81	0.75	0.85	0.79	0.77		0.87	0.84	0.83	0.89	0.86	0.90	0.82	0.86				
GDP growth[9]	4.1	4.0	3.6	8.8	−1.5	5.6	8.5	5.5	5.9	2.9	3.1	1.4	7.3	12.1	5.1	1.8	1.8	0.9

Sources:
[1] Cea et al. (2009) for 2004–2005.
[2] Tornarolli and Conconi (2007) for 2005–2006. Informal self-employed considered as self-employed.
[3] Arceo (2011); weighted average of men and woman transitions for 2008–2010.
[4] Duryea et al. (2006). One-year transitions for Albania (2002–2004), Georgia (1998–1999), Hungary (1993–1997), Poland (2000–2002), Russia (1994–2003), and Ukraine (2003–2004).
[5] Cheon (2012) for 2005–2007.
[6] Fairlie (2005). Cumulative two year-by- two year transitions for 1994–2002.
[7] Meager and Carta (2011) for 2009–2011.
[8] Kaiser (2006). Cumulative year-by-year transitions for 1994–2002.
[9] The average annual growth rate corresponds to the period for which the transition is reported at each country.

Note: For those cases in which the sources do not distinguish the five categories, we report the transitions that correspond to salaried employment rather than to informal salaried and formal salaried employment (in Chile and the United States); to employment rather than self-employment and salaried employment (in the European Union); and to nonemployment rather than out of the labor force and unemployment (in the United States).

The intensity of worker transitions is related to the business cycle: job finding and job-to-job transitions are usually procyclical, and job separations are anticyclical. Thus, fluctuations in labor market flows can be anticipated if fluctuations of the economy are expected.

Regardless of whether the informal sector is good or bad, the sector certainly absorbs workers intermittently and with stronger intensity during troughs (Table I.2). While this intermittency may or may not undermine human capital accumulation (specialization, experience, on-the-job training), it most likely prevents financial capital accumulation at levels (and frequencies) that would allow workers to earn pensions after retirement. Thus, labor market reforms aimed at enlarging the contributory base should bear in mind the likelihood of eventual separations when promoting formalization of the worker supply. That is, efforts should not be placed on prompting just formality but rather *persistent* or *permanent* formality, which goes beyond mere enrollment.

Labor Informality and Income Risk

Dynamic labor informality not only translates into employment mobility risk but also into income risk. That is, mobility of workers generates uncertainty about post-retirement protection (pensions) as well as pre-retirement incomes.

By uncertainty about pre-retirement incomes we are not referring to (static) income insecurity due to low current labor remuneration as analyzed previously. Instead, we mean exposure to higher unexpected volatility of future incomes for workers who are more transient (especially toward informality). In other words, income risk arises because shocks that relocate workers and firms from one state of employment to another can come at any time, and the uncertainty prompted by those unexpected transitions translates into unexpected changes in incomes.

The degree of exposure to economic shocks is directly correlated to mobility: in the formal sector, productivity shocks affect the wages of entrant workers but not those of incumbents.

This book explores the role of labor mobility in wage setting in the formal sector by computing the pass-through of aggregate productivity shocks to wages and earnings for distinct workers grouped according to mobility and formality. While the relation between productivity and wages is weaker for incumbent formal workers who do not transit across employment states (as suggested before, the insurance provided through contracts within firms seems to operate

TABLE I.2 Volatility of Employment Flows and Correlation between Flows and Economic Cycle

	Correlation with the economic cycle				Standard deviation of flows			
	Colombia (1)	Ecuador (2)	Peru (3)	Venezuela (4)	Colombia (5)	Ecuador (6)	Peru (7)	Venezuela (8)
A. Job finding								
U to SE	0.654	0.844	0.052	0.598	0.042	0.010	0.018	0.007
U to I	0.558	–0.648	0.192	0.706	0.051	0.016	0.030	0.007
U to F	0.683	0.699	–0.032	0.770	0.067	0.005	0.012	0.009
B. Job separation								
SE to U	–0.331	–0.597	–0.100	–0.791	0.020	0.001	0.006	0.003
I to U	–0.399	–0.454	–0.415	–0.906	0.004	0.005	0.008	0.007
F to U	–0.215	–0.490	–0.220	–0.426	0.015	0.002	0.013	0.002
C. Employment to employment								
I to F	0.592	0.304	0.348	0.864	0.064	0.003	0.014	0.023
F to I	0.479	0.698	0.126	0.651	0.018	0.003	0.019	0.016
SE to F	0.660	0.398	0.150	0.597	0.031	0.002	0.003	0.004
F to SE	0.458	–0.249	0.435	0.021	0.029	0.003	0.012	0.005

Source: National labor surveys. For details see Box 1.1
Note: All discrete transitions have been first smoothed with moving averages (two or four periods for semi-annual and quarterly series; annual series are not smoothed) and then de-trended using the Hodrick and Prescott (HP) filter with adjustment parameters equal to 100, 400, and 1600 for yearly, semiannual, and quarterly data. Correlations with the economic cycle correspond to the HP-filtered real GDP per capita (indexed to the earliest year in the labor series of each country), except for Ecuador, where it corresponds to the index of economic activity (*Indice de nivel de actividad registrada*). U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

well among formal workers who remain formal), we find that the competitive model prescriptions correlating wages to productivity hold for entrant workers into the formal sector (either entering from unemployment or moving from the informal sector). The highest significant short-run wage productivity elasticities are those observed for new hires in Peru (0.5) and for sector movers in Ecuador (0.24) and Venezuela (0.9). Sector stayers, in contrast, display either low or nonsignificant results

Income shocks do not fade away after impact—they can persist for quite some time. They last longer for more vulnerable groups of workers (including those with less education, less experience, informal jobs, etc.) and also for workers moving across employment sectors.

This book shows that (1) most of the variation in unexpected income shocks seems attributable to transitory shocks (they are five to 10 times stronger than those coming from permanent shocks); (2) formal employees have a lower transitory component than workers in any other state of employment (the self-employed bear income shocks whose transitory component is about four times that observed among formal workers and about twice that of informal salaried workers); and (3) the permanent component of the income shock volatility for formal salaried workers is far lower than that observed among informal salaried or self-employed workers. We also find that the variance of the permanent component of the income shocks of workers staying in the same employment state is lower than that of those moving across states. Hence, evidence suggests that the more transient or informal workers are, the higher the permanent income risk they will face.

Impact of Institutional Adjustments, Labor Reforms, and Social Programs on Labor Formality

Labor outcomes (employment status and incomes) are not just subject to strictly exogenous shocks. Governments have taken some actions to mitigate pre-retirement exposure (improving employability, employment, and wages) and post-retirement exposure (reform to pension systems). Some of these interventions have been ineffective or even counterproductive in terms of formality.

Minimum wage increments only help reduce inequality among formal workers; worse, they can induce worker flows toward informality.

This book measures the impact of minimum wage adjustments on inequality and worker displacements. Minimum wages appear to be influential only at the very low end of the income distribution of formal workers. While there seems to be some "lighthouse effect" of the minimum wage to conform formal wages, its real impact on inequality is found in the three first deciles of formal workers (among whom the minimum wage is binding) in Colombia and Ecuador. There seems to be no effect of minimum wage adjustments on inequality in Peru or Venezuela. In fact, we found that in cities that have more workers with earnings close to the minimum wage, formal workers tend to be displaced more to the informal sector and the duration of informality increases following increases in the minimum wage. In Ecuador, the more exposed cities experience informalization of their labor force. In Ecuador,

Peru, and Venezuela, more exposed cities increase the probability of keeping workers in the informal sector. In Venezuela, flows from the informal to the formal sector in exposed cities decline dramatically. Given that in some cases the institutional arrangements to adjust the minimum wage do not exclusively follow indexation to the evolution of fundamental factors (such as productivity gains), policymakers should bear in mind the pervasive effects that discretionary minimum wage increases would have on labor outcomes, especially considering the lack of impact of such adjustments on inequality reduction among the most exposed group of workers.

Unification of the contributory mechanism for health and pension coverage may exert positive results, but not for the most exposed sector (micro firms).
A study on the impact of the unification of payments for health and pension systems in Colombia found that it significantly increased full formality and the overall coverage of the pension system by about 0.97 and 1.18 percentage points, respectively. Full informality increased and health insurance coverage decreased by one percentage point among independent workers. The effects are different by firm size, with the largest firms being unaffected. Small-to-medium-sized firms increased full formality and micro firms increased full informality.

Conditional cash transfer programs can have a negative impact on labor outcomes.
A study on the impact of Ecuador's *Bono de Desarrollo Humano* (BDH) conditional cash transfer program found that (1) beneficiaries experienced a longer duration of unemployment than the comparable group of workers that do not receive those benefits (BDH decreases the hazard of leaving unemployment by about 70%); and (2) the program did not have distortive effects on the probability of finding an informal job or on the probability of separation from formal employment.

References

Arceo, E. 2011. "Estudio cuantitativo sobre desempleo en México y sus implicaciones para la participación laboral femenina." Working Paper No. 2. Mexico DF, Mexico: Instituto Nacional de las Mujeres.

Cea, S., Contreras, M., Martínez, C. and Puentes, E. 2009. "Trabajadores por Cuenta Propia: ¿Quiénes Son? ¿De Dónde Vienen? ¿Para Dónde Van?" Working Paper No. 308. Santiago de Chile, Chile: Facultad Economía y Negocios, Universidad de Chile.

Cheon, B. 2012. "Labour Market Transitions in Korea Compared with those of EU." Hanshin University. Mimeographed document.

Duryea, S., Marquéz, G., Pagés, C., Scarpetta, S. and Reinhart, C. 2006. "For Better or for Worse? Job and Earnings Mobility in Nine Middle- and Low Income Countries." *Brookings Trade Forum, Global Labor Markets?* 187–209.

Fairlie, R. 2005. "Self-employment, entrepreneurship, and the NLSY79." Monthly Labor Review of Bureau of Labor Statistics.

Goñi Pacchioni, E. and Maloney, W. 2012. "Why Don't Poor Countries do R&D." World Bank, Washington, DC, United States. Mimeographed document.

Goñi Pacchioni, E., López, H. and Servén, L. 2011. "Fiscal Redistribution and Income Inequality in Latin America." *World Development.* 39(9): 1558–569.

IDB (Inter-American Development Bank). 2010. *The Age of Productivity. Transforming Economies from the Bottom Up.* Washington, DC, United States: Palgrave MacMillan.

Kaiser, L. 2006. "Female Labor Market Transitions in Europe." Discussion Paper No. 2115. Bonn, Germany: The Institute for the Study of Labor (IZA).

Meager, N. and Carta, E. 2011. "Skills for self-employment." Evidence Report No. 39. London, United Kingdom: UK Commission for Employment and Skills, Institute for Employment Studies.

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

Pagés, C., Pierre, G. and Scarpetta, S. 2009. *Job Creation in Latin America and the Caribbean. Recent Trend and Policy Challenges.* Washington, DC, United States: Palgrave MacMillan and the World Bank.

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

Schneider, F. 2005. "Shadow Economies around the World: What Do We Really Know?" *European Journal of Political Economy.* 21(3): 598–642.

Tornarolli, L. and Conconi, A. 2007. "Informalidad y Movilidad Laboral: Un Análisis Empírico para Argentina." Working Paper No. 59. La Plata, Argentina: Centro de Estudios Distributivos, Laborales y Sociales.

World Development Indicators (WDI). 2012. Obtained from http://data.worldbank.org/data-catalog/world-development-indicators

PART I

What, Where, and When? Labor Informality in the Andean Countries

Since the term "informality" was originally introduced in the economic literature, several definitions and taxonomies have been proposed to classify it according to its different facets—such as tax compliance, worker safety, environmental compliance, social security benefits, and public registries—and at its different margins. This in part corresponds to the fact that informality, by any definition, is not always directly observable or traceable, and hence it is not precisely measurable. This makes it difficult to draw firm lines between formality and informality, as one characteristic that may be a qualifier for formality in one dimension may not necessarily be a disqualifier for informality in another, and, unfortunately, we cannot objectively measure either of them. For instance, part of the labor force hired by registered formal firms could be informal. Thus, at the margin of registry, the distribution of firms would not only be truncated (as unregistered firms are not "observable") but also misleading, because in the demand dimension such firms would augment formality, whereas in the supply dimension only one portion of their hiring would qualify for formal status, while another would dampen the "observable" chunk of formal workers.

Likewise, some partially protected workers might have only temporary contracts; others with full protection and more stable contracts might have effective limited access to the social security public services network; and some small registered firms could be working at subsistence levels and under hazardous conditions. In any of those cases, informality encompasses more than a single aspect and, despite its indirect measurability, characterizing it presents a challenge.

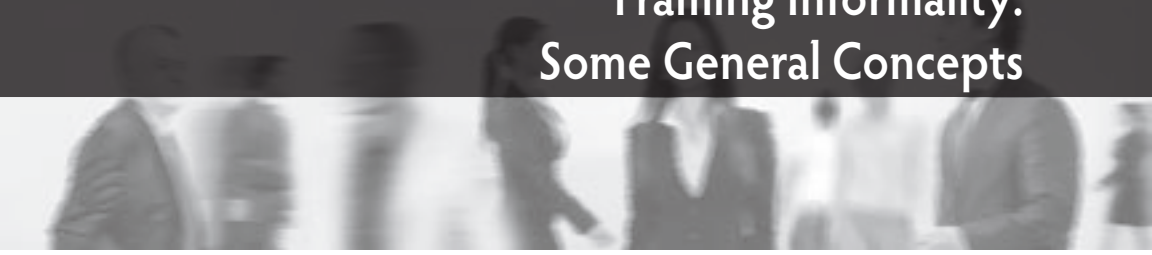
This study builds on the definitions that appear most suitable to the structures and inputs observed in the Andean countries during the first decade of 2000s. Hence it starts with a brief survey of the dimensions and margins used to define and classify informality. Only then does it proceed toward an attempt to describe informality in the Andean countries.

Chapter 1 frames the concept of informality used in the discussion throughout the book, drawing on well-established seminal contributions. It suggests a potentially apposite taxonomy, given the characteristics observed in the Andean markets. The chapter also provides a brief review of the strands studying informality in labor markets and a survey of the regulatory framework influencing relevant labor market institutions in the Andean countries.

Chapter 2 characterizes the Andean informal sector as seen at the end of the first decade of the 2000s. Focusing on labor informality, it first reports the size of the formal, informal, and self-employed sectors for several subgroups of workers using distinct definitions of labor informality. The chapter also focuses on the distributional analysis of wages and salaries among labor sectors. Exploiting cross-sectional variation, special attention is given to the effects of minimum wages on the income distribution of formal and informal workers.

1

Framing Informality: Some General Concepts



Studies of the phenomenon of informality have referred to several dimensions in which the term *informal* can be observed. From seminal references[1] to most recent[2] efforts to conceptualize and characterize the problem, it is clear that the spectrum of areas using the term *informality* is wide and hence the term itself is equivocal. Harding and Jenkins (1989, 150) contend that "the literature of the informal sector is characterized by terminological confusion."[3] Perry et al. (2007, 21), when referring to informality, indicate that "the multiplicity of adjectives from very distinct fields of study suggests that we may have a classic blind men and the elephant problem—everybody touches a part of the animal, but understands only the part that they touch." Kanbur (2009, 33) claims that "informality is a term that has the dubious distinction of combining maximum policy importance and political salience with minimal conceptual clarity and coherence in the analytical literature."

Within labor markets, informality can indeed be observed in several dimensions. For instance, in the dimension of labor demand, informality can refer to the activity of those firms operating under the radar of the government

[1] Hart (1973), who coined the term in the development economics literature, used informality to denote economic activity outside the reach of state regulation, either because regulations did not apply or because they were not enforced.

[2] See Flodman (2004), Charmes (2006), Chen (2006), and Kanbur (2009, 2011).

[3] Jüttin, Parlevliet, and Xenogiani (2008, 13) also conclude that "there is no single internationally accepted and operational definition or indicator of informal employment, and in practice a variety of definitions and indicators is used."

(that is, operating without any official permit or without signing on to any fiscal, sanitary, operational, or other type of public record). In the dimension of labor supply, informality can refer to the portion of the labor force working without any contract or social benefits, or earning wages below the legal minimum wage. Together, these two dimensions encompass what is commonly associated with informal status in labor markets: either lack of registration or lack of protection (or both).

Maloney (2006) sketches three margins along which individuals and firms make calculations about or face constraints to becoming formal. Within the demand dimension, the decision of becoming (in)formal can be taken at two distinct margins: the "intra-firm margin," where firms are partly formal and partly not, and the "firm inter-sectoral margin," where firms are fully formal or fully informal. Within the supply dimension, the decision is taken at the "worker inter-sectoral margin," at which a worker decides whether to become formal salaried, informal salaried, or informal self-employed.

Within the same dimension, informality can be defined by several qualifiers of different depth. Within the labor demand dimension, one of the most common qualifiers is registration: a firm is informal if it is not registered in any public record.[4] Such a qualifier is easiest to achieve but at the same time the easiest to overcome. A second dimension, a less superficial qualifier to define informality, is related to compliance with tax, operational, or social regulations. A third and even deeper dimension, and one that most likely conveys sustainability and private and social profitability, is related to the standards and quality of the productive process of the firm. A firm is informal if it uses inefficient, hazardous, and artisanal production technologies, or if it is small and disarticulated from the value chain. In every case, it is the firm that decides to become informal, as it is the firm, independent of the labor force, that decides whether to register or comply with regulations, or whether to use a certain technology. On the other hand, within the labor supply dimension

[4] This is probably the most practical qualifier to define the formality of firms, but it is also the flimsiest. Formality is not conveyed by the mere act of registration. True, registration makes firms visible to the government, but it does not necessarily imply sound fundamentals that will allow firms to comply with tax, operational, social, and other regulations. Nor does registration guarantee profitability or sustainability. Even if registration costs are related to the level of income or assets, and hence could be thought of as promoting sustainability, registration does not guarantee that sustainability, especially for young and small firms, which have low survival rates in Latin America (Pagés, Pierre, and Scarpetta, 2009). Without surpluses generated by the firm to distribute between its owners and its workers, labor formality cannot happen, at least not endogenously or sustainably. Thus one should be careful when reading improvement in registration figures that do not correspond to improvements in other qualifiers of formality.

(*labor informality*), informality can be recognized by contractual qualifiers: workers are informal if they do not have a written arrangement regulating the employment relationship.[5] Informality can also be recognized through social benefits qualifiers: workers are informal if they do not contribute to a retirement pension (or health) plan by virtue of their work. Further, informality can be camouflaged under formal short-term contracts that do not provide social coverage and are constantly renewed, conferring firms the same services from the unprotected labor force but not the same obligations to it.[6] In contrast to *firm informality* in the inter-sectoral margin, *labor informality* can be the outcome of coordinated agreements between the involved agents (firms at the intra-firm margin and workers) who choose their optimal levels of compliance based on a comparison between the costs and benefits that such compliance implies. This room for agents to rationally and voluntary decide on their degree of engagement with formal (legal) institutions is what has recently driven the research of many authors who conceive informal status as an outcome of voluntary exit rather than unwanted and inexorable exclusion.

It also happens that within and between dimensions, qualifiers can overlap: unregistered firms are usually low-tech, while workers without contracts do not enjoy social benefits. Likewise, low-tech, unregistered firms usually hire labor without contracts and without social benefits.[7] Furthermore, margins can overlap at distinct strata of formality. For instance, part of the labor force hired by registered formal firms could be informal. Thus, if looking at the registration qualifier at the inter-sectoral margin in the demand dimension, such firms would augment *firm formality,* whereas if looking at the social-benefit qualifier in the intersectoral margin of the supply dimension (or at the compliance qualifier in the intra-firm margin of the demand dimension), only a portion of the firm's hires would qualify for formal status, while others would be categorized as *labor informality*.

Figure 1.1 proposes a schematic way to understand the dimensions and the qualifiers that define informality in labor markets. As discussed earlier, there

---

[5] Similarly, temporary written contracts that do not require employers to render a fully-fledged bundle of social benefits can also define a margin of informality, as long as successive temporal contracts substitute for a regular formal appointment (Meléndez and Pagés 2011; Steiner and Parra 2011).

[6] Flodman (2004) also mentions that another qualification of informality is the location of the actors. Under this criterion, home-based workers, street traders, itinerant (or seasonal) workers, as well as workers in between the streets and home (e.g., garbage collectors) are considered informal.

[7] It also happens that there are characteristics regularly associated with these qualifiers. For instance, in the demand dimension, firm size is highly correlated with formality; in the supply dimension, the workforce's educational attainment is also highly correlated with formality. Chapter 3 explores this in detail.

are different reasons for informality across firms and among workers. While firms mainly aim to maximize profits and decide on whether to engage in the formal value chain, invest in modern technologies, or comply with regulations at a first unilateral stage,[8] at a second bilateral stage workers may or may not have the same room to optimize and voluntarily decide their status in terms of salaried formality. Thus it is necessary to look not only at qualifiers of social insurance, but also at economic inclusion qualifiers, where workers may (or may not) bargain for salaries above the minimum wage, or to work hours below or above the legal number of hours permitted.

Such a dichotomy is also reflected in the structure that Andean governments usually have to promote and regulate labor supply and labor demand. On the one hand, production ministries promote development of firms of any scale through programs and regulations aimed at improving productivity, competition, access to markets, and access to the formal value chain. On the other, labor ministries are more concerned about enforcing worker protection regulations and improving the quality of the labor force through training and labor insertion programs. This structure also explains why the strongest engine of formalization is on the demand side, as without endogenously driven *firm formality* it is difficult to exogenously enforce sustainable *labor formality*. Unfortunately, policy design aimed at formalizing labor markets in the region is usually bipolar (most likely focused on labor formality), and poor coordination between ministries in charge is common throughout the region.

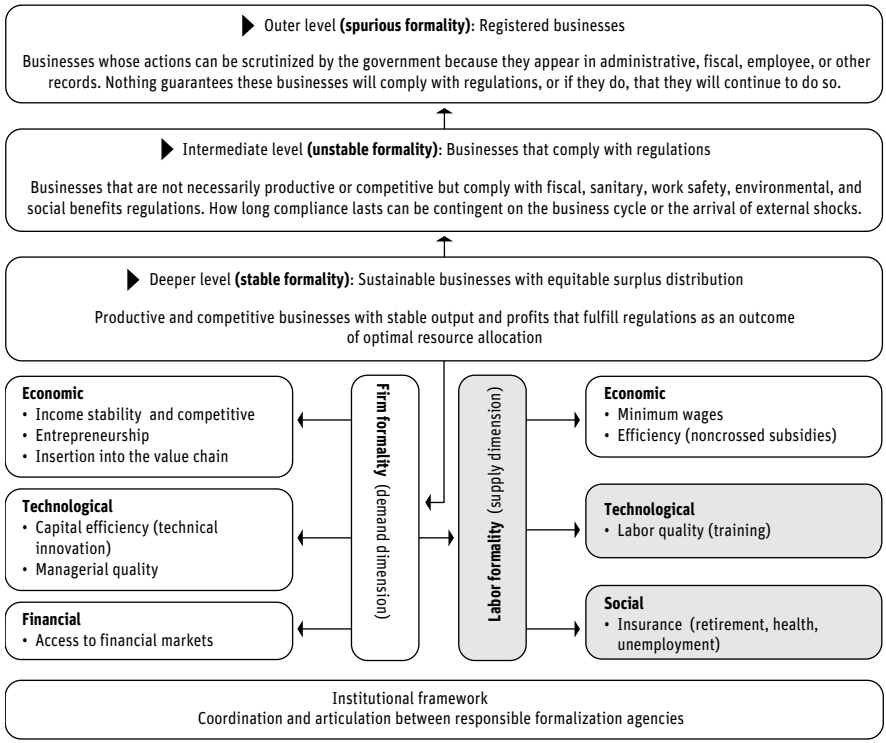
As explained earlier, Figure 1.1 also suggests that at each dimension different features may qualify a firm or a worker to be considered informal. These qualifiers (economic, technological, financial, or social) may manifest themselves continuously or discretely and hence the threshold to define formal status is not easy to determine.[9] Making matters worse, given that informal activity usually takes place in the underground economy, its measurement relies on indirect approximations. These last two aspects in part determine the empirical

---

[8] Perry et al. (2007) suggest that opportunistic evasion is the primary way that firms opt out of the formal system in the face of the failure of the state to provide public services of sufficient quality to justify tax and social compliance, and to enforce its regulations.

[9] Informality in labor demand can arise due to economic conditions that prevent firms from being sustainable ventures. For instance, low investments in quality factors, small unskilled crews, or low (and usually unstable) income levels are common among informal firms. Yet, because these features are common, determining what threshold defines the border between formality and informality would be discretional, Flodman (2004) maintains that the notion of informality is commonly related to (1) low entry requirements of capital and professional qualifications, (2) small scale, (3) skills of the labor factor obtained through means other than education, and (4) labor-intensive methods of production.

FIGURE 1.1 | Dimensions and Levels of Formality in Labor Markets



Source: Prepared by the author.

approach followed in this book: we rely on household surveys spanning samples that are representative of the entire population of certain regions of Andean countries and hence capture information on informal workers that is missing in administrative records. We constrain our analysis to the supply dimension and to a definition based on a categorical (discrete) qualifier of informality: whether workers receive social protection due to their employment and how that relates to retirement pensions.

Indeed, this book devotes most of its attention to *labor informality* based on the *social benefits qualification*. Special attention is given to this qualifier in part because current debate in the region is significantly centered on policies to reduce the rising numbers of workers exposed to social risks,[10] and in part

[10] Through policies aimed at enhancing the base of contributors to pension systems among salaried and especially independent workers, reducing the costs for firms to hire formally, etc.

because of the opportunity conferred by rich novel panel datasets that are collected through household rather than firm surveys.

What do these margins look like in the Andean region? Following the definitions of employment sectors based on social protection (formal salaried, informal salaried, and informal nonsalaried or self-employed),[11] Figure 1.2 reports the margins of informality in the Andean labor markets. The figure combines information about firm size and worker social insurance, the most conventional ways to define informality in labor markets. The intersectoral margin is read across the spectrum of size: for instance, firms with less than five workers choose to be informal, while firms with more than 100 choose to be formal.[12] Taking each column as the representative (average) firm of each respective size, the intra-firm margin is approximated by the composition of each column: for instance, firms with 11 to 20 workers seem to be half formal and half informal. The figure reports that a vast incidence of nonsalaried informality (that is, the share of independent workers) is found in firms with less than 10 workers (93% or more of independent workers in the region work in firms with 10 workers or less). Analogously, between 70% and 85% of informal salaried workers in the region are found in the same group of firms.[13] Looking at just public sector workers (Panel B),[14] one observes a dramatic change in the intra-firm margin for the biggest firms. Not surprisingly, most public workers work at big institutions,[15] and most, but not all,[16] receive social benefits. Paradoxically, decisions at the intra-firm margin are also observed in public institutions.

Table 1.1 reports the size of the labor force and the inferred number of firms at each firm size category. While this method may have considerable measurement error bias, it is a useful way to approximate the number of firms according to size (especially if one would like to take into consideration to the

---

[11] Gasparini and Tornarolli (2007) estimate that in Latin America only 6% of the self-employed are formal (enrolled in social security).

[12] It is still possible to find firms partly formal and partly informal but, as it is inferred from the figures, most of the smallest and biggest firms are informal and formal, respectively.

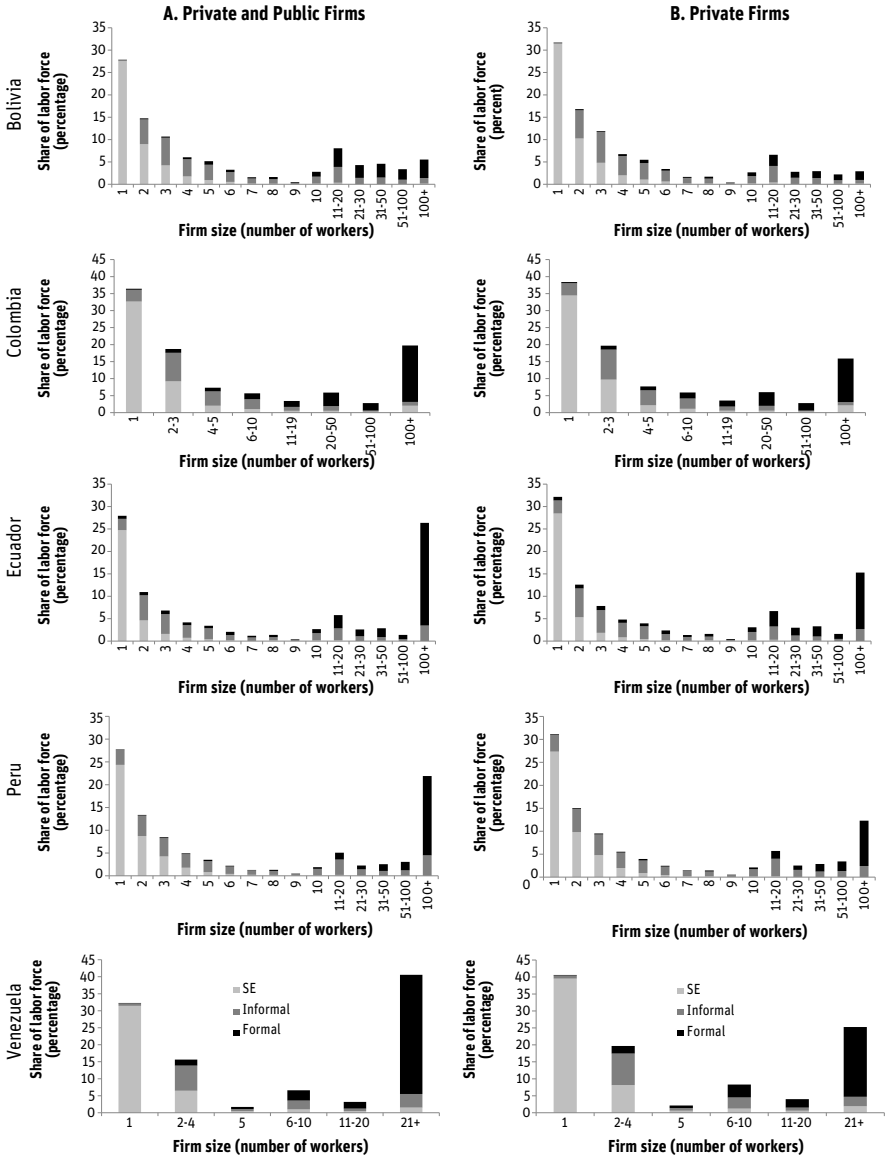
[13] In the case of Peru, the share of informal salaried workers in firms in the range 11–100 workers is larger than in the rest of the region, adding 20 percentage points to the 65% observed in micro firms (firms with 10 or less workers).

[14] This is done just in this chapter of the book. For other chapters we separate out based on social protection but not type of work.

[15] The case of Bolivia is particular, as the number of employees working in big firms is modest and even public employees report to work at small or medium-sized institutions. In contrast, Ecuador, Peru, and Venezuela, have a significant number of formal public workers at large agencies. The size of the public sector in Colombia seems to be smaller compared to its regional peers

[16] In some countries, the number of informal workers increases by as much as 12% when public workers are taken into account.

FIGURE 1.2 | **Margins of Informality in Andean Labor Markets (Urban Areas), 2010**



Source: National labor surveys. For details see Box 1.1

Note: SE denotes self-employment; Formal denotes formal salaried employment; Informal denotes informal salaried employment. Informality is defined as the lack of social contributions for pension insurance in the principal activity of the worker. Firm size reflects the total number of workers at the firm. To achieve national representativeness, the figures reported for Colombia are based on household survey rather than FEDESARROLLO's longitudinal survey. The question about firm size in Venezuelan surveys only allows for reporting discrete ranges (which correspond to the categories reported in this figure).

TABLE 1.1 | Number of Workers and Firms in the Andean Region (Urban Areas), 2010

	Bolivia			Ecuador			Peru		
Firm size	Workers	Workers*	Firms*	Workers	Workers*	Firms*	Workers	Workers*	Firms*
1	496,724	496,724	496,724	986,494	986,494	986,494	2,447,584	2,447,584	2,447,584
2	262,800	262,800	131,400	385,933	385,933	192,967	1,180,085	1,180,085	590,043
3	190,223	186,080	62,027	240,241	240,241	80,080	747,943	747,943	249,314
4	107,597	105,325	26,331	147,300	147,300	36,825	433,903	433,903	108,476
5	91,944	85,855	17,171	121,035	121,035	24,207	310,642	310,642	62,128
6	57,888	53,486	8,914	72,852	72,852	12,142	193,985	193,985	32,331
7	27,963	25,905	3,701	41,634	41,634	5,948	114,017	114,017	16,288
8	28,816	26,485	3,311	48,890	48,890	6,111	115,194	115,194	14,399
9	8,044	6,241	693	13,806	13,806	1,534	42,343	42,343	4,705
10	49,653	41,568	4,157	94,312	94,312	9,431	166,400	166,400	16,440
11 to 20	143,546	103,198	6,880	204,996	204,996	13,666	447,890	447,890	29,859
21 to 30	76,634	43,541	1,675	91,414	91,414	3,516	198,573	198,573	7,637
31 to 50	81,490	45,817	1,117	101,178	101,178	2,468	224,399	224,399	5,473
51 to 100	60,240	34,457	453	48,804	48,804	642	268,823	268,823	3,537
more than 100	98,354	45,505	379	930,392	468,438	3,904	1,932,648	965,784	8,048
Total	1,781,916	1,562,987	764,933	3,529,281	3,067,327	1,379,935	8,824,429	7,857,565	3,596,463
Total (more than 2)	1,285,192	1,066,263	268,209	2,542,787	2,080,833	393,441	6,376,845	5,409,981	1,148,879

(continued on next page)

TABLE 1.1 | **Number of Workers and Firms in the Andean Region (Urban Areas), 2010** (*continued*)

	Colombia				Venezuela		
Firm size	**Workers**	**Workers***	**Firms***	**Firm size**	**Workers**	**Workers***	**Firms***
1	6,110,264	6,110,264	6,110,264	1	3,735,643	3,735,643	3,735,643
2 to 3	3,137,378	3,131,767	1,252,707	2to4	1,809,051	1,809,051	603,017
4 to 5	1,229,885	1,226,733	272,607	5	197,368	197,368	39,474
6 to 10	951,063	943,381	117,923	6 to 10	764,435	764,435	95,554
11 to 19	575,458	567,043	37,803	11 to 20	369,845	369,845	24,656
20 to 50	991,132	960,090	38,404	more than 20	4,692,573	2,323,167	93,851
51 to 100	468,353	444,513	5,849				
more than 100	3,310,039	2,530,867	21,091				
Total	16,773,572	15,914,658	7,856,647	Total	11,568,915	9,199,509	4,592,196
Total (more than 2)	10,663,308	9,804,394	1,746,383	Total (more than 2)	7,833,272	5,463,866	856,553

Source: National labor surveys. For details see Box 1.1

Note: * denotes statistics for the private sector exclusively. Figures take into account the working population between ages 14 and 65 (between 10 and 65 in Ecuador). The number of firms is approximated using the information provided by workers about the size of the firm where they work as their main job. The number of firms is computed as the ratio (workers at a firm-size category)/(size category). The midpoint of the size interval is used as a reference to do the approximation in those cases in which the question about firm size is posted using a range. For those firms with 100 or more workers, 120 is used as the reference point (50 in the case of the last interval of Venezuela). To achieve national representativeness, the figures reported for Colombia are based on household survey rather than FEDESARROLLO's longitudinal survey.

informal sector, for which there are no administrative records). Abstracting from single-operator productive units,[17] we observe that while the percentages of workers in firms with two to five workers are 60, 44, 43, 49, and 37 percent in Bolivia, Colombia, Ecuador, Peru and Venezuela, respectively, the percentages of firms with two to five workers are 88, 87, 85, 88 and 75 percent for those same respective countries. The corresponding percentages for firms with 20 or more workers are 16, 40, 34, 31, and 43 percent for worker concentration in Bolivia, Colombia, Ecuador, Peru and Venezuela, respectively, and 1.4, 3.7, 2.7, 2.1, and 11 percent for firm concentration in those same respective countries. Thus while micro firms absorb an important mass of the labor force (about 47%), they sustain most of the entrepreneurial support (about 85%). On the other hand, while big firms absorb a significant 33% of the labor force, they only account for about 4% of Andean firms. We have argued that policies aimed at formalizing labor markets should first target firm formalization, as otherwise there is no sustainable basis for labor formalization. Indeed, with such a distribution of firms and workers, policy design of formalization strategies should be mindful of the significant amount of resources that would be necessary to enforce labor regulations that are not incentive-compatible for regulated companies (for instance, monitoring costs of micro firms that number in the millions and are unstable and often close, merge, or otherwise change).[18]

Mindful of the various dimensions and margins at which informality can be defined, and after having framed and delimited the scope of this book around the social benefit margin, this chapter introduces the discussion of labor informality in Andean labor markets starting by making a rapid tour through the historical evolution of the term in the labor economics literature and in strands of the literature that stem from seminal works, and by examining some definitions and data sources (see Box 1.1) used for the production of the chapters that follow.

---

[17] Among informal salaried jobs, independent activities—which absorb labor force usually deprived of social benefits such as pensions, medical insurance, vacations, severance payments, etc.—are not only frequent but have been widespread in Latin America and seemingly desirable for workers who voluntarily opt out of salaried jobs and expect better upfront monetary outcomes in self-employed/micro-entrepreneurial activities. As seen in Table 1.1 and as we will show in Chapter 2, self-employment has become a leading sector in the Andean labor force.

[18] For instance, in Peru, the number of inspectors in charge of monitoring the compliance of labor regulation is less than 500 for the whole country (despite the fact that there are 2.4 million single-entrepreneur firms with about 6 million workers just in the urban areas). Some regions like Amazonas, Cajamarca, Huanuco, Junin, and Ucayali do not have a single local inspector on duty. See La Republica, "Mil inspectores defenderán derechos laborales, pero los de ellos están en veremos", June 8, 2012.

Historical Review of the Concept and Strands of Labor Informality

Informality is an issue that has been studied extensively in many recent works; however, since the inception of the term, all the authors have not used the same concept of informality or even clearly outlined the definition upon which their works are based. Flodman (2004) and Chaudhuri and Mukhopadhyay (2010) suggest that the literature about the informal sector and its multiple definitions generally runs along three strands: dualistic, neo-liberal or legalistic, or structural.

The dualistic strand proposes that the informal sector is essentially a marginal sector completely separated from the formal sector. Less-developed countries have a predominant pre-capitalist subsistence (informal) sector and a small modern dynamic (formal) sector, with independent wage determination across them. Lewis (1954) crafted the notion of organizational dualism, and since then several authors have followed this exclusionary approach that insinuates a less-desirable labor sector within a segmented labor market. For instance, Todaro (1969) refers to the "urban traditional" sector, and Santos (1979) identifies "lower circuits." McGee (1971) refers to the "proto-proletariat." Geertz (1963) talks about pre-modern peddlers in a "firm-centered economy" and Cole and Sanders (1985) refer to the "urban subsistence sector." In this tradition, the contributions of Harris and Todaro (1970) and Fields (1975), among the early definitions of informality proposed by ILO (1972),[19] are usually considered to be the most influential.

The neo-liberal or legalistic strand argues that informality is a response by small entrepreneurs to over-regulation by the state. De Soto (1989) is one of the first to suggest that informality arises as a form of defensive evasion in the face of poor regulation, excessive costs, and government failures in the provision of public goods and services. In this vein, Rauch (1991), Jones (1997), and Gindling and Terrell (2005) have studied the effects of minimum wage regulations on informality. Similarly, Loayza (1996), Johnson, Kauffman, and Schleifer (1997), Sarte (2000), Friedman et al. (2000), Schneider and Enste (2000), Boeri and Garibaldi (2002), Djankov et al. (2002), Botero et al. (2003), Schneider (2005), and Loayza, Oviedo, and Serven (2005) stress the influence of registration costs and tax policy on the size of the informal sector. Bennett and Estrin (2007) follow Maloney (1999, 2004) in seeing the informal sector

[19] The ILO (1972) argued that informality was part of a phenomena in third-world countries in which the economy was separated into large, regulated enterprises (formal sector) and self-employed and small-scale enterprises (informal sector).

primarily as entrepreneurial, and they argue that informality is in fact a choice among entrant entrepreneurs in developing countries. Maloney (1999) and the most recent World Bank report on informality in Latin America (Perry et al. 2007) acknowledge that while there is still evidence of segmentation, voluntary exits in the face of ineffective or socially unprofitable regulations are gaining relevance. Levy (2008) also maintains that part of the voluntary movement of workers across types of employment corresponds to undervalued and compulsory components of the benefit packages of formal arrangements, while Kanbur (2009) insists on the role of state regulation in determining the size of the informal sector.

The structural strand argues that the informal economy is subordinated to the formal one. In this case, the big (formal) enterprises subordinate and sometimes impoverish small (informal) firms in order to maintain a reserve of labor surplus and eventually reduce their costs. According to this strand, informality is not a categorical choice and can be strategically and partially adopted within the intra-firm margin: firms may choose to avoid the red tape and the monetary costs associated with formalization for just a part of their activities/hirings. The first authors to follow this strand were McGee (1973), Quijano (1974), and Mingione (1984). This strand also portrays a heterogeneous informal sector with a dynamic upper-tier and limited-entry subsector integrated into the formal chain and an easy-entry subsistence countercyclical subsector (Fields 1990; Ranis and Stewart 1999; Florez 2002).

Labor Regulation and Institutional Arrangements Influencing Informality

Earlier in this chapter we introduced some general concepts to understand informality in labor markets. As explained, the term usually refers to either lack of registry (operation of productive units in the underground economy) or lack of nonwage benefits (social protection, labor rights, etc.). In either case, although the fundamental reasons driving informal arrangements are economic, labor regulation can trigger, catalyze, or contain the incidence of such arrangements. As later chapters will show, labor informality in the Andean countries is high, volatile, and exposes workers to considerable pre-retirement income risks. Some of the policies implemented to cope with it have had only a modest impact. All this could have been influenced by the legal framework regulating the interactions between firms and workers. Thus, to complete the landscape in which the results of this book should be read, this section

BOX 1.1. INFORMALITY FOR PURPOSES OF THIS BOOK: DEFINITIONS AND DATA SOURCES

This book devotes most of its attention to *labor informality* based on the *social benefits qualification*. Aside from Box 1.2, which addresses the issue from a firm perspective,[a] most of the book adopts the social protection perspective. According to the approach, informality may be present in both registered and unregistered, public or private, or small or big enterprises. The focus is on the working conditions of workers or the type of contract (whether legal or not) that they agree to with their employer. Under the social protection view, attention is usually focused on social security contributions (or severance payments).

We first observe if workers are *salaried* (if they get a wage that is usually of fixed amount and frequency based on dependency on their employer) or *nonsalaried* or self-employed (if their earnings are not fixed to a constant level or frequency, as there is not a bond of dependency between the workers and their eventual employer).

Then, based upon retirement pension contributions stemming from the principal activity of the workers, we define their employment status as formal or informal. Thus we outlay three states: *salaried formality, salaried informality,* and *self-employment*. Self-employment is taken as informal, as most independent workers do not receive contributions toward social security from their employers.

Once the issue of defining informality is dealt with, the next problem is choosing how to measure it.[b] The first factor that must be taken into account when trying to measure informality is what data sources are available in the country. Some countries collect data about labor in special surveys exclusively designed to monitor employment; others have special modules included in more general household surveys. Given the type of informality upon which we are focusing, information at the worker level is necessary to measure informality.

There are several household surveys available in the Andean countries under study (Bolivia, Colombia, Ecuador, Peru, and Venezuela). We are interested in a group of surveys that cover the last decade and gather the necessary data about the employment situation of those surveyed in order to determine their formality status. Not only do we need a relatively invariant set of information and comparable methodology, but as several of the exercises developed in this book require longitudinal data, we must use sources with a panel component.

In the case of Bolivia, the government has developed the Quarterly Employment Survey (or ETE in Spanish). This survey has gathered information for several years during the last decade, but has only recently developed a panel component. The panel sample started in the first quarter of 2009 and by the time this book was in production, data were available up to the last quarter of 2010. The panel structure of this survey includes two consecutive quarters of information for the same household, followed by two consecutive quarters of absence. Finally, the household is surveyed again in the following two quarters for the last time. With this structure (sometimes called the 2-2-2 structure) a household is seen in the same two consecutive quarters of two years. The survey covers nine capital cities plus *El Alto,* adjacent to La Paz, due to its large population.

For Colombia, the official survey from which labor statistics are drawn is the Comprehensive Integrated Household Survey (*Gran Encuesta Integrada de Hogares* – GEIH), which replaced a previous survey, the Ongoing Household Survey (*Encuesta Continua de Hogares* – ECH). Unfortunately, neither the GEIH nor the ECH had a panel component.

(continued on next page)

BOX 1.1. INFORMALITY FOR PURPOSES OF THIS BOOK: DEFINITIONS AND DATA SOURCES (*continued*)

To overcome this limitation, we used a relatively small survey developed by the Foundation for Higher Education and Development (FEDESARROLLO) called the Social Longitudinal Survey (*Encuesta Social Longitudinal* – ESLF), which does have a panel component. This yearly survey started in 2004 and was conducted only in three cities. As the years passed, new cities were introduced into the sample. For the last sample (2010), information was available for over 20 cities. The downside of this survey (aside from its small size) is that several methodology and coverage changes were made. To minimize comparability issues, only information since 2006 has been used and only for those cities that were part of the sample for this entire period (Bogota, Bucaramanga, and Cali).[c] The survey only covers urban areas.

In Ecuador, we used the official Employment, Unemployment and Underemployment Survey (ENEMDU in Spanish). This survey has been available since 2003 with quarterly information and a panel structure (also a 2-2-2 structure). Even though some methodological changes were made in 2007, we decided to use the entire sample for this survey (up until the last quarter of 2010) in some parts of the book because the evolution of the indicators shows consistency.[d] The survey covers both urban and rural areas; however, we only focus on the former.

Information for Peru was taken from the National Household Survey (ENAHO in Spanish) developed by the Peruvian Statistics Institute. This survey is taken continuously throughout the year, but its results are consolidated in annual reports. The sample used for the ENAHO goes from 1998 to 2010. The panel structure of the survey allows for using three distinct panels. The first panel sample goes from 1998 to 2001, the second started in 2002 and ended in 2006, and the last panel sample started in 2007 and is ongoing. Although the coverage of the survey is national, for the purposes of this book we mainly focus on urban areas.

Finally, for Venezuela, information was used from the Household Survey by Sampling (EHM in Spanish). This survey has semiannual information starting in 2001 and going up to the second semester of 2010. It has a long panel structure that allows for following a household for as long as 11 semesters. Like the surveys for Ecuador and Peru, this survey covers both urban and rural areas; however, it is not possible to separate out one from the other. Given the small participation of the rural population, rural workforce, and rural production in Venezuela,[e] we decided to live with the measurement error that may arise after including some rural observations, and we refer to the whole sample as if it were urban.

[a] The approach toward firm informality is also known as the "productivity perspective" of informality. It focuses on the legal status of the firms and the firms' intersectoral margin.

[b] See Vuletin (2008) for a review of the methods used to measure informality.

[c] Sections of 2004 and 2005 have a limited panel component, as the surveyed individuals are asked to give answers only to those variables that they consider had changed between the last survey and the current one. Only since 2006 have those surveyed been asked to report answers to every question at each period in which they are observed.

[d] Prior to 2007, a nontrivial number of observations reported to be "regular workers" and also reported to have no earnings. Contrary to those that reported to be strictly unpaid workers—and besides reporting lack of earnings—these "regular workers" also report zero working hours. Thus these observations were reclassified as unemployed.

[e] Based on United Nations (2011), the World Bank estimates that the Venezuelan rural population in 2010 was 6.5% of the country's total population.

reviews the regulatory framework that governed the labor interactions during the period under analysis.

The legal framework regulating labor markets is complex. After the extensive economic reforms of the early 1990s, Andean governments enacted (and subsequently modified) several laws to regulate minimum wages, taxes, and payroll contributions, as well as the labor rights of workers in micro, small, and medium-sized enterprises, oftentimes with the goal of promoting the formalization of firms and workers (see Box 1.2). Paradoxically, informality has risen in some countries and in part this could be due to these institutional changes as they may increase the costs of being formal by imposing heavier restrictions on the ability of firms to hire and fire workers, thereby reducing the flexibility that businesses need to adapt to changes in the economy. Needless to say, a regional comparison is even more challenging, as the specific direction that each country has followed in the last decade has been defined according to different political and economic programs. With that in mind, this section presents a brief comparative description of the existing regulatory framework and the labor market institutions in the Andean countries that may exert influence on the formalization of firms and workers.[20]

Boeri and van Ours (2008) outline a structure of labor market institutions that can explain the imperfections of labor markets. They distinguish between institutions acting on the prices of the labor factor (minimum wages, labor unions, taxes on labor) and institutions acting on the quantities of the factor (working hours, working age). The rest of this section is based on that outline in the context of the Andean labor markets.

Institutions Acting on Prices

Minimum Wages

The minimum wage is a labor market institution that sets a lower bound of the remuneration that workers are entitled to in exchange for their work (at least in the formal market). In some cases the minimum wage is unilaterally set by the government; in others it is the outcome of negotiations between workers and representatives of firms. Minimum wages are one of the most important labor market institutions, as they influence not only decisions on hiring (or not) but on hiring formally or informally. Under the competitive market assumption,

[20] Part of the description and most of the tables in this section are from Montes (2012), a background paper prepared for this study.

BOX 1.2. INFORMALITY OF SMALL FIRMS IN PERU

Micro and Small enterprises (MSEs) account for 55% of total firms in Peru and employ 70% of the economically active population. According to MINTRA (2008), 73% of these firms are informal. In 2003, the government enacted the Micro and Small Enterprise (MYPE) Law to promote competitiveness, formalization, and development of MSEs by reducing their burden related to labor costs (from 61% to 7% for microenterprises and to 39% for small firms), and by giving these firms access to at least 40% of public sector purchases.

The MYPE Law defines the two target groups as follows: micro firms (up to 10 workers and annual revenues less than 150 tax units) and small firms (11 to 100 workers or annual revenues between 150 and 1,700 tax units). This definition, however, creates incentives for microenterprises not to grow beyond the threshold limit of 10 employees, since a firm that wants to move from micro to small status faces the increase in nonwage total cost from 7% to 39%. Another problem is that one of the strongest incentives to attract participants is access to public purchases, but while such access can help firms briefly improve sales it does not guarantee a sustained flow of income or long-term improvements in the competiveness of the participating firm (as there is no clear program to improve the quality of production of participant firms).

According to its registration status, a MSE can be (1) informal, which means it is not in any public record, or (2) formal, which means it is registered at least in the taxpayer register (*Registro Único de Contribuyentes* – RUC). MSEs are divided into those that are (1) beneficiaries of the MYPE Law, in which case they must be registered in the MSE record known as the *Registro Nacional de Micro y Pequeña Empresa* (REMYPE); and (2) those that are not beneficiaries of that law.

Has the law improved the performance of beneficiary firms compared to that of nonbeneficiary and informal firms? Although available data do not allow for tracking treated and control firms before and after the application of the MYPE Law, they do allow for measuring the association between micro firms' profitability and their participation in the program. Box Table 1.2.1 shows the results of linear specifications of profitability according to registration status (controlling for firm characteristics).

BOX TABLE 1.2.1 | **Profitability Determinants among Micro Firms Participating in Peru's MYPE Program, 2011**

Covariates	(1) Informal Firms	(2) Formal Firms	(3) Total Micro Firms (A)	(B)
Firm size (base = personal firm)				
2–5 workers	−0.2308***	0.0015	−0.1969***	−0.1975***
	[0.0168]	[0.022]	[0.0121]	[0.0122]
6–10 workers	−0.3807***	−0.0056	−0.2252***	−0.2203***
	[0.0967]	[0.0228]	[0.0237]	[0.0239]
Firm longevity (base = 0–2 years)				
3–5 years	0.0697**	0.0145	0.0716***	0.0718***
	[0.0213]	[0.0155]	[0.0143]	[0.0143]
More than 5 years	0.0685***	−0.0022	0.0647***	0.0644***
	[0.0177]	[0.0142]	[0.0121]	[0.0122]

(continued on next page)

BOX 1.2. INFORMALITY OF SMALL FIRMS IN PERU (*continued*)

BOX TABLE 1.2.1 Profitability Determinants among Micro Firms Participating in Peru's MYPE Program, 2011 *(continued)*

Covariates	(1) Informal Firms	(2) Formal Firms	(3) Total Micro Firms (A)	(3) Total Micro Firms (B)
Owner's education level (base = without level)				
School	0.1485*** [0.0427]	0.0885*** [0.0112]	0.1003*** [0.0196]	0.0984*** [0.0196]
College	0.1299** [0.0447]	0.0689*** [0.0106]	0.0781*** [0.0198]	0.0773*** [0.0199]
Economic sector (base = service)				
Manufacture	−0.5801*** [0.0461]	0.0791*** [0.0104]	0.0219 [0.0203]	0.0153 [0.0205]
Other sector	−0.6772*** [0.0413]	0.0349** [0.0119]	−0.1169*** [0.0199]	−0.1234*** [0.0201]
Firm legal status (base = nonregistered)				
RUC			−0.4289*** [0.0176]	−0.4228*** [0.018]
REMYPE (beneficiary of MYPE Law)				−0.0473 [0.0246]
Constant	1.3796*** [0.058]	0.0916*** [0.027]	0.7812*** [0.0275]	0.7909*** [0.0277]
Observations	9,379	3,201	12,580	12,580
Adjusted R-squared	0.052	0.045	0.145	0.145

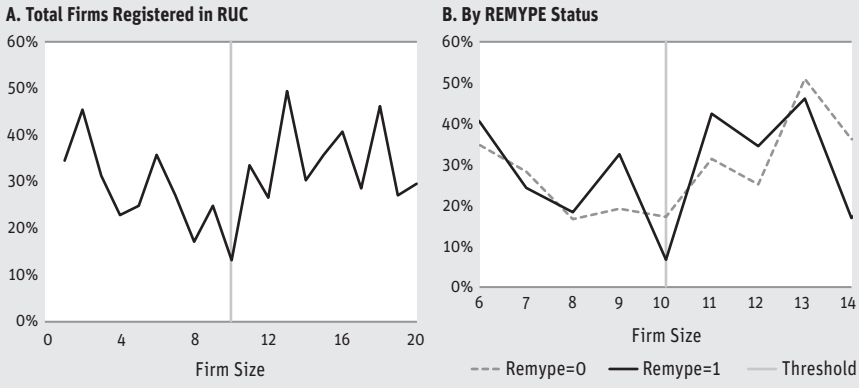
Source: Data for informal firms are based on the National Household Survey (Encuesta Nacional de Hogares - ENAHO) and data for formal firms are taken from the Micro and Small Enterprise Survey (Encuesta de Micro y Pequeña Empresa - EMYPE).
Note: Columns (1) and (2) correspond to results of informal and formal firms groups, respectively. Column (3) shows the results merged for these two groups. In subcolumn (A), the dummy variable "RUC" indicates the effect of being formal, while in (B) the dummy variable "REMYPE" measures the marginal effect of belonging to the group of beneficiaries of the MYPE Law. Profitability is defined as the ratio (income – expenses)/expenses. The results are reported only for micro firms due to lack of information for informal small firms. Standard errors in square brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Box Table 1.2.1 shows that informal firms have higher margins than formal firms. This result is consistent with Chacaltana (2008) and means that it is better for firms to avoid registration in order to increase profitability in the short run. Moreover, beneficiary formal firms do not exhibit better profitability than nonbeneficiary formal firms, which suggests that the MYPE Law is not achieving its objectives at least in the short run. In addition, the law may introduce perverse incentives to remain small. One very simple way to check this using survey data (administrative records would allow a finer bunching analysis) is to observe the growth rates of firms of different scales. If the law introduces distortions, one should expect a discontinuity of the growth at the threshold of 10. Box Figure 1.2.1 plots the proportion of firms that registered positive growth in the number of employees (vertical axis) against their initial employment level (horizontal axis).

(continued on next page)

BOX 1.2. INFORMALITY OF SMALL FIRMS IN PERU (*continued*)

BOX FIGURE 1.2.1 | **Proportion of Formal Firms that Increased in Size, 2010–2011 (in percent)**



Source: Micro and Small Enterprise Survey (Encuesta de Micro y Pequeña Empresa - EMYPE), 2010–2011.
Note: We cannot compare the behavior of informal firms due to the absence of a panel for such firms in the data. RUC = Registro Único de Contribuyentes; REMYPE = Registro Nacional de Micro y Pequeña Empresa. Remype = 1 denotes participating firms.

As Box Figure 1.2.1 shows, the proportion of formal firms that decide to grow reaches the minimum value at the threshold level (Panel A). More interestingly, firms that do not participate in the MYPE Law are more likely to grow at the limit that defines micro firms (Panel B). This means that micro firms may find it unprofitable to grow and move to the small firm regime, suggesting that MSE legislation affects the firm's decision to hire employees at the threshold. This is a very simple approximation conditioned on the data limitations. Further work to better identify the impact of the MYPE Law on different outcomes, and a rigorous assessment of the MSE promotion mechanisms, are necessary. These refinements should bear in mind that the goal is to achieve formalization in its deepest sense (as it is explained at the beginning of Chapter 1). For instance, McKinsey (2009) found that value-chain incentives (mechanisms to integrate MSEs with large private companies through the purchasing of goods and services) have the greatest effect on formality, while mere registration and tax concessions are not sufficient incentives for firms to pass the threshold of the benefit-cost analysis when deciding to become formal.

one would expect wages to correspond to the productivity of the labor factor. The problem is that at the minimum threshold of legal wage there could still be a mass of workers with productivity below the corresponding minimum wages. For those workers, firms that are willing to hire them usually do it with remuneration below the minimum wage. By the same reasoning, workers earning the minimum wage can be shifted to the informal sector if minimum wage increases do not correspond to their actual productivity. Chapter 2 shows

that an important mass of informal salaried workers earns well below the minimum wage,[21] and Chapter 4 shows that minimum wage increases can lead to increased informality.

How are minimum wages set in the Andean countries? In Bolivia, the minimum wage is determined after negotiations between employers, employees, and the government, taking into account the complexity of work, labor force productivity, and the value of the typical consumption basket. In Colombia, the minimum wage adjustments take account of inflation, GDP growth, and productivity changes. In Ecuador, the National Salary Council (CONADES), made up of representatives of employers, employees, and the government, sets an annual minimum wage taking into account inflation, consumer basket costs, productivity changes, and the complexity of work performed. In the event no agreement is reached, the Ministry of Labor is responsible for determining the minimum wage. In Peru, the minimum wage is the result of a negotiation process in the National Labor Council between representatives of workers, employers, and the government. However, the most recent increases in the minimum wage (after 2011) have been by decision of the Executive, with no intervention by the council. In Venezuela, the minimum wage results from negotiations between representatives of employers and employees, the government, and a coordinator assigned by the Ministry of Labor. Venezuelan minimum wages are adjusted mainly according to changes in the value of the consumer basket. Table 1.2 reports the recent evolution of minimum wages in the Andean countries.

Labor Unions

According to Boeri and van Ours (2008, 51), "trade unions typically bargain over all aspects of an employment contract: wages, working hours, overtime pay, fringe benefits, employment security, health and safety standards, etc. They

---

[21] Minimum wage increases can generate increases in informality. Borda and Ramírez (2006) show that in Bolivia the minimum wage increase in 2006 may have led to higher levels of informality in the short run, and to higher unemployment in the medium term. Lopez and Lasso (2008) show that increases in the minimum wage during 1998–2006 in Colombia increased the number of working hours among those who got the increase and that workers whose minimum wage was not raised became informal. Jaramillo (2004) shows that the increase in the minimum wage in Peru in 2003 led to an increase in the number of working hours and in informality in micro and small enterprises, instead of an increase in the welfare of workers. Bonilla (2009) finds that increases in the minimum wage in Venezuela increase informality. He also shows that the proportion of workers who earn a salary around the minimum wage has been increasing and this has translated into a reduction in the returns to education, labor experience, etc. ILO (2009) indicates that minimum wage adjustments are usually aimed at maintaining the same purchasing power, rather than at preserving the level of employment.

TABLE 1.2 | Monthly Minimum Wages in Andean Countries, 2000–10

	Bolivia		Colombia[a]		Ecuador		Peru		Venezuela[b]	
	US$	LCU	US$	LCU	US$	LCU	US$	LCU	US$	LCU
2000			125	260,100	57	57	117	410	177	120
2001			124	286,000	86	86	117	410	199	144
2002			123	309,000	105	105	117	410	137	158
2003			115	332,000	122	122	132	460	118	190
2004			136	358,000	136	136	135	460	131	247
2005	55	440	164	381,500	150	150	140	460	153	321
2006	62	500	173	408,000	160	160	153	500	186	513
2007	67	525	209	433,700	170	170	160	500	133	615
2008	79	578	237	461,500	200	200	189	550	184	799
2009	92	647	238	496,900	218	218	183	550	144/159	879/968
2010	97	679	264	515,000	240	240	193	550	138/158	1065/1224

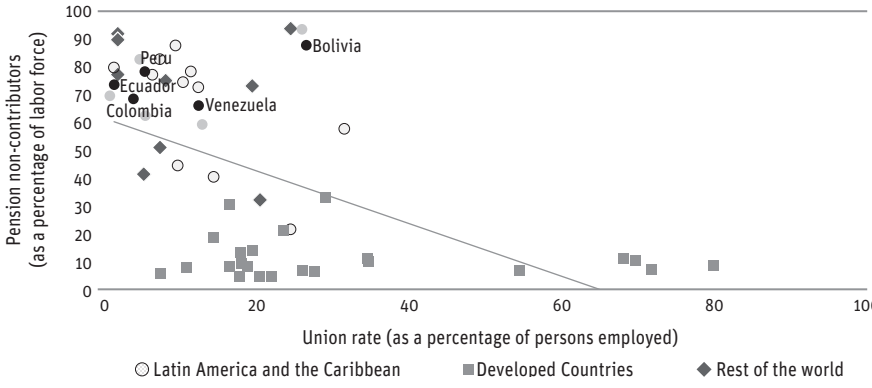
Source: Central Banks or Ministries of Labor.
Note: LCU=Local Currency Unit.
[a] Workers receiving less than two minimum wages and living in areas where public transportation is available also receive a transportation bonus.
[b] Since 2006, market exchange rates instead of official rates have been used. All figures are expressed in bolivares fuertes before 2008 (1 bolivar fuerte = 1,000 bolivares). Minimum wages were adjusted twice a year (in May and September) in 2009 and 2010. Thus, in May 2009 the minimum wage was US$144.

negotiate with employers on a collective basis, overruling or complementing individual contracts. By coordinating wage claims of a plurality of workers, unions force employers to pay for labor services at a rate above the reservation wage of otherwise uncoordinated individuals." In this sense, strong labor unions can induce more protection and hence formality for their affiliates (indeed Figure 1.3 shows a negative relation between labor informality and unionization). Legislation of unions in the Andean countries is very homogeneous and it has been stable during recent years (Montes 2012), but the presence of the unions in the Andean labor markets has been declining (Lora and Pagés 2003) and nowadays—with the exception of Bolivia, where paradoxically labor informality is the highest—unionization rates are very low.

Taxes on Labor

Payroll taxes are distortive in the allocation of productive factors as they directly tax labor input and generate a wedge between the cost of labor to the firm and

FIGURE 1.3 | Unionization and Labor Informality



Source: Prepared by the author based on Trade Union Membership Statistics Database (2013), OECD Stat Extracts (2010), Confederación Sindical de las Américas CSA (2010), WDI (2012) and Cuesta (2005).
Note: Based on latest available year per country as reported by the databases. Information of Latin American countries is taken from CSA (2010) and Cuesta (2005).

the net salary that the workers receive. Thus, high payroll taxes may induce firms to hire less or to hire informally. In the Andean countries, payroll taxes are mainly levied to finance workers' health insurance and pension contributions. Although workers are the main beneficiaries of the services to be financed with these contributions, the contributions themselves are oftentimes shared between both workers and firms. Table 1.3 summarizes the structure of payroll tax contributions in the region.

As shown in Figure 1.2 and Table 1.1, most firms (as well as most of the labor force) in the Andean markets are in the small business sector. General tax requirements can become a heavy burden for many small start-up businesses. With relatively small surpluses, young, small firms may face difficulties in complying, and so join the formal sector. For this reason, labor regulation in most Andean countries encourages the formalization of these firms by creating separate labor and tax benefits for micro, small, and medium-sized companies. To prevent disincentives for firms to grow, the benefits of these special regimes are intended to be temporary until the beneficiary graduates.[22] Unfortunately, as Figure 1.2, Table 1.1 and Box 1.2 suggest, the impact of such special regimes

[22] The objectives of the special regimes include (1) reducing the contribution rates of firms per employee, (2) giving opportunities to increase sales by directing a share of government procurement to the production of firms, (3) training, and (4) access to working capital loans with low interest rates.

TABLE 1.3 | Payroll Taxes in the Andean Countries, 2010

	Regime	Bolivia	Colombia	Ecuador	Peru	Venezuela
Health	General Regime	1.97% paid by the employee	Monthly payments of 12.5% of the employee's salary. 8.5% is paid by the employer and 4% by the employee. The maximum taxable salary is 25 minimum wages.	5.71% paid by employer.	Monthly payment of 9% paid by the employer.	Mandatory social security of 11% for low-risk firms, 12% for medium-risk firms, and 13% for high-risk firms, paid by the employer. 4% paid by the employee.
	Micro, Small and Medium-sized Enterprise Laws		Employers hiring new employees with a salary lower than 1.5 minimum wages, or under 28 years old, or women at least 40 years old who were without a job during the last 12 months, are allowed to discount the contributions for health (Fosyga) for these employees from their income tax, as long as the number of employees and the payroll increase.		Monthly payment of 9% paid by the employer. Government will pay 50% of that amount as subsidy.	

(continued on next page)

TABLE 1.3 | Payroll Taxes in the Andean Countries, 2010 (*continued*)

	Regime	Bolivia	Colombia	Ecuador	Peru	Venezuela
Pension	General Regime	10% paid by the employee	Monthly payments of 16% of the employee salary. 12% is paid by the employer and 4% by the employee. Employees earning more than 4 minimum wages pay an additional 1% to the *Fondo de Solidaridad* (Solidarity Fund). Additional charges for employees earning more than 16 minimum wages as follows: From 16 to 17 minimum wages: 0.2% From 17 to 18 minimum wages: 0.4% From 18 to 19 minimum wages: 0.6% From 19 to 20 minimum wages: 0.8% From 20 to 25 minimum wages: 1.0%. The maximum taxable salary is 25 minimum wages.	6.64% paid by employee, 3.10% paid by employer.	13% paid by employee if affiliated with the public pension system (SNP) or 10% if affiliated with the private pension system (SPP).	Mandatory social security of 11% for low-risk firms, 12% for medium-risk firms, and 13% for high-risk firms, paid by the employer. 4% paid by the employee.
	Micro, Small and Medium sized Enterprise Laws		Employers hiring new employees with a salary lower than 1.5 minimum wages, or under 28 years old, or women at least 40 years old who were without a job during the last 12 months, are allowed to discount the contributions for pensions (*Fondo de Garantía de Pensión Mínima*) for these employees from their income tax, as long as the number of employees and the payroll increase.		Employees can choose among SNP, SPP, or the Social Pension System (SPS).[1] Employees affiliated with SNP will pay 13%, those with SPP 10%, and those opting for the SPS will pay up to 4% as a minimum mandatory payment. In the event the employee opts for a SPS, the government will match the payment up to the minimum mandatory payment.	

(continued on next page)

TABLE 1.3 | Payroll Taxes in the Andean Countries, 2010 (*continued*)

	Regime	Bolivia	Colombia	Ecuador	Peru	Venezuela
Other	General Regime	*Fondo Social* (Social Fund): 0.05% for salaries more than Bs 13,000 1% for salaries more than Bs 25,000 5% for salaries more than Bs 25,000 10% for salaries more than Bs 35,000.	Professional risks. The maximum taxable salary is 20 minimum wages. The rate goes from 0.348% to 8.7% depending on the risk involved in the activities of the firm. It is paid by the employer. *Parafiscales*.[2] Employers have to make additional payments for the ICBF (3%), SENA (2%), and the family subsidy (4%).	Administrative charges for IESS: 0.36% paid by the employee; 0.44% paid by the employer. Job risk: 0.55% paid by employer. Farmer social security 0.35% paid by employers and employees.	0.75% to SENATI if the firm operates in the manufacturing sector. One monthly salary per year of compensation for the time that the employee has worked in the company (CTS).	Loans and training under the social security regime (*Régimen Prestacional de Empleo*). 2.5% of monthly salary. 2% is paid by the employer and 0.5% by the employee. The minimum taxable salary is one minimum wage and the maximum 10.

(continued on next page)

TABLE 1.3 | Payroll Taxes in the Andean Countries, 2010 (*continued*)

	Regime	Bolivia	Colombia	Ecuador	Peru	Venezuela
Other	Micro, Small and Medium-sized Enterprise Laws		Micro, small, and medium-sized firms allowed to reduce payments for SENA, ICBF, and family compensation fund (*Cajas de Compensación Familiar*). In the first year of activities they will pay 1.75%; in the second year 2.50%; and in the third year 3.25%.	Layoff insurance: 2% paid by employee and 1% paid by the employer. SECAP 0.5% paid by the employer and IECE 0.5% paid by the employer.		*Régimen Prestacional de Empleo*. 2.5% paid by workers working as self-employed or in cooperatives. In cases of low-income workers, the government subsidizes 50% of the contribution.

Source: Appendix Table 1.1.

[1] The law introducing the social pension system was enacted in 2008; however, by the end of 2010 the rules to regulate it were not still into place.
[2] These payroll taxes were reduced by the end of 2012 and replaced by a tax to firms' profits.

has been modest, as much of the informal sector is still comprised of small firms.[23] Table 1.3 summarizes the structure of contributions for these special regimes and Table 1.4 shows some of their characteristics.

TABLE 1.4 | Characteristics of Micro, Small, and Medium-sized Enterprise Laws in the Andean Countries, 2010

	Colombia	Ecuador	Peru	Venezuela
Law	Law on Formalization and Generation of Employment (Ley MIPyME - Ley 1429)	Law to promote small firms in manufacturing and handicraft sectors.	Law for the Promotion of Competitiveness, Formalization, and Development of Micro and Small Enterprises and Access to Decent Employment (Ley MYPE - DS Nº 007-2008-TR).	Law for the promotion and development of small and medium-sized enterprises
Definition of Micro, Small and Medium-Sized Enterprise	Microenterprise: • No more than 10 employees • Total assets value less than 501 current minimum wages. Small enterprise: • Between 11 and 50 employees • Total assets value between 501 and 5,001 current minimum wages. Medium-sized enterprise: • Between 51 and 200 employees • Total assets value between 5,001 and 15,000 current minimum wages.	Manufacturing and handicraft firms with assets value less than US$350,000.	Microenterprise: • Between 1 and 10 employees • Annual sales lower than 150 taxable units (TU).[a] Small enterprise: • Between 1 and 100 employees Annual sales lower than 1,700 TU.	Small enterprise: • Between 5 and 50 employees • Annual sales between 1,000 and 100,000 tributary units (TU). Medium-sized enterprise: • Between 51 and 100 employees • Annual sales between 100,001 and 250,000 TU. The value of the TU for 2010 was Bs65 (about US$11 at the market rate).

(continued on next page)

[23] Lopez-Acevedo and Tan (2010) find some positive effects of small and medium-sized enterprise laws on several labor outputs for Chile, Colombia, Mexico, and Peru.

TABLE 1.4 | Characteristics of Micro, Small, and Medium-sized Enterprise Laws in the Andean Countries, 2010 (*continued*)

	Colombia	Ecuador	Peru	Venezuela
Requirements	• Formal establishment (foundation) and registration in the customs and tax administration office. In case it is necessary, registration in the chamber of commerce. • Continuous reporting to the customs and tax administration office about their status as micro, small, and medium-sized enterprises.	• Formal request to the Ministry of Commerce to be considered as a small firm. • Once the request is approved, the ministry will recommend the type of benefits to be granted and their duration.	• Micro and small enterprises must be registered in the National Tax Office (SUNAT). • Micro and small enterprises must keep a record of the sales and purchases and keep a regular inventory of their assets.	• Micro, small, and medium-sized enterprises must foster training for their workers and follow all legislation.
Main Benefits	• Access to flexible credits • Training • Small enterprises starting their activities under this law will waive their income tax during the first two years of activities, pay 25% in the third year, 50% in the fourth, 75% in the fifth, and 100% as of the sixth year. • Small enterprises starting their activities under this law in Amazonas, Guainía, and Vaupés will waive their income tax during the first eight years of activities, pay 50% in the ninth year, 75% in the 10th, and 100% as of the 11th year. • Micro, small, and medium-sized enterprises are allowed to reduce payments for SENA (2%), ICBF (3%), and the Family Compensation Fund (*Cajas de Compensación Familiar*) (4%). During the first year of activities they will pay 1.75%, 2.5% in the second year, and 3.25% in the third.	• Exemption from export taxes • Exemption from imports taxes for raw material not produced in the country and used in the production of export goods • Exemption from real estate taxes • Faster depreciation of machinery and equipment, etc.	• Simplified requirements to create and register a micro and small firm • Access to flexible credits • Access to at least 40% of the total purchases of the public sector • 50% subsidy of the mandatory health insurance payments • Income tax rate reduced to 1.5% of net monthly income • Accelerated depreciation; furniture, machinery and equipment may be depreciated in three years • Access to training on management and productivity strategies.	• Access to soft credits • Access to renegotiation plans for current loans • Incentives to reinvest • Assistance with export initiatives • Access to training on management and productivity strategies

(continued on next page)

TABLE 1.4 Characteristics of Micro, Small, and Medium-sized Enterprise Laws in the Andean Countries, 2010 (*continued*)

	Colombia	Ecuador	Peru	Venezuela
Main Benefits (*continued*)	• Employers hiring new employees with a salary lower than 1.5 minimum wages, or under 28 years old, or women at least 40 years old who were without a job during the last 12 months, are allowed to discount the contributions for SENA, ICBF, etc. for these employees from their income tax, as long as the number of employees and the payroll increase.			

Source: Appendix Table 1.1.
[a] TU value changes every year; in 2011 the value was PEN 3,600 (about US$1,300).

Institutions Acting on Quantities

Working Hours

The usual measure of the intensive margin of labor supply is the average number of working hours per week. In labor markets with poor enforcement of labor regulation, or a high tendency toward informality, working hours constitute an important measure, as firms complying with some benefits (such as the minimum wage) could "adjust" labor shifts beyond the legal maximum without awarding overtime compensation when those benefits rise without there being sound fundamentals (such as an increase of productivity). Chapter 2 reports average hours of work by distinct groups of workers in each Andean country. Here we focus on the regulation of working hours. Working hours are clearly established in the Andean countries. In general, the maximum number of working hours is 8 hours per day with a maximum of 48 hours per week. The main differences appear in the overtime rates, as shown in Table 1.5.

Working Age

Regulations of the minimum working age and minimum retirement age affect the size of the labor force. They also influence the size of the informal sector, as young workers below the minimum age or senior workers close to the official retirement age looking for jobs will have difficulties finding employment with full benefits.

TABLE 1.5 | Regulations on Working Hours in Andean Countries, 2010

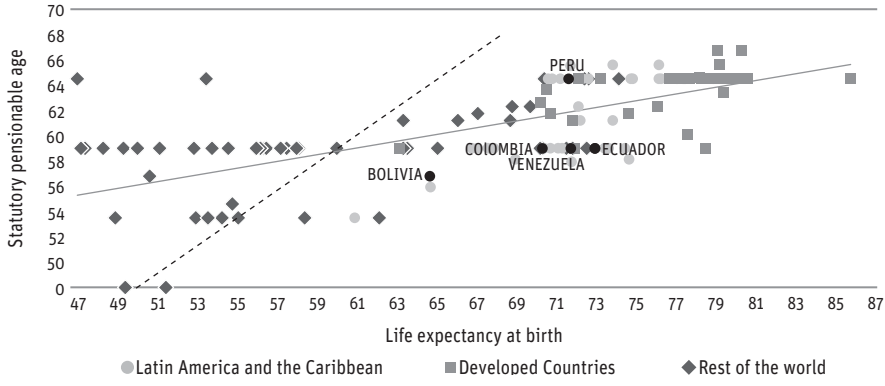
	Bolivia	Colombia	Ecuador	Peru	Venezuela
Maximum number of worked hours	8 per day; 48 per week. Business days are defined as each day of the year except Sundays, holidays, and days decreed by law. The regular shift goes from 8:30 a.m. to 4:30 p.m., including 30 minutes for lunch.	Average of 8 per day; 48 per week. The average is computed every three weeks.	8 per day; 40 per week. Business days run from Monday to Friday.	8 per day; 48 per week.	12 per day (with a break); 44 per week. In 7 working days, there must be at least one day off.
Payment for overtime	25% (for hours worked between 7 p.m. and 6 a.m.).	25% for daytime and 75% for nighttime overtime. Maximum overtime of 2 hours per day and 12 hours per week; can be increased in cases of natural disasters.	50% for overtime until midnight and 100% after that. Maximum overtime of 4 hours per day and 12 hours per week.	25% for the first two hours and 35% for any additional time.	50% on top of the regular wage. Night shifts receive a 30% bonus in the regular wage. Overtime compensation for night shifts is computed on top of the adjusted wage.

Source: Appendix Table 1.1.

The minimum age to work in the Andean countries is between 14 and 15. In all cases minors who choose to work need permission from their parents and the Ministry of Labor. In Bolivia, persons between 14 and 17 require not only the permission of their parents, but also the permission of a labor inspector. In Colombia, the minimum age for labor is 15 years. Children under 15 can work in remunerated artistic, cultural, recreational, or sport activities that do not take more than 14 hours a week. In Ecuador, the minimum working age is 15 years for all types of activity or industry,[24] while in Peru the minimum age for labor depends on economic activity. The minimum age for a worker in nonindustrial farming is 15 years, for industry, commerce, and mining, 16, and for fishing, 17, while for all other activities the minimum age is 12 years.

[24] Before 2012, children 10 years old or more were considered part of the working-age population in Ecuador.

FIGURE 1.4 | Statutory Pensionable Age and Life Expectancy for Males, 2011



Source: U.S. Social Security Administration, Social Security Programs Throughout the World 2011.

In Venezuela, the minimum age to work is 14 years and working hours must not exceed 30 hours a week.

Regarding retirement age, Figure 1.4 shows that only Peru has statutory retirement ages similar to those found in developed countries, where life expectancy is 10 years longer. Bolivia has the lowest statutory retirement age in the group. Taking as a reference the 45 degree line (dashed), we observe that a significant number of developing countries set statutory pensionable ages above the observed life expectancy at birth. Latin America, as well as all the developed countries, is not in that pool. In fact, the average difference between life expectancy and statutory pensionable age is 9.7 years in the Andean countries (with Bolivia and Peru pushing the mean downwards), 10 years in Latin America, and 12.6 years in the developed countries.

Other Influential Institutions in the Labor Market

Other institutions in the labor market with potential influence on labor informality are severance payments and public transfer programs. Although they aim to protect formal workers, high severance payments may have perverse effects on labor markets, either by deterring separation of unproductive or redundant workers or inhibiting further formal hiring. For their part, public transfer programs have income effects on the beneficiaries' budgets that can affect their decision to work, or to work formally. Two institutions are worthy of mention in this regard: cash conditional transfer programs and noncontributory pensions. (Chapter 5 explores specific programs and provides some impact evaluations.)

Severance Payments

Severance payments refer to a monetary transfer from the firm to the worker to be paid in the event the employer initiates the separation of a worker, terminating the contractual relation earlier than agreed upon. The labor law of each country stipulates the minimum compensations that workers are entitled to if they receive early separations. The higher these minimum compensations are, the more expensive it is for firms to fire redundant workers. This may affect formal hiring, not only by preventing the hiring of a replacement worker, but also by reducing the tenure offered to new hires, as the longer the tenure, the larger the contingency of a severance payment. Table 1.6 summarizes the regulations for severance payments in the Andean countries.

Conditional Cash Transfers

Conditional cash transfers (CCTs) were created to facilitate long-term investment in human capital by reducing the opportunity costs of sending children to school. Typically, recipients are asked to fulfill certain conditions such as prenatal care, immunization of children, and sending children to school. However, CCTs can also affect labor outcomes. Given the positive income effect they have on the beneficiaries' budget, they can affect beneficiaries' decisions about how many hours to work or how much time to stay searching for a better job opportunity. They can also induce migration toward more flexible self-employment or home-based activity that would reinforce the aim of CCTs to improve child care.

Diaz-Cayeros and Magaloni (2009) define the CCT as programs to reduce poverty by increasing levels of household consumption through the increase of human capital (a long-term goal) or the increase of household income (a short-term objective). According to Hoddinott and Bassett (2009), CCTs have three characteristics: (1) they are targeted interventions using socioeconomic information to identify potential beneficiaries; (2) they make monetary transfers that are paid to the mother or person in charge of the household; and, (3) they are conditional transfers based on a certain number of specific conditions. Diaz-Cayeros and Magaloni (2009) add a fourth characteristic: the possibility of evaluation and monitoring of results. Table 1.7 shows the list of CCT programs in the Andean countries, as well as their target population and the conditions that beneficiaries must fulfill.[25]

---

[25] Venezuela is excluded because it does not have any CCT program.

TABLE 1.6 | Severance Payments in the Andean Countries, 2010

Bolivia	Colombia	Ecuador	Peru	Venezuela
One monthly salary for each year that the worker was in the enterprise. In case the employee worked for less than a year, the compensation is prorated. A recent mother or a father will not be fired, moved, or get reductions in their salary until their baby is one year old. In the event of unjustified layoff, workers can request reincorporation into the firm under the same conditions they enjoyed before the layoff. Economic problems in the enterprise are not considered as a justified cause to lay off workers.	For fixed term contracts the compensation will be the unpaid amount of the contract or the equivalent of 15 working days payment, whichever is the highest. For undefined length labor contracts the compensation will be 45 days of salary for the first year in the firm. For the second through the fourth year an additional 15 days will be charged for each year. For the fifth to the ninth year an additional 20 days on top of the 45 days will be charged for each year. As of the 10th year, 30 days will be added to the 45 days for each year. Underage pregnant workers will not be fired without the authorization of the Department of Labor.	Three monthly salaries if the worker was tenured for up to three years. If the worker was tenured for more than three years, one monthly salary for each year in the firm. Severance payments cannot exceed 25 monthly payments.	One monthly salary for each year in the firm. For microenterprises the compensation is equivalent to 10 daily remunerations for each year in the firm with a maximum of 90 daily remunerations. For small enterprises the compensation is equivalent to 20 daily remunerations for each year in the firm with a maximum of 120. In case the employee worked for less than a year the compensation will be prorated.	15 days of salary if the worker has been in the social security system for from 3 to 6 months; 45 days of salary if the worker has been in the social security system for from 6 to 12 months; 60 days if the worker has been in the social security system for more than one year.

Source: Appendix Table 1.1.

ECLAC (2009) compiled the principal evaluations made of CCT programs in the region. The results show that CCT programs in Bolivia, Colombia, and Peru are responsible for the reduction of almost 2 percentage points in the poverty rate for 2008, while in Ecuador for the reduction of about 10 percentage points. Evaluations of the impact of CCTs on labor outcomes are scarce. Perova and Vakis (2009) evaluated the *Juntos* program in Peru and found no reduction in the work of adults or increases in the fertility rate in households in the

TABLE 1.7 | Conditional Cash Transfer Programs in the Andean Countries

	Name	Target	Conditionality
Bolivia	*Bono Juancito Pinto* (since 2006)	Children and adolescents attending public schools for formal, alternative and / or special education.	Education: 80% school attendance according to the teacher report.
	Bono Madre Niña-Niño Juana Azurduy (since 2009)	Pregnant women (transfer for prenatal care).	Health: Attend prenatal controls at the assigned health center. Follow and comply with medical recommendations. Attend meetings and educational activities.
		Pregnant women. Children under 2 years of age (transfer for delivery and postnatal monitoring at a health center).	Health: Have a delivery performed in a health center. Carry out a post-delivery control up to ten days after delivery. Comply with medical instructions.
		Pregnant women. Children under 1 year of age (Transfer for comprehensive health checks)	Health: Attend comprehensive health checks at the assigned health center. Comply with nutritional recommendations and vaccine schedule. Mothers must attend sessions and educational activities.
Colombia	*Familias en Acción* (since 2001)	Children under 7 years old (nutrition subsidy).	Health: all children in the household must have 100% attendance for growth and development controls planned by the health center with which they are affiliated. Training and information: Mothers and members of beneficiary households must attend the training and care conferences scheduled by the municipality. Sanctions: Suspension of benefits in the event the household does not match the conditionality three times in a row or four times during a year.
		Children between 11 and 18 years old (education subsidy).	Education: Regular school attendance of the children (at least 80%). Training and information: Mothers and members of beneficiary households are committed to attend the training and care conferences scheduled by the municipality. Sanctions: Suspension of the benefits in the event the household does not match the conditionality three times in a row or four times during a year.

(continued on next page)

TABLE 1.7 | **Conditional Cash Transfer Programs in the Andean Countries (*continued*)**

	Name	Target	Conditionality
Colombia (*continued*)	Transfers conditioned on school attendance (since 2005)	Children under 19 years old enrolled between 6th and 11th grade (education subsidy).	Education: Attend school with a maximum of 8 excused absences (every two months). Sanctions: The household will lose the subsidy if the student fails the school year or violates the commitments of school attendance during two cycles (continuous or discontinuous). The transfer is divided into two types: type 1 (9th, 10th, and 11th grades) and type 2 "pass level" incentive: (6th, 7th, and 8th grades). From the age of 16, the transfer can be withdrawn by the child.
		Children between 14 and 19 years old enrolled between 9th and 11th grade living more than 2 kilometers from the school (transportation subsidy).	Education: School attendance with a maximum of 10 excused absences (every two months). The subsidy is assigned for one year, renewable annually. If the beneficiary does not attend school, s/he will lose the subsidy.
Ecuador	*Bono de Desarrollo Humano* (since 2003)	Children under 16 years old.	Education: Children between 5 and 17 years must be enrolled in school and have at least 75% school attendance. Health: Children between 0 and 1 year old must be brought to at least one preventive health control every 2 months. Children between 1 and 5 years old must be brought to at least one preventive health control every 6 months.
Peru	*Programa JUNTOS* (since 2005)	Families in extreme poverty, with pregnant women, widowed parents, elder adults, or children less than 15 years old.	Health: Attend health checks for children between 0 to 5 years old, pregnant women, and infants. Nutrition: Participation in the Food Supplement Program for Higher-Risk Groups (PACFO) (children between 6 months and 3 years old). Education: Children between 6 and 14 years old must have at least 85% school attendance. Identification: Enroll children to obtain their ID.

Source: Based on Cecchini and Madariaga (2011).

program.[26] Chapter 5 presents an evaluation of the Ecuadorean CCT program, the Human Development Bonus (*Bono de Desarrollo Humano* – BDH).

[26] Beneficiaries could increase their fertility rate to remain as beneficiaries of the program.

TABLE 1.8 | Noncontributory Pension Systems in the Andean Countries, 2010

	Bolivia	Colombia	Ecuador	Peru	Venezuela
Name of system	*Fondo Solidario – Renta Dignidad*	*Fondo de Solidaridad Pensional*	*Pensión de Adultos Mayores*	*Pensión 65*	*Ley de Régimen Prestacional de Servicios Sociales al Adulto Mayor*
Requirements	Adults over 60 years old	Workers registered in the Social Security Regime (Régimen de Seguridad Social)	Adults over 65 years old without social security who belong to the lowest income quintile	Adults over 65 years old in extreme poverty	Elderly adults in need
Amount	Bs 200 for those without pension Bs 150 for those with a pension	Percentage of worker contribution to social security	US$35	250 soles (about US$95)	Between 60% and 80% of the actual urban minimum wage

Source: Montes (2012).

Noncontributory Pensions

During the last decade, various types of noncontributory pensions have been created in the Andean region (Table 1.8). In noncontributory pension programs, the beneficiaries receive a pension transfer without having contributed to the funds that finance such a transfer. Instead, these pensions are funded by formal taxpayers either indirectly (by public expenditure) or directly (by mandatory specific contributions levied from their payroll).[27] Noncontributory pension programs are aimed at (1) subsidizing pensions for those independent workers who may not have enough income to make contributions (e.g., pro-bono workers, people with disabilities, etc.); and (2) providing a subsidy to people in extreme

[27] For instance, the noncontributory pension fund in Bolivia is financed by compulsory contributions from formal workers under the following scheme: 0.5% for those with a labor income of Bs 13,000; 1% for those with a labor income between Bs 13,000 and Bs 25,000; 5% for those with incomes between Bs 25,000 and Bs 35,000; and, 10% for those with income above Bs 35,000. The noncontributory pension fund in Colombia is financed by mandatory contributions made under the following scheme: 1% for those with labor income higher than four minimum wages; 0.2% of additional pay for those with a labor income between 16 and 17 minimum wages; 0.4% of additional pay for those with labor income between 17 and 18 minimum wages; 0.6% of additional pay for those with labor income between 18 and 19 minimum wages; 0.8% of additional pay for those with a labor income between 19 and 20 minimum wages; and 1% of additional pay for those with labor income between 20 and 25 minimum wages.

poverty or who are indigent. Hence, the targeting of noncontributory pensions (as happens with any noncontributory transfer) has an important impact on labor market behavior. For instance, elder beneficiaries who are not extremely poor or indigent and who are living in households sustained financially by some close relatives (offspring, siblings, etc.) could allocate the pension to enhance the household budget and hence affect the marginal decision of working (or working independently) of the other household members. It could also be the case that (not necessarily extreme) poor elderly persons could be part of poor households already receiving other transfers (such as CCTs), further exacerbating the disincentives to work or to work formally. Likewise, for pension contributors whose incomes are very low, a noncontributory pension policy can become an incentive to discontinue contributions (i.e., to become informal) because beneficiaries would expect to get a pension when they need it without having made any contribution. Unfortunately, to date there are no studies of the impact of noncontributory pensions on formal employment.

Conclusions and Policy Recommendations

Informality is an elusive concept that can be used in several contexts with various meanings. In labor markets, informality usually refers either to lack of registration that puts firms into the underground economy (firm informality) or to the lack of social benefits that leaves workers unprotected from risks (labor informality) in the short run (minimum wages, severance payment, unemployment insurance, etc.) or in the long run (pensions). This chapter has outlined the conceptual framework and provided some initial estimates of the order of magnitude of both firm informality and labor informality in the Andean region.

The chapter has explained that within each dimension (demand and supply), distinct qualifiers determine the degree of informality. For instance, in the demand dimension, a firm can be qualified as formal or informal according to its enrollment in public records; in the supply dimension, one qualifier to be considered informal is the contribution workers make to a pension system. While there are many qualifiers that can be considered, some of them not mutually exclusive, this book devotes most of its attention to the dimension of labor supply and defines informality based on the social benefits qualification. This corresponds in part to the clean cut one can get when defining labor informality in such a way (a worker either does or does not contribute to a pension system, and one can track this decision); in part to the rich datasets for this qualifier

for several periods and even for the same individuals across time; and in part to the leading role that pension reforms play in the dialogue on labor reforms and social insurance in the region.

An important message conveyed in the chapter is that there are three distinguishable layers of informality. The most superficial is the registry of firms in public records. The deepest is the use of technologies and practices that enable a business to be economically sustainable and financially sound and that allow it to comply with regulations and distribute its surpluses as a result of its performance and not just because of the exogenous enforcement of the law. This is an important notion that policymakers should bear in mind: enrollment in public registries is important (as it grants access to financial markets, to the local and international formal value chain, etc.), but formalization is not just about promoting registration. Many formalization initiatives in the region have put significant efforts into only improving registration, when more registration in fact does not guarantee either firms' survival or their compliance with regulations (such as payment of workers' social benefits), much less the firms' chance of success. Likewise, several Ministries of Labor, aiming to improve coverage against risks of the labor force, are more concerned with how to increase the enforcement of social regulations than with how to expand the coverage of the provisional system through incentive-compatible mechanisms. Some attempts have been made in countries like Ecuador, where the social security institute has a bank that offers mortgage loans at very competitive conditions to qualifying workers who have contributed regularly to the pension fund. Likewise, a reform to induce voluntary pension savings among the self-employed is currently being engineered in Peru.

Related to this last point, another key message of this chapter is about the sequence of formalization. The chapter argues that policies aimed at formalizing labor markets should first target the formalization of firms, as otherwise there is no sustainable basis for labor formalization. While micro firms absorb an important portion of the Andean labor force (about 47%), they sustain most of the entrepreneurial support (about 85%). On the other hand, while big firms absorb a significant 33% of the labor force they only account for about 4% of Andean firms. With such a distribution of firms and workers, the policy design of formalization strategies should be mindful of the significant amount of resources that would be necessary to enforce labor regulations that are not incentive-compatible for those under regulation (for instance, monitoring costs of micro firms that number in the millions and are unstable and often shut down, merge, or otherwise change in some way). Strategies aimed at strengthening the productivity or competitiveness of firms and entrepreneurships at the very

micro level could better build support for a sustainable formal sector than those targeting mere registration or likely-unstable enforced compliance through labor regulation.[28] That said, labor regulation is also an important ingredient for sustainable formal interactions, at least when those regulations are designed to be economically incentive-compatible mechanisms and not just to be legal mandates that oftentimes end up inhibiting formal hiring.

A final message to take out of this chapter is that a reading of the empirical margins of informality in the region reflects that, even within big firms (where firm informality is nil), labor informality is present. The general pattern observed across all countries in the region suggests that labor informality is seen in micro firms populated by both independent entrepreneurs and independent workers; small firms absorbing mainly informal salaried workers; and medium-sized and large firms that hire most of the formal salaried workforce but also hire informal salaried and self-employed workers. This overall picture reveals not only that the highest exposure lies at the less traceable end of firm distribution—think, for example, about the millions of itinerant self-employed street vendors or the thousands of spontaneous cab drivers that one can find in many urban areas of the Andean countries—but also in a sector compounded by agents whose economic rationale blends firm and worker/consumer behavior. A big challenge remains to better understand the self-employed sector, as many of the policies aimed at prompting labor formality have been focused on protecting informal salaried workers, and such policies may not have the same impact on independent small entrepreneurs.[29]

[28] For instance, technological improvement programs, training programs to upgrade the labor force to better meet the needs of the labor market, horizontal integration programs, clustering and promotion of industrial parks, programs for vertical integration to the formal value chain, regional fairs and workshops to convene and match commercial partners, etc.

[29] See McKenzie, de Mel, and Woodruff (2008) and Narita (2010) for an empirical and theoretical assessment of self-employment in developing economies, respectively.

APPENDIX TABLE 1.1 | Main Labor Legislation in the Andean Countries

		Bolivia	Colombia	Ecuador	Peru	Venezuela
Labor market institutions acting on prices	Unions	• Ley General del Trabajo.	• Resolución 1651. • Resolución 1875. • Ley 584. Ley sobre la libertad sindical.	• Ley reformatoria al Código del Trabajo.	• Decreto Supremo 010-2003TR. Ley de relaciones colectivas de Trabajo. • Decreto Supremo 013-2006-TR. Reglamento de la Ley de Relaciones Colectivas de Trabajo.	• Ley Orgánica del Trabajo.
	Payroll taxes: General and Special regimes	• Ley 065. Ley de Pensiones. • Ley 3785. Ley de Trabajadores estacionales y Pensión Mínima. • Ley 3791. Ley de la Renta Universal de Vejez (Renta Dignidad). • Decreto Supremo 26069. Compensación de Cotizaciones mediante los Procedimientos Automático y Manual, para la emisión, el pago y las prestaciones del Seguro Social Obligatorio (SSO) de largo plazo a través de las Administradoras de Fondos de Pensiones o Entidades Aseguradoras.	• Ley 100, Ley de la Seguridad Social Integral. • Decreto 813 que reglamenta la ley 100. • Código Sustantivo del Trabajo. • Ley 50. Reformas al Código Sustantivo del Trabajo. • Decreto ley 2158, Código procesal del trabajo y de la seguridad social. • Ley 1210. Ley de modificación del Código Sustantivo del Trabajo y del Código Procesal del Trabajo y de la Seguridad Social.	• Ley de reforma a las leyes de seguridad social, a la ley de seguridad social de las fuerzas armadas y seguridad social de la policía nacional. • Ley reformatoria al Código del Trabajo. • Ley 2001–55. Ley de seguridad social. • Reglamento de seguridad y salud de los trabajadores y mejoramiento del ambiente de trabajo.	• Decreto Supremo 018-2007-TR Disposiciones relativas al uso de la planilla electrónica. • Decreto Supremo No. 003-2007-TR, Reglamento de la Ley que Regula la Actividad de las Empresas Especiales de Servicios y Cooperativas de Trabajadores. • Decreto Supremo 008-2010 TR. Modifica el reglamento de seguridad y salud y aprueba formulario de registro de accidente de trabajo. • Ley 29351 Reducción de costos laborales de aguinaldos y bonificaciones por fiestas patrias y navidad.	• Reglamento de la Ley Orgánica del Trabajo. • Reforma Parcial del Reglamento de la Ley Orgánica del Trabajo. • Ley del Régimen Prestacional de Empleo. • Ley Orgánica del Trabajo. • Ley Orgánica del Sistema de Seguridad Social. • Ley del Seguro Social. • Ley de Servicios Sociales. • Decreto 2814 Reforma parcial del reglamento de la ley del seguro social.

(continued on next page)

APPENDIX TABLE 1.1 | Main Labor Legislation in the Andean Countries (*continued*)

		Bolivia	Colombia	Ecuador	Peru	Venezuela
Labor market institutions acting on prices (*continued*)	Payroll taxes: General and Special regimes	• Decreto Supremo 25851. Ley de Pensiones. • Decreto Ley 16896. Código Procesal del Trabajo. • Ley General del Trabajo. • Ley 1732 Ley de Pensiones. • Decreto Supremo 24469. Reglamento de la ley de pensiones. • Código de Seguridad Social. • Decreto Supremo 822. Reglamento Ley de Pensiones. • Decreto Supremo 29537. Tiene como objetivo complementar y modificar la reglamentación del Seguro Social Obligatorio de largo plazo. • Ley 2427. Modifica cobertura del Bonosol.	• Ley 1233 Definición de elementos estructurales de las contribuciones a la seguridad social y parafiscales. • Ley 797. Sistema general de pensiones previsto en la Ley 100 de 1993. • Ley 789. Ampliación de la protección social y modificación del código sustantivo del trabajo. • Decreto Número 3771. Reglamento de Fondo de solidaridad. • Ley 71. Modifica el Código procesal del trabajo y de la seguridad social.		• Decreto Supremo 001-97-TR. Texto Único ordenado de la ley de compensación por tiempo de servicios. • Ley 26790. Ley de modernización de la seguridad social en salud. • Resolución Jefatural 047-2000-Jefatura/ONP. Procedimiento de Inscripción al Régimen Facultativo del Sistema Nacional de Pensiones. • Decreto Supremo 024-2001-TR Consolidación de beneficios laborales. • Decreto Legislativo 688. Ley de consolidación de beneficios laborales. • Decreto Ley 25897 Creación del Sistema Privado de Pensiones (SPP). • Decreto Ley 19990 (1973) Creación del Sistema Nacional de Pensiones. • Ley 26790. Ley de Modernización de la Seguridad Social en Salud.	

(continued on next page)

APPENDIX TABLE 1.1 | Main Labor Legislation in the Andean Countries (*continued*)

		Bolivia	Colombia	Ecuador	Peru	Venezuela
Labor market institutions acting on prices (*continued*)	Payroll taxes: Micro, Small and medium-sized enterprise laws		• Ley 1429. Ley de formalización y generación de empleo. • Ley 590. Ley de Promoción del desarrollo de las micro, pequeñas y medianas empresas.	• Codificación de la ley de fomento de la pequeña industria y artesanía.	• Decreto Supremo 007-2008-TR Texto Único Ordenado de la Ley de Promoción de la Competitividad, Formalización y Desarrollo de la Micro y Pequeña Empresa y del Acceso al Empleo Decente-Ley MYPE. • Decreto Supremo 008-2008-TR. Reglamento del Decreto Supremo 007-2008-TR. • Decreto Supremo 01-2011-PRODUCE. Modifica Reglamento de Ley MYPE. • Decreto Legislativo 1086. Ley de Promoción de la competitividad, formalización y desarrollo de la micro y pequeña empresa y del acceso al empleo decente. • Decreto Supremo 009-2006-TR. Aprueba Plan Nacional de Promoción y Formalización para la Competitividad y Desarrollo de las MYPE 2005-2009. • Ley 28015. Ley de Promoción y Formalización de la Micro y Pequeña Empresa. • Decreto Supremo 003-97-TR Texto Único Ordenado del DL728. Ley de productividad y competitividad laboral. • Decreto Ley 728. Ley fomento del empleo.	• Decreto 6215. Ley para la Promoción y Desarrollo de la Pequeña y Mediana Industria y Unidades de Propiedad Social.

(continued on next page)

APPENDIX TABLE 1.1 | Main Labor Legislation in the Andean Countries (*continued*)

		Bolivia	Colombia	Ecuador	Peru	Venezuela
Labor market institutions acting on quantities	Regulation on working hours	• Resolución Ministerial 1073/10. Reglamento del horario de Trabajo. • Decreto Supremo Nº0751. Regula la jornada de trabajo en horario continuo en entidades del Órgano Ejecutivo. • Decreto Supremo 29000. Regula la jornada de trabajo en horario discontinuo en todas las instituciones públicas.	• Código Sustantivo del Trabajo.	• Mandato constituyente No. 8. Eliminación y prohibición de la tercerización, intermediación laboral, contratación laboral por horas y cualquier forma de precarización de las relaciones laborales.	• Decreto Supremo 007 2002 TR. Texto Unico Ordenado de la ley de jornada de trabajo, horario y trabajo en sobretiempo.	• Ley Orgánica del Trabajo.
	Compulsory schooling age or minimum working age	• Ley General del Trabajo.	• Ley 1098. Código de la infancia y la adolescencia.	• Ley reformatoria al Código del Trabajo.	• Ley 27337. Aprueba el Nuevo Código de los Niños y Adolescentes. • Código de los Niños y Adolescentes.	• Ley orgánica para la protección de niños, niñas y adolescentes.

(continued on next page)

APPENDIX TABLE 1.1 | Main Labor Legislation in the Andean Countries (*continued*)

		Bolivia	Colombia	Ecuador	Peru	Venezuela
Other influential labor institutions	Employment protection legislation (Severance payment)	• Decreto Supremo 521. Prohibición de la evasión a la norma laboral, la subcontratación, tercerización internalización, en tareas propias del giro del establecimiento laboral. • Resolución Ministerial 868/10. Procedimiento de reincorporación de trabajadores. • Decreto Supremo 28699. Estabilidad Laboral, Derogación Art. 55 Del Decreto Supremo 21060.	• Código Sustantivo del Trabajo.	• Ley reformatoria al Código del Trabajo.	• Decreto Supremo 001-97-TR. Texto Único Ordenado de la ley de compensación por tiempo de servicios. • Decreto Supremo 024-2001-TR Consolidación de beneficios laborales. • Decreto Legislativo 688. Ley de consolidación de beneficios laborales.	• Ley Orgánica del Trabajo.

Source: Montes (2012).

References

Bennett, J. and Estrin, S. 2007. "Informality as a Stepping Stone: Entrepreneurial Entry in a Developing Economy." Discussion Paper No. 2950. Bonn, Germany: Institute for the Study of Labor (IZA).

Boeri, T. and Garibaldi, P. 2002. "Shadow Activity and Unemployment in a Depressed Labour Market." Discussion Paper No. 3433. London, United Kingdom: Centre for Economic Policy Research (CEPR).

Boeri, T. and van Ours, J. 2008. *The Economics of Imperfect Labor Markets.* New Jersey, United States: Princeton University Press.

Bonilla, J. 2009. "El Salario Mínimo en Venezuela: Algunas consideraciones generales." *Gaceta Laboral.* 15(1): 29–55.

Borda, D. and Ramírez, J. 2006. "Bolivia: Situación y Perspectivas de las MYPES y su Contribución a la Economía." IDB Serie de Notas de Referencia. RE1-RN-06–001. Washington, DC, United States: Inter-American Development Bank.

Botero, J., Djankov, S., La Porta, R., López-de-Silanes, F. and Schleifer, A. 2003. "The Regulation of Labour." Working Paper No. 9756. Massachusetts, United States: National Bureau of Economic Research (NBER).

Cecchini, S. and Madariaga, A. 2011. "Programas de Transferencias Condicionadas: Balance de la Experiencia Reciente en América Latina y El Caribe." Cuadernos de la CEPAL 95, Naciones Unidas.

Chacaltana, J. 2008. "Una evaluación del régimen laboral especial para la microempresa en Perú, al cuarto año de vigencia." Mimeographed document.

Charmes, J. 2006. "Measurement of the contribution of informal sector/Informal employment to GDP in developing countries: some conceptual and methodological issues." Paper presented at the Conference of Expert Group on Informal Sector Statistics. New Delhi: India.

Chaudhuri, S. and Mukhopadhyay, U. 2010. *Revisiting the Informal Sector. A General Equilibrium Approach*. New York, United States: Springer.

Chen, M. 2006. "Rethinking the Informal Economy: Linkages With the Formal Economy and the Formal Regulatory Environment." In: B. Guha-Khasnobis, R. Kanbur and E. Ostrom, editors. Linking the Formal and Informal Economy Concepts and Policies. New York: Oxford University Press.

Cole, W. and Sanders, R. 1985. "Internal Migration and Urban Employment in the Third World." *American Economic Review.* 75(3): 481–94.

Confederación Sindical de las Américas. 2010. "Sindicalización y Densidad Sindical en las Américas." Paper presented at the "Formación Sindical sobre

Empleo, Salarios y Piso básico de Protección Social" conference. Cancun: Mexico.

Cuesta, L. 2005. "Impacto de los sindicatos en Colombia: mayores salarios y más desigualdad?" Working Paper No. 2005–45. Bogotá, DC, Colombia: Centro de Estudios sobre Desarrollo Económico (CEDE), Universidad de los Andes.

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

Diaz-Cayeros, A. and Magaloni, B. 2009. "Conditional Cash Transfer Programs and the Fight against Poverty in Latin America." Paper presented at the Conference on Poverty, Inequality, and Democracy. Bratislava: Slovakia.

Djankov, S., La Porta, R., López-de-Silanes, F. and Shleifer, A. 2002. "The Regulation of Entry." *Quarterly Journal of Economics*. 117(1): 1–37.

ECLAC (Economic Commission for Latin America and the Caribbean). 2009. *Social Panorama of Latin America*. Santiago: ECLAC.

Fields, G. 1975. "Rural-Urban Migration, Urban Unemployment and Underemployment, and Job Search Activity in LDC's." *Journal of Development Economics* 2(2): 165–88.

Fields, G. 1990. "Labour Market Modeling and the Urban Informal Sector: Theory and Evidence." In: D. Turnham, B. Salomé and A. Schwarz, editors. *The Informal Sector Revisited*. Paris, France: Development Center of the Organization for Economic Cooperation and Development.

Flodman, K. 2004. "The Informal Economy." SIDA Fact-finding Study Stockholm Swedish International Development Cooperation Agency.

Flórez, C. 2002. "The Function of the Urban Informal Sector in Employment: Evidence from Colombia 1984–2000." Working Paper No. 2002–04. Bogotá, DC, Colombia: Centro de Estudios sobre Desarrollo Económico (CEDE), Universidad de los Andes.

Friedman, E., Johnson, S., Kaufmann, D. and Zoido-Lobatón, P. 2000. "Dodging the Grabbing Hand: The Determinants of Unofficial Activity in 69 Countries." *Journal of Public Economics*. 76(3): 459–93.

Gasparini, L. and Tornarolli, L. 2007. "Labor Informality in Latin America and the Caribbean: Patterns and Trends from Household Survey Microdata." Working Paper No. 0046. La Plata, Argentina: Centro de Estudios Distributivos, Laborales y Sociales (CEDLAS), Universidad Nacional de La Plata.

Geertz, C. 1963. *Peddlers and Princes: Social Change and Economic Modernization in Two Indonesian Towns*. Chicago, United States: University of Chicago.

Gindling, T. and Terrell, K. 2005. "The Effect of Minimum Wages on Actual Wages in Formal and Informal Sectors in Costa Rica." *World Development.* 33(11): 1905–921.

Harding, P. and Jenkins, R. 1989. *The Myth of the Hidden Economy: Toward a New Understanding of Informal Economic Activity.* Berkshire, United Kingdom: Open University Press.

Harris, J. and Todaro, M. 1970. "Migration, Unemployment and Development: A Theoretical Analysis." *American Economic Review.* 60(1): 126–42.

Hart, K. 1973. "Informal Income Opportunities and Urban Employment in Ghana." *Journal of Modern African Studies.* 11(1): 61–89.

Hoddinott, J. and Bassett, L. 2009. "Conditional Cash Transfer Programs and Nutrition in Latin America: Assessment of Impacts and Strategies for Improvement." Working Paper No. 9. Rome, Italy: Hunger-Free Latin America and the Caribbean Initiative, Food and Agriculture Organization.

ILO (International Labor Organization). 1972. *Employment, Incomes and Inequality: A Strategy for Increasing Productive Employment in Kenya.* Geneva, Switzerland: ILO.

ILO (International Labor Organization). 2009. *2009 Labour Overview. Latin America and the Caribbean*. Geneva, Switzerland: ILO.

Jaramillo, M. 2004. "Efectos del Salario Mínimo sobre el Empleo en el Perú." CRECER Project, USAID. Washington, DC, United States. Mimeographed document.

Johnson, S., Kauffman, D. and Schleifer, A. 1997. "The Unofficial Economy in Transition." *Brooking Papers on Economic Activity.* 2: 159–239.

Jones, P. 1997. "The Impact of Minimum Wage Legislation in Developing Countries where Coverage is Incomplete." Working Paper No. 98–2. Oxford, United Kingdom: Center for the Study of African Economies, Institute of Economics and Statistics, University of Oxford.

Jüttin, J., Parlevliet, J. and Xenogiani, T. 2008. "Informal Employment Re-loaded." Working Paper No. 266. Paris, France: Development Center, Organization for Economic Cooperation and Development.

Kanbur, R. 2009. "Conceptualizing Informality: Regulation and Enforcement." *Indian Journal of Labour Economics.* 52(1): 33–42.

Kanbur, R. 2011. "Avoiding Informality Traps." In: E. Ghan, editor. *Reshaping Tomorrow: Is South Asia Ready for the Big Leap?* London, United Kingdom: Oxford University Press.

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

Lewis, A. 1954. "Economic Development with Unlimited Supply of Labour." *The Manchester School.* 22(2): 139–91.

Loayza, N. 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: 129–162.

Loayza, N., Oviedo, A. and Serven, L. 2005. "The Impact of Regulation on Growth and Informality – Cross-country Evidence." Working Paper No. 3623. Washington, DC, United States: World Bank.

Lopez-Acevedo, G. and Tan, H. 2010. *Impact Evaluation of SME Programs in Latin America and Caribbean*. Washington, DC, United States: World Bank.

López, H. and Lasso, F. 2008. "Salario Mínimo, salario medio y empleo asalariado privado en Colombia. Un estudio exploratorio sobre la evasión al mínimo legal." Borradores de Economía. No. 484. Medellín, Colombia: Banco de la República.

Lora, E. and Pagés-Serra, C. 2003. "Labor market regulations and institutions." In: Economic and Social Progress in Latin America – 2004 Report, Inter-American Development Bank.

Maloney, W. 2004. "Informality Revisited." *World Development.* 32(7): 1159–178.

Maloney, W. 1999. "Does Informality Imply Segmentation in Urban Labor Markets? Evidence from Sectoral Transitions in Mexico." *World Bank Economic Review.* 13: 275–302.

Maloney, W. 2006. "Informality Deconstructed." World Bank, Washington, DC, United States. Mimeographed document.

McGee, T. 1971. *The Urbanized Process in the Third World*. London, United Kingdom: G. Bell and Sons.

McGee, T. 1973. "Peasants in the Cities: A Paradox, A Most Ingenious Paradox." *Human Organization.* 32(2): 135–42.

McKenzie, D., de Mel, S. and Woodruff, C. 2008. "Who Are the Microenterprise Owners? Evidence from Sri Lanka on Tokman v. de Soto." Working Paper No. 4635. Washington, DC, United States: World Bank.

McKinsey & Company. 2009. "Análisis del sector informal e incentivos fiscales en México." IDB (Inter-American Development Bank). Mimeographed document.

Meléndez, M. and Pagés, C. 2011. "Payroll Taxes and Labor Demand: Evidence from Colombia." Mimeographed document.

Mingione, E. 1984. "The Informal Sector and the Development of the Third World Cities." *Regional Development Dialogue.* 5(2): 135–42.

MINTRA (Ministerio de trabajo). 2008. *Actualización de Estadísticas de las MYPE*. Lima, Perú: Ministerio de trabajo.

Montes, J. 2012. "Labor Regulation and Institutional Arrangements: A Comparative Survey for Andean Countries." IDB (Inter-American Development Bank). Washington, DC, United States. Mimeographed document.

Narita, R. 2010. "Self Employment in Developing Countries: A Search-Equilibrium Approach." University College London. Mimeographed document.

OECD Stat Extracts. 2010. Obtained from http://stats.oecd.org/.

Pagés, C., G. Pierre, and S. Scarpetta. 2009. *Job Creation in Latin America and the Caribbean. Recent Trends and Policy Challenges.* Washington, DC, United States: Palgrave MacMillan and the World Bank.

Perova, E. and Vakis, R. 2009. "Welfare Impacts of the Juntos Program in Peru: Evidence from a Non-experimental Evaluation." World Bank. Mimeographed document.

Perry, G., Arias, O., Fajnzylber, P., Maloney, W., Mason, A. and Saavedra, J. 2007. *Informality: Exit and Exclusion*. Washington, DC, United States: World Bank.

Quijano, A. 1974. "The Marginal Pole of the Economy and the Marginalized Labour Force." *Economy and Society.* 3(4): 393–428.

Ranis, G. and Stewart, F. 1999. "V-goods and the Role of the Urban Informal Sector in Development." *Economic Development and Cultural Change.* 47(2): 259–88.

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

Santos, M. 1979. *The Shared Space: The Two Circuits of the Urban Economy in Underdeveloped Countries*. London, United Kingdom: Metheuen.

Sarte, P. 2000. "Informality and Rent-Seeking Bureaucracies in a Model of Long Run Growth." *Journal of Monetary Economics.* 46(1): 173–97.

Schneider, F. 2005. "Shadow Economies around the World: What Do We Really Know?" *European Journal of Political Economy.* 21(3): 598–642.

Schneider, F. and Enste, D. 2000. "Shadow Economies: Size, Causes, and Consequences." *Journal of Economic Literature.* 38(1): 77–114.

Steiner, R. and Parra, M. 2011. "Trabajo temporal e indirecto y sus implicaciones sobre el mercado laboral. Resultados de la Encuesta Social Longitudinal de Fedesarrollo." Debates de Coyuntura Económica y Social No. 89. Bogotá, Colombia: Fundación para la Educación Superior y el Desarrollo – FEDESARROLLO.

Todaro, M. 1969. "A Model of Labour Migration and Urban Unemployment in Less Developed Countries." *American Economic Review.* 39(1): 138–48.

Trade Union Membership Statistics Database. 2013. Obtained from http://www.ilo.org/ifpdial/information-resources/dialogue-data/lang--en/index.htm.

United Nations. 2011. *World Urbanization Prospects: 2011 Revision*. New York, United States: United Nations.

Vuletin, G. 2008. "Measuring the Informal Economy in Latin America and the Caribbean." Working Paper No. 08/102. Washington, DC, United States: International Monetary Fund.

World Development Indicators (WDI). 2012. Obtained from http://data.worldbank.org/data-catalog/world-development-indicators.

2

Assessing Exposure to Labor Informality: Where Do the Andean Countries Stand?

Labor informality is an endemic feature of all Andean labor markets. Still widespread, its evolution during the last decade has followed particular trends in each country, both in terms of the allocation and remuneration of the labor force. This chapter examines these trends for all the Andean countries.

We start the analysis with a conventional and basic static approach aimed at providing descriptive statistics of the size of the *exposure* to informal arrangements from two perspectives. The first perspective focuses on the incidence of informal arrangements in the *allocation of labor* among different groups of workers (to provide a characterization of the informal sector). The second perspective stresses the influence of informality on *remuneration* of the labor force (to see if wages are compensating for workers' lack of protection). At this stage, our aim is purely descriptive as we intend to assess the order of magnitude of informality and frame the problem in both equilibrium outcomes: supplied/demanded labor and earned/paid wages.

The chapter provides evidence on the temporal evolution of the size of employment sectors as well as of the remuneration of workers in each sector. The static time series studied at this point is abstract from any connection between snapshots (dynamic longitudinal analysis is left for Chapters 3 and 4). Here instead we are interested in learning if overall informality is getting bigger or smaller or if salaries are evolving in such a way to compensate or exacerbate the lack of protection that an informal job implies. Ultimately our understanding of exposure combines readings on both axes: How informal is the labor force

of a country? And how adequately or inadequately compensated are informal workers in monetary terms?

Finally, in order to assess the effectiveness of government interventions aimed at securing minimum levels of compensation (or purchasing power) of workers in distinct groups, this chapter studies if minimum wages set by the Andean governments are helping to reduce income inequality between groups. It also examines the extent to which minimum wages among salaried workers (both formal and informal) are binding and how influential they are in determining wages at higher levels of the earnings distribution (the so-called "lighthouse effect").

The final goal of this chapter is to start the analysis of labor informality in the Andean countries from the very basics, assessing the exposure to the problem and providing a documented background of where the countries stand. This will allow for further and more refined examinations in the subsequent chapters in terms of both worker allocation and remuneration.

Where Do the Andean Countries Stand?

Labor informality accounts for about 70% of the Andean urban labor force. That is, 7 of 10 workers in urban areas of the region lack social benefits that should be provided by their employers. Some recent contributions (Perry et al. 2007) have suggested that voluntary exits from the formal sector might be inducing a significant portion of displacements toward the informal sector in the Andean region. However, about 60% of the informal salaried workers of the Andean region earn less than the national legal minimum wage. In other words, 4 out of 7 informal workers are not only socially unprotected in terms of health or retirement contingencies, they are also de facto economically unsecured. Thus, even if voluntary formal exits involving workers looking for more flexible arrangements are plausible, evidence also suggests that there is a significant mass of informal workers who are not benefiting from the "gains" of avoiding taxes that are supposed to come from informal arrangements. This situation—more akin to exclusion than to voluntary exit—is aggravated by the vicious circles that frame interactions between workers, employers, regulators and institutions in the Andean labor markets (see Chapter 1).[1] Hence, in spite of the flexibility that informal setups convey and that may attract employers

[1] Fields (2004) suggests the informal sector is not homogeneous but rather consists of two tiers. The upper tier represents the competitive tier into which individuals enter voluntarily because, given their specific characteristics, they expect to earn more than they would earn in the for-

and employees,[2] such high levels of informality are not without their costs and can also involve detrimental consequences that could gradually lead to a suboptimal equilibrium.[3]

Exposure to Social "Insecurity": Size and Characteristics of the Informal Sector

Labor hired in a given sector is the outcome of the interaction of at least two parties, employers and employees, who agree on employment and remuneration based upon a match between the need to get a job done and the skills to do that job. The remuneration and the arrangement may or may not be within the scope of the local legal framework, but it is presumed that if accepted they meet the criterion of being at least as good as the best alternative for both parties. From the point of view of a worker, if the arrangement is informal, and our mindset is dualistic (see Chapter 1), the alternative would be unemployment; if our mindset is competitive, the alternative would be a less flexible or favorable formal arrangement. Here we study the set of workers that either due to exclusion or voluntary reasons belongs to the informal sector.

We use household surveys available for Bolivia, Colombia, Ecuador, Peru, and Venezuela to analyze the phenomena of labor informality in the region and compare its development across the Andean region. Save for Venezuela (whose rural sector is relatively small), and unless otherwise indicated, all statistics are drawn exclusively from the urban sector.

Panel A of Figure 2.1 shows the size of urban informality (measured as a lack of social security) in the five Andean countries. The figure shows that across

---

mal sector. The lower tier harbors individuals rationed out of the formal labor market (and, possibly, out of upper-tier informal jobs). See Gunther and Launov (2007) for an empirical test of the coexistence of competitive and segmented employment in the informal sector for the urban labor market in Ivory Coast.

[2] Flexible working conditions in terms of the number of worked hours per week, schedules, job location, etc., are common arguments that workers present when they speak in favor of informal arrangements. Likewise, firms might also find it easier to attract workers they need if they can have a certain flexibility in terms of hours, wages, working conditions, and seasonality, as well as hiring and firing procedures that formalization does not permit (Coudouel, Cunningham, and Mason 2010).

[3] As explained earlier, besides the potential harmful effects that lack of social protection may have on workers' welfare, high informality drags economic growth, perpetuates inefficiencies, and exacerbates vulnerabilities (see the Introduction of this book and the discussion of vulnerabilities in Chapters 4 and 5). For instance, under the framework of the classic Harris-Todaro (1970) model, equilibrium is suboptimal for two reasons: first, wages are not equalized across sectors and hence permanent differentials persist; and second, it prompts unemployment. Chaudhuri and Mukhopadhyay (2009) compile a number of general equilibrium models, some showing suboptimality of informal arrangements. Levy (2008) argues that inducing workers to self-select into the informal sector leads to suboptimal growth rates and productivity levels.

the region, self-employment is the most prominent sector (with the exception of Colombia, where it is about the same size as the formal salaried sector). Self-employed workers usually do not contribute to pension systems (Gasparini and Tornarolli 2007), and hence they are responsible for more than half of the informal sector. The remaining share of the informal sector is comprised of workers hired by an employer who pays them a term salary but without making any contribution to a pension system. Although self-employment is roughly the same size in all the countries (around 40% except for Ecuador, with only 32%), there are important differences in the size of informality among salaried workers. The lowest levels of overall informality[4] in the Andean region are observed in Colombia and Venezuela, where formal employment accounts for as much as 40% of the labor force. Ecuador follows with around a third of formal workers. The smallest formal sectors are in Peru (22%) and Bolivia (14%).

Panels B and C of Figure 2.1 also report the size of the informal sector under alternative definitions of labor informality for those countries for which the surveys allow us to make such a distinction. For instance, if instead of using the lack of contributions to a pension system we use the lack of contributions to a health system or the lack of a labor contract[5] to regulate the relationship between workers and employers, we still see a prominent dominance of the informal sector in Colombia and Peru, although its size would diminish slightly compared to that observed under the lack of pension definition.[6] Ecuador is interesting because it suggests that 55% of the employed labor force has contracts but only 34% contribute to pension systems. In Colombia, the difference is not as striking (43% contracted versus 39% contributing to old-age pensions systems), whereas in Peru the relative difference lies somewhere in between (28% versus 22%, respectively). In any case, two aspects are clear: first, regardless of the definition of labor informality, the size of the informal sector is very high across the region; and second, our preferred definition (lack of contributions to a pension system) is the most conservative.[7]

---

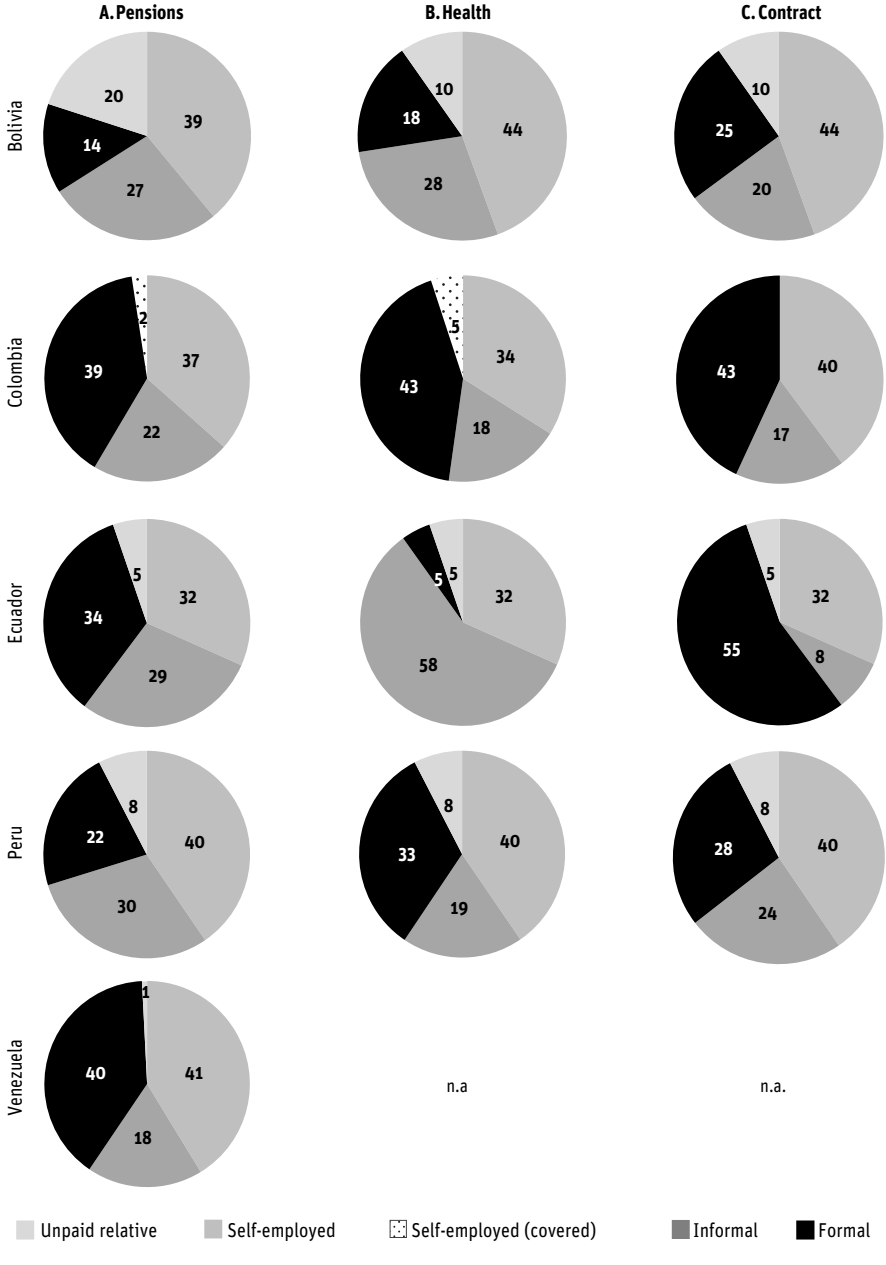
[4] That is, self-employed and informal salaried.

[5] There is some heterogeneity across countries in the questions regarding contracts. In Colombia, the question asks if there is a permanent contract. In Ecuador and Peru, the questions consider temporal contracts in addition to permanent contracts. In Bolivia, verbal contracts are also considered.

[6] This suggest that lack of pensions is a much stricter criteria to measure informality, either because of better enforcement of health contributions and contract underwritings, or because of stronger incentives to get health insurance or to have/provide contracts.

[7] The exception is Ecuador, where only 5% of the employed labor force reports having health insurance provided by employers.

FIGURE 2.1 | **Size of Labor Informality according to a Legal Definition Using Various Criteria, 2010**
(Structure of the employed labor force in percent; urban areas)



Source: National labor surveys. For details see Box 1.1

Notice that for the purposes of this study, the measurement of the informal sector is limited to urban areas. This is because the institutional arrangements governing the labor market in rural areas are distinct from those found in urban areas and hence unconditioned comparisons would not be evenhanded. For

BOX 2.1. INFORMALITY IN THE ANDEAN COUNTRIES IN THE GLOBAL CONTEXT

Considered in a global context, informality in the Andean region is high even for its level of development. Latin America employs 66% of its labor force under informal arrangements.[a] While this figure is certainly higher than that observed in the developed world, it lies at the middle of the distribution of informal labor arrangements in the developing world. Latin America is more informal than the developing areas of Europe and Central Asia, but not much more than developing areas of the Middle East and North Africa and much less informal than Sub-Saharan Africa or South Asia, where more than 90% of the workforce does not contribute to a pension system (see panel A of Box Table 2.1.1). Similarly, while self-employed and unpaid workers in Latin America account for about a third of the labor force, that figure is twice as high in South Asia and Sub-Saharan Africa but not that different from that observed in other emerging areas of the world (see panel B of Box Table 2.1.1). The fact remains, however, that informality in the Andean region—where three-quarters of the labor force does not contribute to a pension system—is surpassed only by that of Sub-Saharan Africa and South Asia. Moreover, controlling by development level (Box Figure 2.1.1), the Andean countries exhibit levels of informality higher than those expected given their level of output per capita.

BOX TABLE 2.1.1 | **Labor Informality in the World**
(As a percentage of the labor force)

A. Average pension noncontributors by region		B. Average vulnerable employment by region	
Developed Countries	15.2	Developed Countries	10.9
Europe and Central Asia	43.3	Europe and Central Asia	29.5
Middle East and North Africa	64.5	Middle East and North Africa	31.5
Latin America and the Caribbean	65.6	Latin America and the Caribbean	36.0
East Asia and Pacific	73.6	Andean Countries	43.7
Andean Countries	74.9	East Asia and Pacific	48.0
Sub-Saharan Africa	91.5	South Asia	68.5
South Asia	92.0	Sub-Saharan Africa	72.1
World	59.6	World	38.0

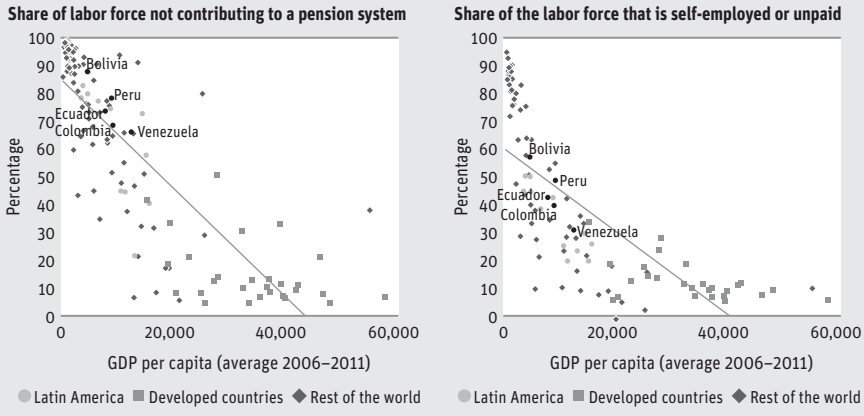
Source: WDI (2012).
Note: Based on latest available year per country as reported by the WDI. Countries are grouped in regions according to the World Bank classification of developing countries.

Source: International Labour Organization (ILO), Key Indicators of the Labour Market database, 2012.
Note: Latest available year per country as reported by the ILO. Countries are grouped in regions according to the World Bank classification of developing countries. Self-employment and unpaid employment are considered as vulnerable.

(continued on next page)

BOX 2.1. INFORMALITY IN THE ANDEAN COUNTRIES IN THE GLOBAL CONTEXT (*continued*)

BOX FIGURE 2.1.1 | **Labor Informality in the World**
(As a percentage of the labor force, controlling for development level)

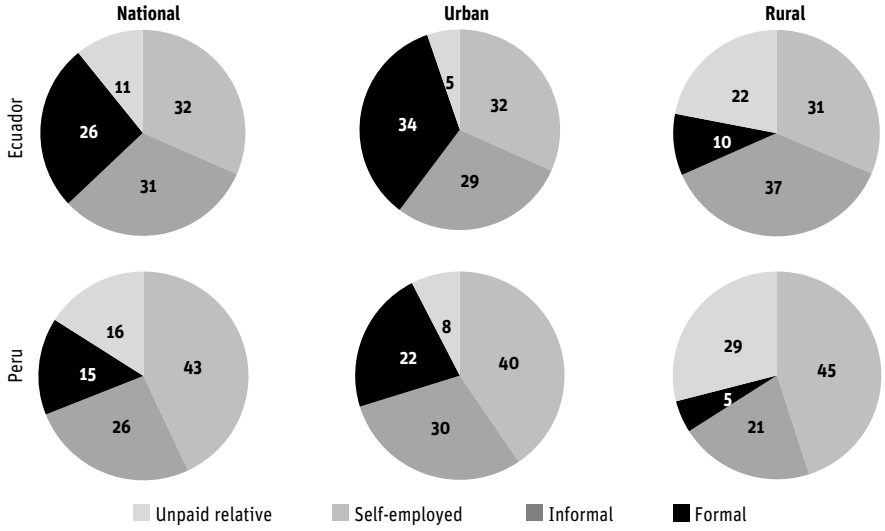


Source: WDI (2012); International Labour Organization, Key Indicators of the Labour Market Database, 2012.
[a] Estimate based on WDI (2012) data on pension noncontributors as a percentage of the labor force.

instance, in rural areas, high shares of agricultural activity[8] of small-scale[9] farms are usually subsistence farming run by unpaid family members. These circumstances carry a system of incentives and remuneration distinct from that found in urban areas, where workers usually rent their time in exchange for monetary remuneration. It is not by chance that seminal contributions to the study of informality portray dualistic structures with a developed urban economy and a backward rural subsistence economy, and where the urban market does not have enough jobs for urban unskilled or rural migrant workers who thus end up in the informal sector. Finally, most of the data sources employed in this study are constrained to metropolitan urban areas, where longitudinal surveillance is more feasible.[10]

[8] The percentages of the rural labor force concentrated in agriculture are 85% in Bolivia, 53% in Colombia, 67% in Ecuador, and 78% in Peru (Köbrich and Dirven 2007).
[9] For instance, in Bolivia, about 50% of agricultural productive units are run by small or medium-sized producers who work about 20% of the productive land. In Ecuador, 64% of agricultural productive units operate on properties of less than 5 hectares. In Peru, 55% of agricultural productive units operate on properties of less than 3 hectares, and 85% operate on properties of less than 10 hectares (GRADE 2012).
[10] One of the criteria used by the 15th International Conference of Labor Statisticians (ICLS) to define informal enterprises is that they are engaged in nonagricultural activities, including

FIGURE 2.2 **Size of Labor Informality according to a Legal Definition Using the Criteria of Contributions to a Pension Plan, 2010**
(Structure of the employed labor force in percent; national, urban and rural areas)



Source: National labor surveys. For details see Box 1.1.

However, so as not to completely disregard this issue, Figure 2.2 shows the corresponding computations for Ecuador and Peru, countries where the surveys cover rural as well as urban areas. We observe that the composition differs dramatically from one area to another. For instance, the participation of the formal salaried sector in the labor force of urban areas is about four times that in rural areas. Within the informal sector, self-employment participation remains roughly the same in both rural and urban areas. However, participation of unpaid relatives is about three times as high in rural areas compared to urban ones. Participation of salaried informal workers is also different between rural and urban areas, but not necessarily in the same way for both countries. In Peru the share of salaried informality is larger in urban areas, while the opposite happens in Ecuador. A noticeable difference between the rural labor markets in the two countries is the share of salaried workers. In Ecuador about half of the

secondary nonagricultural activities of enterprises in the agricultural sector. However, this recommendation was based on practical data collection reasons rather than on conceptual disagreements about the inclusion of firms dedicated to agriculture in the measurement of informality.

employed rural labor force is salaried, while in Peru three-fourths is nonsalaried (either unpaid or independent).

As implied by the regional disaggregation shown in Figure 2.2, a reading of the average size of the labor sectors in each country is informative of the aggregate dimension of the problem, but it disguises assorted situations of specific subgroups, some lying above and others below such averages, and each with particular characteristics that may amplify or mitigate the risks of being informal. Figures 2.3a and 2.3b further examine the aggregate labor force and measures the size of each sector for several categories of workers grouped according to age, educational attainment, the size of the firm where they work, and income levels.

Figures 2.3a and 2.3b reveal many similarities across Andean countries. For instance, in terms of age, Figure 2.3a shows the composition of the labor sector for workers at different phases of the life cycle. Until age 20, most of the working-age population is out of the labor force, but their participation increases substantially above the age of 16 and remains steady between the ages of 25 and 50, as indicated by the out-of-the-labor-force series.

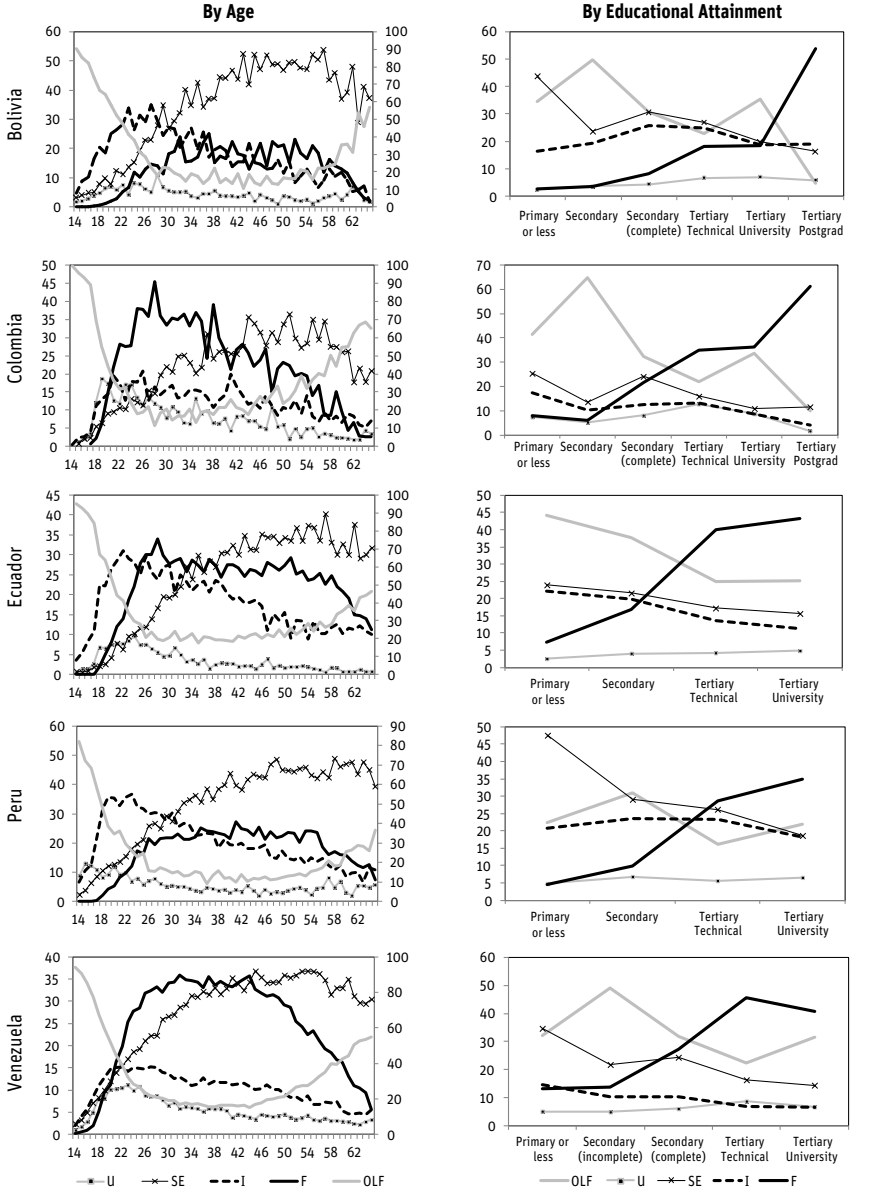
Among young people under the age of 25, either the informal salaried sector or the unemployment sector absorbs most of the labor force. Among the prime-age population group—late 20s and early 30s—salaried formality prevails in Colombia, Ecuador, and Venezuela, but not in Bolivia or Peru. Self-employment absorbs the largest share of the labor force for workers above age 40. In Bolivia and Peru, this feature is more prominent, as self-employment dominates even among workers above age 30.[11] In this snapshot of the composition of several overlapped generations, one can observe that among all Andean countries, Peru (closely followed by Bolivia) is the country with the fewest young workers contributing to a pension system. This will carry serious implications by the time these workers reach retirement age. Indeed, simulations run by Herrera and Bosch (2012) indicate that—given the poor contributory densities and the high transition rates[12] observed in Peruvian labor markets—about 44% of retired Peruvian workers would earn less than a minimum pension by 2030 and about 73% by 2050.

Education also seems to be a relatively good predictor of formality in the region, as the share of unprotected workers drops almost evenly in all countries

[11] Narita (2010) finds a similar pattern in Brazil (share of self-employed population increases positively with age).

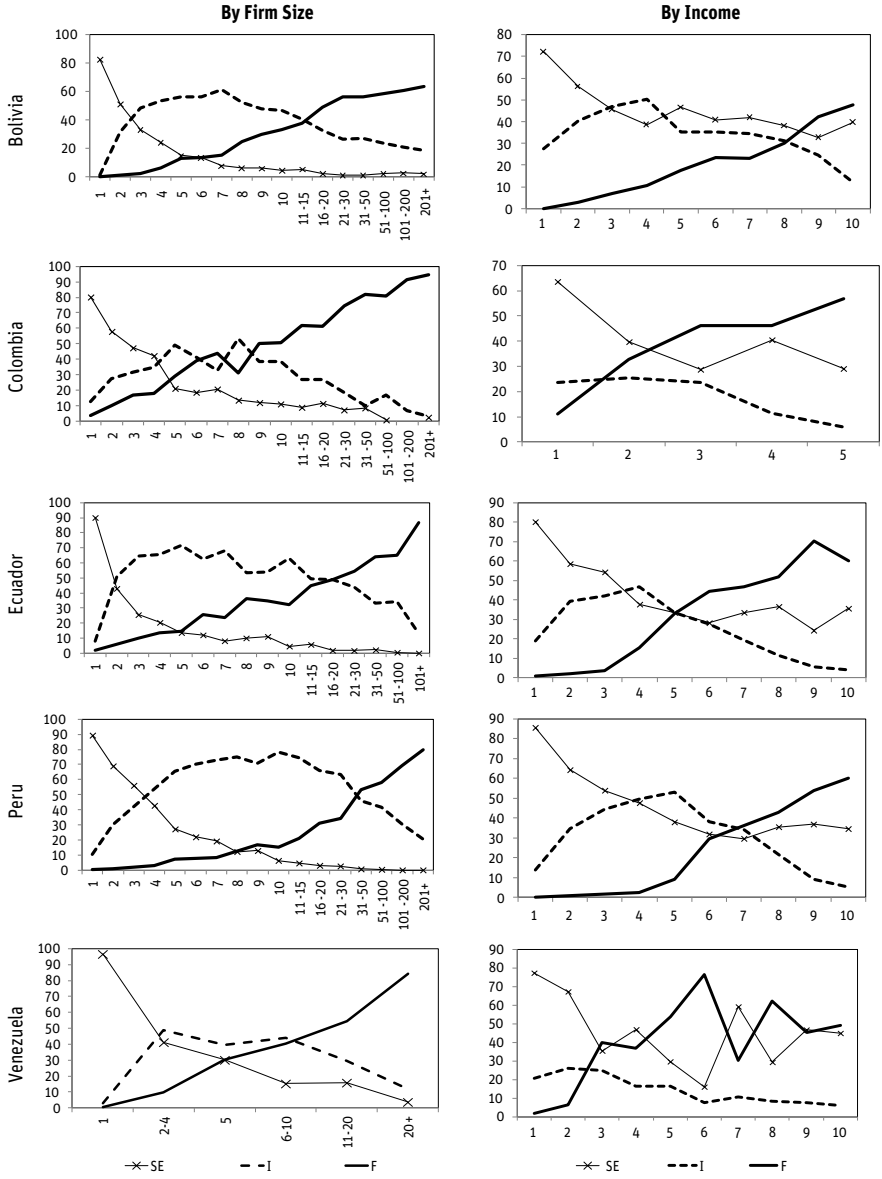
[12] High transition rates in labor markets would prevent workers from accumulating enough contributions to qualify for or afford a permanent stream of income at retirement age.

FIGURE 2.3a | **Size of Labor Informality by Age and Educational Attainment, 2010**
(In percent; urban areas only)



Source: National labor surveys. For details see Box 1.1.
Note: The right axis of figures reported in the left panel (by Age) measures the share of OLF. All figures are expressed as shares of the working-age population. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

FIGURE 2.3b | **Size of Labor Informality by Firm Size and Income, 2010**
(In percent; urban areas only)



Source: National labor surveys. For details see Box 1.1.
Note: All figures are expressed as shares of the employed labor force. Horizontal axis of figures reported in the right column (by Income) corresponds to individuals' income deciles (except in Colombia where quintiles are reported to prevent measurement error due to limitations in the sample size). The question about firm size in Venezuelan surveys only allows reporting discrete ranges in the left column. SE = self-employed; I = informal salaried; F = formal salaried.

by around 30 points when comparing uneducated and educated individuals at working age (right column of Figure 2.3a). It is noteworthy that even among the most educated workers, there is a significant share of informality: in Ecuador and Peru a third and a half, respectively, of the population at working age with tertiary technical education is still informal. It is also noteworthy that unemployment rates are higher among most educated workers across the whole region. This can be attributed to a skill mismatch between labor market requirements and the curricula of the education system[13] (with a consequent increase of fresh graduates who start at unemployment) or to the fact that most educated people can afford longer periods of unemployment waiting for suitable jobs whereas the less educated are more willing to take any available job.

Informality is also related to firm size.[14] The left column of Figure 2.3b reports the composition of the labor force according to the size of the employer firm. There is a clear positive correlation between the size of the firm and the share of formal workers in every country. About half of the labor force working at firms of six workers or less is informal in Colombia. About 60% of the labor force working at firms of 10 workers or less is informal in Ecuador, and 70% in Peru. More interesting is the fact that in the three countries, firms with 100 to 200 workers still have a nontrivial share of informal workers—Peru being the most alarming case, with 20% of the labor force working at firms with more than 200 workers being informal—and that the inflection point of informal hiring seems to lie around the size of 10 workers. Perry et al. (2007) provide some reasons and evidence to explain why firms on the upper end of size distribution are more likely to operate formally, or why registered firms with relatively low levels of productivity are more likely to report higher rates of tax and social security evasion. They cite the following: (1) compared to larger firms, micro-firms belong to a much denser grid and hence they face smaller risk of being caught by government inspectors when operating irregularly; (2) micro firms are likely to have a harder time amortizing the fixed

[13] Bassi et al. (2012, p. 162) claim that in Latin America "the main actors involved (students, parents, teachers, schools' authorities and policy makers) need more information about the type of skills and competencies demanded by the labor market," and that the disconnection "between the supply and demand of skills confirms that schools are largely isolated from their environment, especially from the productive system."

[14] The Fifteenth International Conference of Labour Statisticians defined informal sector enterprises on the basis of several criteria. One of them is: "Their size in terms of employment is below a certain threshold to be determined according to national circumstances, and/or they are not registered under specific forms of national legislation (such as factories' or commercial acts, tax or social security laws, professional groups' regulatory acts, or similar acts, laws or regulations established by national legislative bodies as distinct from local regulations for issuing trade licenses or business permits), and/or their employees (if any) are not registered."

costs associated with regulatory compliance (costs of firm registration, permits, and licenses); (3) the red tape and costs associated with formalization probably have a larger effect on recently created (small) firms, which may choose to avoid formalization until they have accumulated sufficient evidence regarding their actual profitability and likelihood of staying in business; and (4) firms with inherently low productivity and/or growth prospects are likely to have a lower demand for credit, business development services, and contract enforcement mechanisms, thus they are less affected in their informality decisions by the level of development of market-support institutions such as the courts, financial markets, and the like.

Finally informal workers are thought to earn lower incomes than their formal counterparts. The right column on Figure 2.3b shows preliminary evidence confirming this. Workers at the lowest quintile of the income distribution are mostly informal (either salaried or self-employed). The opposite is observed at the upper end of the income distribution.

To complement the static characterization, Table 2.1 examines specific shares of the employment sectors according to several characteristics. Findings worth noting include the following:

- In the region as a whole, participation of the female labor force is predominantly independent (for instance, self employment accounts for up to 58% of the female labor force in Bolivia), except in Venezuela where almost half of female employment is formal salaried;
- Workers aged between ages 14 and 25 are predominantly informal salaried in Bolivia, Ecuador, and Peru, and less than a third of the Andean employed workforce getting closer to retirement age contributes to a pension system;[15]
- High school graduates are dominantly formal only in Colombia, Ecuador, and Venezuela;
- Only 2% of employment found in firms with 1 to 10 workers is formal in Peru (less than 10% in the rest of the region) and not more than 85% of employment in Andean firms with more than 100 workers is formal;
- Employment in the primary sector is mostly informal, except in Venezuela;
- Within a country, shorter work shifts are usually observed among the self-employed, except in Bolivia;
- Colombian workers report the longest daily work shifts in every employment sector. In the Colombian formal sector, males, high-school nongraduates, and workers from firms with 1 to 10 employees work more than 10 hours a day.

[15] We refer here only to pension contributions coming from the current job.

TABLE 2.1 | **Independent, Informal, and Formal Salaried Workers (as a Percentage of the Urban Employed Workforce) and Average Number of Hours Worked per Day** *(in brackets)*

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried
A. All employed aged between 14 and 65	48 [8.7]	32 [8.5]	20 [8.1]	48 [9]	23 [9.5]	29 [10]	35 [8.1]	35 [8.4]	29 [9.2]	47 [7.7]	33 [8.7]	20 [8.9]	41 [7.5]	16 [7.8]	43 [8]
B. By gender															
Male	40 [9.2]	38 [8.9]	21 [8.7]	50 [9.9]	22 [9.9]	27 [10.4]	34 [8.9]	39 [8.6]	27 [9.6]	45 [8.3]	33 [8.8]	21 [9.5]	44 [8]	17 [8.1]	38 [8.4]
Female	58 [8.2]	24 [7.7]	18 [7.1]	46 [7.6]	23 [8.9]	31 [9.3]	38 [7]	28 [8]	33 [8.6]	50 [7]	33 [8.5]	18 [7.9]	37 [6.5]	14 [7.2]	49 [7.5]
C. By Age															
14 to 25	28 [7.8]	62 [8.2]	10 [8.7]	35 [8.2]	39 [9.3]	26 [10]	13 [7]	62 [8.3]	25 [9.2]	24 [5.9]	63 [8.4]	13 [9.3]	32 [6.9]	30 [7.7]	38 [8.2]
26 to 45	47 [8.8]	30 [8.7]	23 [8.3]	46 [9.2]	21 [9.7]	33 [10]	33 [8.3]	34 [8.7]	33 [9.3]	47 [7.9]	30 [8.9]	23 [9.1]	39 [7.6]	14 [7.8]	47 [8]
46 to 65	63 [8.7]	15 [8.9]	22 [7.5]	62 [9.1]	15 [9.5]	22 [9.7]	52 [8.1]	22 [8.1]	26 [8.9]	64 [8]	17 [8.6]	19 [8.3]	53 [7.5]	11 [7.9]	37 [7.9]

(continued on next page)

TABLE 2.1 | **Independent, Informal, and Formal Salaried Workers (as a Percentage of the Urban Employed Workforce) and Average Number of Hours Worked per Day** *(in brackets)* **(*continued*)**

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried
D. By Education Level															
Less than high-school graduate	63 [8.8]	31 [9]	6 [9.5]	59 [9.1]	29 [9.7]	12 [10.7]	41 [8.2]	40 [8.5]	19 [9.6]	62 [7.4]	32 [8.5]	6 [9.7]	54 [7.5]	21 [7.9]	25 [8.3]
High. school graduate or higher	39 [8.4]	35 [8.2]	26 [8.2]	38 [9]	17 [9.2]	46 [9.8]	21 [8]	23 [8.2]	56 [8.8]	36 [8.2]	34 [8.8]	30 [8.8]	30 [7.5]	12 [7.6]	58 [7.9]
E. By Firms' Size															
1 to 10 workers	60 [8.7]	34 [8.6]	6 [7.9]	66 [9]	28 [9.5]	6 [10.5]	53 [8.1]	40 [8.3]	7 [9.1]	66 [7.7]	31 [8.6]	2 [8.9]	70 [7.4]	20 [7.9]	10 [8.5]
11 to 100 workers	3 [8.8]	36 [8.4]	61 [7.7]	11 [9.5]	23 [9.6]	66 [10]	2 [10.1]	45 [8.7]	53 [9.3]	3 [9.6]	58 [8.8]	39 [9.8]	5 [9]	11 [7.4]	85 [7.9]
more than 100 workers	2 [8.3]	23 [8]	74 [9.5]	10 [8.7]	6 [9.1]	84 [9.8]	0 [9.9]	15 [9]	85 [9.2]	N.A. N.A.	24 [8.8]	76 [8.6]	N.A. N.A.	N.A. N.A.	N.A. N.A.

(continued on next page)

TABLE 2.1 | **Independent, Informal, and Formal Salaried Workers (as a Percentage of the Urban Employed Workforce) and Average Number of Hours Worked per Day** *(in brackets)* **(*continued*)**

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried
F. By Economic Sector															
Primary	44 [8.6]	31 [8.3]	24 [9.3]	57 [8.7]	34 [9.7]	10 [10.6]	42 [7.8]	48 [7.8]	10 [9.8]	66 [6.5]	27 [7.3]	7 [9.2]	11 [7.8]	5 [8.3]	85 [8.2]
Secondary	38 [8.3]	47 [8.5]	15 [8.7]	44 [8.9]	22 [9.7]	34 [10]	27 [8]	46 [8.8]	28 [9.6]	33 [7.4]	45 [9.1]	21 [10.2]	41 [7.3]	19 [8]	41 [8.1]
Tertiary	50 [8.8]	28 [8.6]	22 [7.9]	47 [9.2]	20 [9.4]	33 [9.9]	36 [8.3]	27 [8.7]	38 [9]	44 [8.5]	32 [8.9]	24 [8.5]	40 [7.5]	13 [7.7]	47 [7.9]

Source: National labor surveys. For details see Box 1.1

Note: Statistics for Ecuador include workers from 10 to 65 years old, as they are part of the labor force according to Ecuador's law during the period under analysis. Statistics for Venezuela in the category of 11 to 100 workers include workers in firms with more than 100 workers. Panel F groups workers according to the economic sector of the employing firm.

TABLE 2.2 | **Variation of the Size and Remuneration (in brackets) of the Working-Age Population** *(in percentage points)*

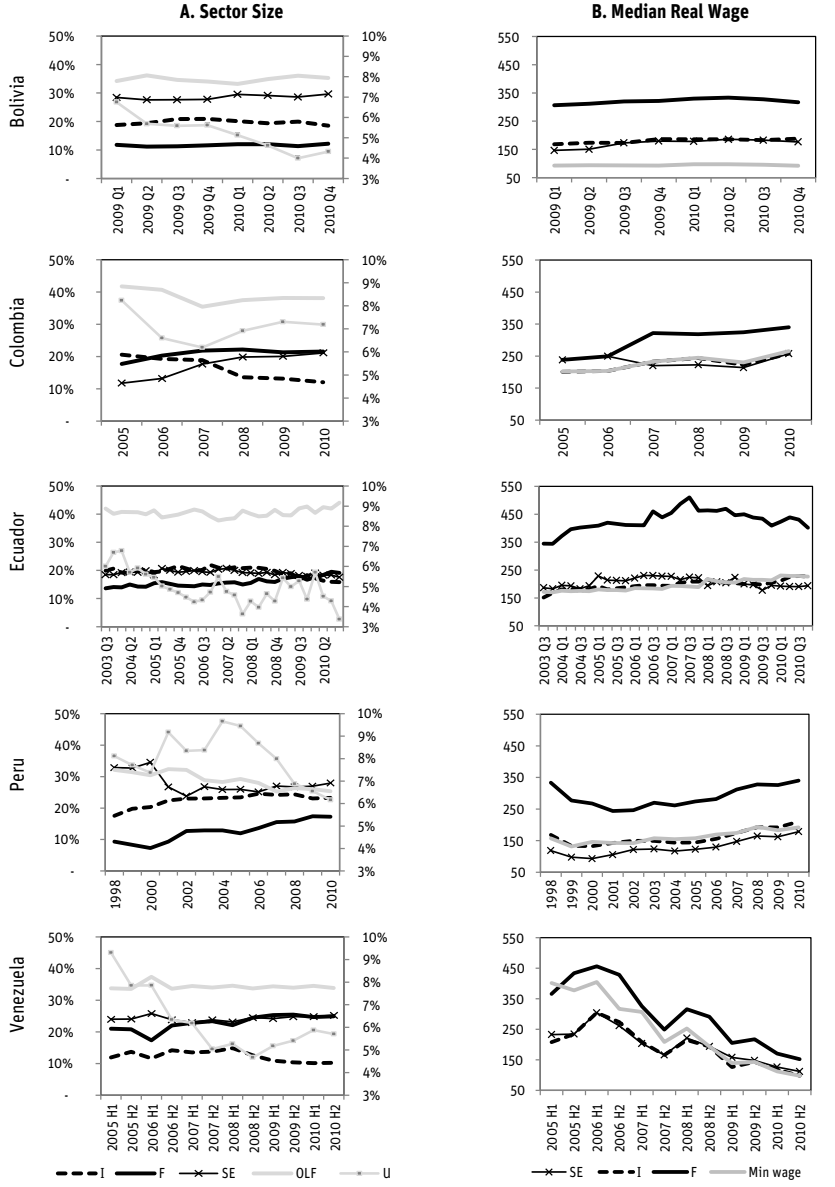
	OLF	U	SE	I	F
Colombia	−0.04	−0.01	0.09 [0.08]	−0.09 [0.28]	0.04 [0.43]
Ecuador	0.03	−0.02	−0.01 [−0.15]	−0.04 [0.18]	0.04 [−0.02]
Peru	−0.03	−0.03	0.01 [0.56]	0.01 [0.5]	0.04 [0.25]
Venezuela	0.00	−0.04	0.01 [−0.52]	−0.02 [−0.53]	0.04 [−0.58]

Source: National labor surveys. For details see Box 1.1
Note: The variation is computed since the first observed period in 2005 until the last observed period in 2010. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

Seen from any angle, it is clear that informality in the Andean region is high. Has it been this high always? Panel A of Figure 2.4 along with Table 2.2 provide a broader perspective about the size of all the labor sectors and its evolution in recent years. In some cases, it shows common patterns across the region. For instance, the share of the working-age population out of the labor force has remained stable or decreased in the entire region except Ecuador, where the gains in formality have been paired with a reduction in the share of the labor force.[16] Stable or decreasing numbers out of the labor force is commonly found in all Latin America, where the participation of younger and female population has intensified in the last decade. On the other hand, unemployment rates have fallen consistently in the entire region,[17] and by 2010 they hovered between 4% and 7%, suggesting that the biggest issue in terms of employment in the Andean region is not necessarily access but quality. In this regard, results are mixed: while the share of formal workers has been increasing in recent years in all Andean countries (Table 2.2), informality (salaried and nonsalaried) has not necessarily fallen. For instance, salaried informality has not decreased in Peru, and self-employment has risen significantly in Colombia (becoming more important than salaried informality). Only Ecuador shows increases in formality accompanied by decreases in informality (salaried and nonsalaried), but even

[16] A more detailed examination of the data suggests that the increase of the share of Ecuadoreans out of the labor force is mainly driven by males and females under age 20 and males above age 60.
[17] Colombia saw a slight upsurge in 2008 and 2009.

FIGURE 2.4 Evolution of Participation and Remuneration of Workers in Each Employment Sector



Source: National labor surveys. For details see Box 1.1.
Note: The right axis of figures shown in Panel A corresponds to the unemployment sector. All figures reported in Panel A are expressed as shares of the working-age population. Real wages reported in Panel B are expressed in constant 2009 U.S. dollars per month and correspond to the remuneration of the principal activity. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

there, the figures are not notable given the nontrivial growth of the numbers out of the labor force. And while informative, these data do not explain the dynamics behind the states of informality. The dynamics of informality are studied in depth in Chapter 3.

Income Insecurity

In terms of a pension, workers are considered informal if they do not currently contribute to finance a pension scheme after they retire. However, workers are not only concerned about securing a living after retirement, they are also concerned (probably more) about securing a living today. Thus, even in cases in which workers seem less protected due to their informal status, it is important to evaluate if this presumable disadvantage in the long run is somehow offset by a direct increase in their current earnings. In other words, workers may voluntarily accept less nonwage benefits if those benefits are offset by better pay right now. Of course, if the market is not competitive to the benefit of the worker (i.e., under a more segmented environment), labor informality becomes an unequivocally bad outcome for workers on all fronts, as they end up being exposed to financial distress and social risks both at present and after retirement.

Two measures of income insecurity for the informal sector are shown here, one in Table 2.3 and another in Figure 2.5. Table 2.3 shows a comparison of median hourly wages earned in different sectors by different groups of workers. It also provides the legal minimum wage earned (transformed into the wage per hour) in each country as a reference of the lower bound that wages should not pass to ensure a minimum level of current consumption. Figure 2.5 provides a more general overview of the income distribution in each salaried labor sector along the referential level of the minimum wage to measure the importance of the concentration of workers earning around or below the minimum wage in each sector. If the typical informal worker earns significantly below the minimum, the challenge of a comprehensive pension reform is doubled, as such a reform needs to design incentive compatible mechanisms to get workers to contribute—and thus smooth their future consumption—while also ensuring conditions that assure at least a minimum wage. Taking into account that a significant mass of the informal salaried population earns below the minimum wage, the costs of formalizing the labor supply of Andean countries are not just limited to inducing workers to contribute to their pension funds but also getting firms to remunerate informal labor with salaries that may not correspond to their actual productivity.

Table 2.3 shows that hourly median earnings in all the countries are significantly higher for formal employees than for both self-employed and informal workers. Additionally, male self-employed workers get earnings that are higher

TABLE 2.3 | **Median Wage or Earnings of Worker's Principal Activity in 2010**
(In U.S. dollars per hour; standard errors in brackets)

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried
Hourly minimum wage			0.55			1.52			1.36			1.11			0.83
A. All employed aged between 14 and 65	1.11 [0.52]	1.12 [0.44]	2.23 [1.04]	1.30 [0.65]	1.30 [0.37]	1.78 [0.43]	1.30 [1.43]	1.31 [0.93]	2.38 [1.66]	0.96 [1.59]	1.09 [1.05]	1.83 [1.57]	1.02 [0.39]	0.88 [0.23]	1.28 [0.34]
B. By gender															
Male	1.36 [0.56]	1.24 [0.48]	2.01 [0.96]	1.39 [0.66]	1.30 [0.34]	1.78 [0.44]	1.46 [1.47]	1.37 [0.91]	2.33 [1.68]	1.10 [1.67]	1.18 [1.12]	1.85 [1.63]	1.17 [0.36]	0.89 [0.23]	1.29 [0.33]
Female	0.87 [0.43]	0.89 [0.38]	2.51 [1.08]	1.30 [0.54]	1.30 [0.38]	1.77 [0.44]	1.18 [1.36]	1.25 [0.97]	2.41 [1.64]	0.78 [1.44]	0.99 [0.92]	1.78 [1.47]	0.88 [0.36]	0.80 [0.2]	1.28 [0.36]
C. By Age															
14 to 25	1.04 [0.44]	0.97 [0.39]	1.35 [0.4]	1.08 [0.56]	1.11 [0.32]	1.51 [0.18]	1.01 [1.3]	1.25 [0.78]	1.88 [1.09]	0.79 [1.43]	0.99 [0.92]	1.38 [1.18]	0.88 [0.33]	0.85 [0.19]	1.17 [0.26]
26 to 45	1.15 [0.55]	1.22 [0.51]	2.11 [0.88]	1.35 [0.65]	1.30 [0.37]	1.89 [0.48]	1.34 [1.37]	1.38 [0.95]	2.33 [1.58]	1.06 [1.64]	1.17 [1.11]	1.90 [1.59]	1.09 [0.41]	0.89 [0.23]	1.31 [0.36]
46 to 65	1.07 [0.51]	1.30 [0.58]	3.10 [1.36]	1.35 [0.65]	1.30 [0.43]	1.89 [0.62]	1.33 [1.5]	1.39 [1.06]	3.13 [1.86]	0.91 [1.56]	1.12 [1.16]	2.03 [1.64]	1.05 [0.41]	0.88 [0.29]	1.31 [0.38]

(continued on next page)

TABLE 2.3 | **Median Wage or Earnings of Worker's Principal Activity in 2010**
(In U.S. dollars per hour; standard errors in brackets) (*continued*)

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried
D. By Education Level															
Less than high-school graduate	1.02 [0.52]	1.05 [0.39]	1.34 [0.48]	1.08 [0.55]	1.04 [0.31]	1.45 [0.22]	1.25 [1.28]	1.25 [0.76]	1.88 [1.27]	0.75 [1.38]	0.95 [0.82]	1.28 [1.24]	0.97 [0.33]	0.88 [0.22]	1.09 [0.26]
High-school graduate or higher	1.27 [0.64]	1.15 [0.51]	2.53 [1.14]	1.35 [0.65]	1.34 [0.39]	1.85 [0.42]	1.88 [1.78]	1.50 [1.33]	3.09 [1.76]	1.30 [1.76]	1.21 [1.16]	1.94 [1.59]	1.22 [0.44]	0.89 [0.24]	1.39 [0.42]
E. By Firms' Size															
1 to 10 workers	1.14 [0.56]	1.05 [0.4]	2.00 [0.78]	1.30 [0.65]	1.16 [0.35]	1.62 [0.31]	1.30 [1.41]	1.25 [0.83]	1.80 [1.08]	0.96 [1.57]	1.00 [0.91]	1.32 [1.26]	1.00 [0.39]	0.88 [0.2]	0.89 [0.16]
11 to 100 workers	1.95 [1.25]	1.35 [0.63]	2.44 [1.06]	2.16 [0.93]	1.49 [0.5]	1.79 [0.41]	5.39 [2.24]	1.46 [1.01]	2.04 [1.39]	2.49 [2.92]	1.31 [1.14]	1.63 [1.39]	1.29 [0.35]	0.89 [0.31]	1.31 [0.36]
more than 100 workers	0.90 [0.3]	1.17 [0.59]	2.22 [1.15]	2.60 [0.97]	1.44 [0.65]	2.16 [0.77]	3.24 [1.66]	1.54 [1.33]	2.86 [1.75]	N.A. N.A.	1.36 [1.35]	1.99 [1.63]	N.A. N.A.	N.A. N.A.	N.A. N.A.

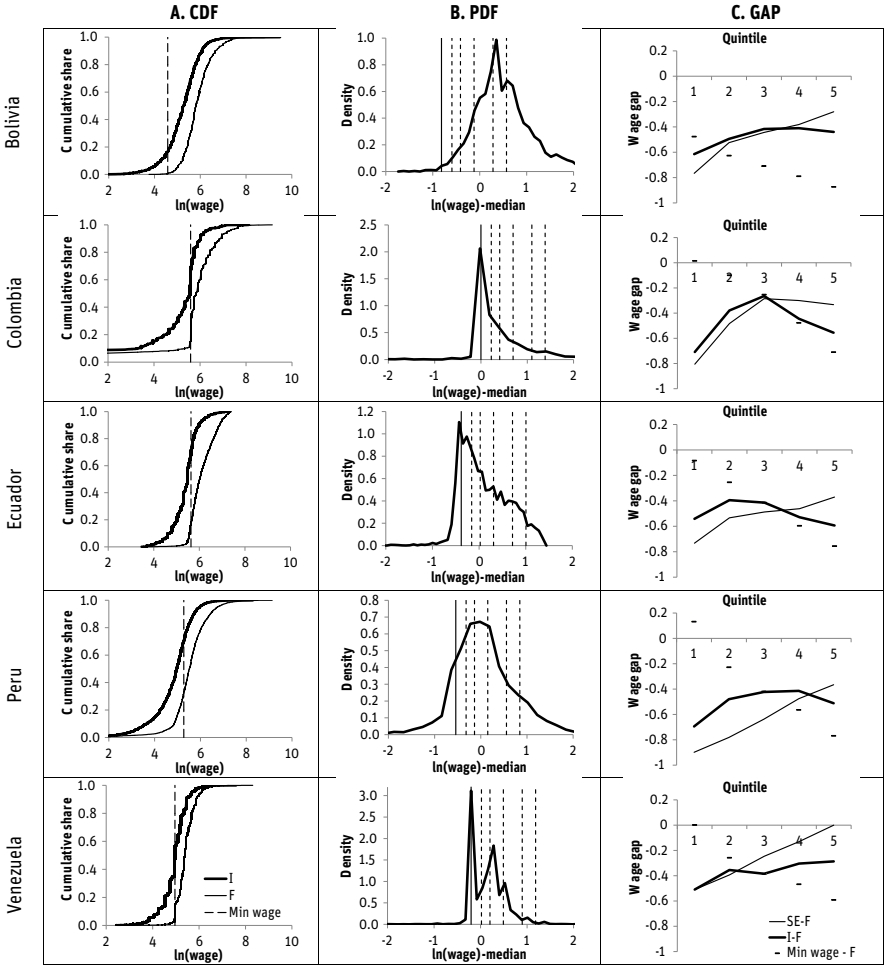
(continued on next page)

TABLE 2.3 | **Median Wage or Earnings of Worker's Principal Activity in 2010**
(In U.S. dollars per hour; standard errors in brackets) (*continued*)

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried	Self Employed	Informal Salaried	Formal Salaried
F. By Economic Sector															
Primary	0.78 [0.6]	1.31 [0.66]	3.00 [0.86]	1.17 [0.59]	1.24 [0.22]	1.62 [0.43]	1.12 [1.33]	1.20 [0.78]	1.81 [1.28]	0.63 [1.49]	0.93 [0.82]	1.50 [1.53]	0.73 [0.24]	0.77 [0.16]	1.22 [0.39]
Secondary	1.30 [0.58]	1.30 [0.45]	1.62 [0.7]	1.30 [0.54]	1.30 [0.32]	1.62 [0.27]	1.44 [1.43]	1.43 [0.82]	2.03 [1.45]	1.15 [1.76]	1.24 [1.04]	1.73 [1.46]	1.22 [0.37]	0.97 [0.23]	1.31 [0.33]
Tertiary	1.04 [0.49]	0.98 [0.43]	2.44 [1.12]	1.35 [0.65]	1.25 [0.4]	1.89 [0.46]	1.31 [1.44]	1.30 [1.03]	2.56 [1.71]	1.11 [1.58]	1.11 [1.11]	1.91 [1.6]	1.05 [0.42]	0.88 [0.24]	1.28 [0.34]

Source: National labor surveys. For details see Box 1.1
Note: Statistics for Ecuador include workers from 10 to 65 years old, as they were part of the labor force under Ecuadorean law during the period under analysis. Statistics for Venezuela in the category of 11 to 100 workers include workers in firms with more than 100 workers. Panel F groups workers according to the economic sector of the employing firm. The (monthly minimum wage at local currency unit or LCU, exchange rate) pairs are (679.4, 6.97); (515,000, 1925.86); (240, 1); (550, 2.83); (1,064.65, 7.32) for Bolivia, Colombia, Ecuador, Peru and Venezuela, respectively, and correspond to the most similar period of the surveys. The monthly minimum wage expressed in U.S. dollars is divided by 22*8 assuming 22 days of 8 hours of work daily per month.

FIGURE 2.5 | **Cumulative Distribution Function, Probability Distribution Function and Earnings Gaps (percentage change) by Country in 2010**



Source: National labor surveys. For details see Box 1.1.

Note: Panel A reports the cumulative distribution function (CDF) for the log wages of the principal activity of formal and informal salaried workers at the latest available section. Panel B reports the probability density function (PDF) for the log wages of the principal activity of formal salaried workers after removing the log of the median salary. Dashed vertical lines depicted in Panel B represent multiples (1.25, 1.5, 2, 3 and 4) of the log minimum wage (after removing the log of the median salary). Panel C reports the gaps between the wages (or earnings) of informal (either salaried or independent) and formal workers per each quintile of the respective wage distribution. *SE–F* = Income gap between Self-employed and formal salaried, *I–F* = Income gap between informal salaried and formal salaried. The gaps are computed as $I-F=w_i^{q_i}/w_f^{q_f}-1$ and $SE-F=w_{se}^{q_{se}}/w_f^{q_f}-1$ where $w_i^{q_i}$ is the median wage of the informal workers of quintile q_i.

or equal to those of informal workers in all countries except for Peru, where their incomes are significantly lower. The highest formality premium is found in Ecuador, where the median formal worker earns 83% more than the median informal one. Indeed, the median Ecuadorean formal worker has the highest hourly wage in the region, while Colombia has the lowest at around 37% more than the median informal wage.

Although informative, such an unconditional comparison hides the effects of characteristics such as education or experience on the income gaps of workers in different sectors. Panels B, C and D of Table 2.3 show that the differences between earnings in different employment sectors remain, although the premia vary according to the specific characteristic. For instance, in Bolivia the median self-employed worker earns almost the same regardless of age,[18] but the median formal worker earns more according to experience and seniority. Likewise while education does not exert a major influence on the median wage of informal salaried workers in Bolivia and Venezuela, it accounts for respective increases of 88% and 28% among formal workers in those countries. Thus, in Bolivia, the wage gap between formal and informal is (28%) 120% for (less) educated workers. With respect to gender differences, the self-employed/formal gap is much more dramatic among women than among men (except in Colombia, where gender seems not to play a wage differential role across employment sectors). As for wage differences according to firm size, informal salaried workers at firms with 11 to 100 workers earn 20% to 30% more than those working at firms with 1 to 10 workers. However, Bolivian and Colombian informal workers in firms with more than 100 workers earn less than those working in medium-sized firms. In Colombia, Ecuador, and Peru, independent workers in medium-sized firms earn more than their formal counterparts. making an interesting case for examining voluntary exits from the formal salaried sector.

Table 2.3 also provides the minimum wage as a comparative reference for each country (Andean minimum wages are put into an international perspective in Box 2.2). While the median wage for formal salaried workers is higher than the minimum wage regardless of the characteristics of workers in almost every country,[19] the median wage for informal workers grouped according to most characteristics is well below it. In particular, while more education or more experience (which arguably lead toward more labor productivity) lead toward

[18] This is at odds with Figure 2.3a, which depicts a positive relation between self-employment and age.

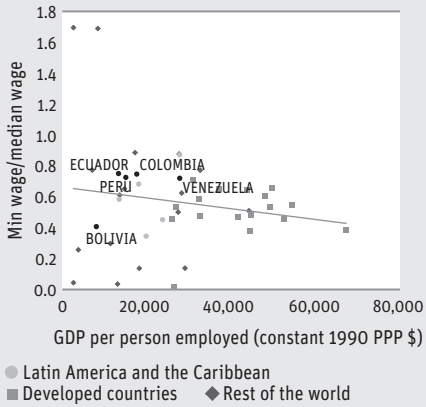
[19] In Bolivia, the minimum wage is not binding for almost every sector.

BOX 2.2. MINIMUM WAGE/MEDIAN WAGE RATIO IN THE ANDEAN COUNTRIES IN THE GLOBAL CONTEXT

Are minimum wages too low or too high in the Andean countries? Compared to national median wages, there is a close similarity across Andean countries—ratios between 0.7 and 0.8. These ratios are also comparable to those found in many developed countries. The one exception is Bolivia's minimum wage, which clearly is below regional and international levels either conditional on "productivity"[a] (Box Figure 2.2.1) or unconditional (Box Figure 2.2.2). Thus, at first view one would preliminarily conclude that vis-à-vis other countries, Andean countries' minimum wages are not too low.

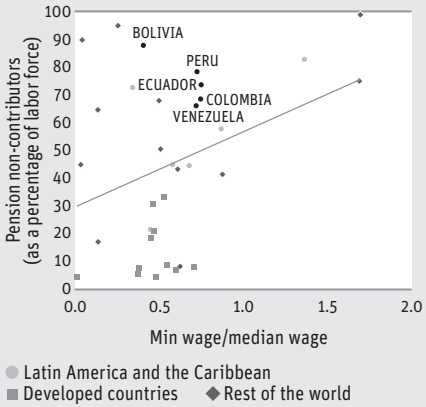
This conclusion can be recast after taking into account that the composition of the workforce for which the median wages are computed is distinct in developing and developed countries. That is, high ratios could be driven by either high minimum wages or low median wages (low median wages, in turn, could be driven by low productivity). Given that in developing countries most of the salaried workforce is compounded by informal workers earning low incomes, a high ratio in the Andes is most likely driven by low medians rather than by high minimum wages, whereas in Organization for Economic Cooperation and Development (OECD) countries, high ratios reflect high minimum wages (Box Figure 2.2.3). Thus, from the perspective of protection against pre-retirement income insecurity, ratios of around 0.8 in the Andes could not necessarily be as good as they are in OECD countries.

BOX FIGURE 2.2.1 | **Minimum/Median Wage Ratio and Development**



Source: ILO (2013).

BOX FIGURE 2.2.2 | **Informality and the Minimum/Median Wage Ratio**



Source: WDI (2012) and ILO (2013).

Are the ratios indeed not too high? The answer requires a careful reading of the cost of an average household basic consumption basket, a comparison of this cost with the private returns to the less productive units of the labor factor, and the differentiation between the income distribution of formal and informal salaried workers. Box Figure 2.2.1 sketches the relation between the minimum/median wage ratio and a narrow proxy of productivity.

(continued on next page)

BOX 2.2. MINIMUM WAGE/MEDIAN WAGE RATIO IN THE ANDEAN COUNTRIES IN THE GLOBAL CONTEXT (*continued*)

BOX FIGURE 2.2.3. | Minimum Wages across Countries, 2010

Source: ILO (2013).

It shows that the ratio for the Andean countries is about 15% higher than what is expected given the observed level of productivity.

If minimum wages are not high enough to cover high income insecurity, but are too high given the low productivity of a significant mass of workers,[b] then one is likely to find firms hiring below the minimum wages and workers willing to give up post-retirement

(continued on next page)

BOX 2.2. MINIMUM WAGE/MEDIAN WAGE RATIO IN THE ANDEAN COUNTRIES IN THE GLOBAL CONTEXT (*continued*)

benefits in exchange for better current income (as is the case of Andean countries). In both cases, informality would increase.

Thus, minimum wages are not only important to provide a bottom safety net for low-income earners, they are also important institutions to establish formal labor arrangements. If minimum wages are too high (for the actual productivity of those workers earning them), they most likely will have negative repercussions on formal hiring. While the impact of minimum wage adjustments on informality and unemployment is left for Chapter 4, Box Figure 2.2.2 advances preliminarily a positive correlation between minimum wages and informality. The figure also shows that, based on the relative minimum wage, Andean informality is too high, and that a very significant number of informal workers earn below the minimum wage.

[a]Average aggregate product per worker is used as a proxy for productivity.
[b]Andean countries have productivity levels far below those of developing countries.

better wages in the formal sector, this is not the case for informal workers. That is, for two median workers of comparable education or experience (say, comparable potential productivity), wages in the formal and informal sector are quite distinct, with more than 50% of the educated and experienced informal workers earning way below the minimum wage. This again is symptomatic of exclusion and of a segmented market, at least in terms of the minimum wage and at the lower end of the income distribution of informal salaried workers. This is not necessarily the case for self-employment: median educated self-employed workers earn more than the minimum in Ecuador, Peru, and Venezuela. Likewise, the median self-employed earn more than the median formal salaried, but only for some groups of workers. Self-employment also confers more flexibility than an informal salaried job. However, self-employment removes a layer of protection against income shocks, as workers and firms are not distinct agents who together can hedge risks. We explore this idea more deeply in Chapter 4.

Going beyond the status of income distributions and income gaps across labor sectors in 2010, it is also important to examine how monthly incomes and gaps have developed in recent years. Figure 2.4 shows that in every country, formal workers have consistently earned significantly more than informal workers. Only in Colombia did self-employed workers have earnings relatively close to those in the formal sector in 2005 and 2006. Looking at the trends (taking into account only the common period sample for all countries, i.e., from 2005 to 2010), we find that Peruvian and Colombian wages have been increasing (in real terms), while Ecuadorian incomes have stayed relatively

unchanged. The gap between formal and informal earnings has declined in Venezuela because median real wages of formal workers have contracted faster than those of informal salaried and self-employed workers: overall median real salaries in Venezuela have declined by half in the last five years (see Table 2.2). Another interesting finding is the stretch relation between the earnings of self-employed workers and the wages of informal salaried workers. Indeed, the gap between them has been reduced in all the countries of the region except Peru, where the median informal salaried workers consistently earned a higher real wage than their self-employed counterpart. Thus, in Peru self-employment does not only convey uncertainty about the frequency of earnings but it also means lower remuneration. Finally, it is also worth noting that, by 2010, the median income of informal salaried workers in most of the countries was approximately the same as the minimum wage. If the median wage is around the legal minimum, it means that around half of informal workers have earnings below what is legal. Thus, not only do informal employees lack social protection, they are also mostly unprotected by minimum wages. Bolivia is the only case where the minimum wage has been consistently below the median income of formal and informal workers, and in Peru, the median self-employed worker has consistently had earnings well below the minimum wage. A similar situation was seen five years ago in Venezuela, but since then the real minimum wage has contracted at a faster pace than the real median income of the informal sector, taking the median informal worker income to the minimum wage level.

These patterns about the distance between median and minimum wages raise the question of how binding minimum wages really are. Figure 2.5 reports the cumulative distribution of wages of both formal and informal workers and shows how they behave around the minimum wage level. In all countries, the formal wage distribution (plain text) dominates the informal one (bold text), meaning that at any wage level, the informal distribution has accumulated a higher share than the formal one. More interesting, the cumulative distributions of Colombia, Ecuador, and Venezuela show clustering points at several points. The major accumulation point happens at the minimum wage for both formal and informal distributions (suggesting a binding minimum wage). Indeed, in these three countries, the minimum wage is actually binding in the formal sector as a significant portion of the population earns just the minimum wage and a nonsignificant mass of formal workers earns below the legal minimum wage (see Panels A and B). The figures are less favorable for informal workers. Some 70% of informal salaried workers earn wages less than or equal to the legal minimum in Colombia, Ecuador, and Peru, and about 60% in Venezuela. Bolivia

is the only case where the minimum wage is very low and hence not binding for the whole salaried population, while in Peru the minimum wage seems not to be binding, as no clustering is observed around it. Peru, however, is the only case where a nontrivial mass of formal salaried workers (approximately 30%) earn below that wage.

Panel A also shows some discrete jumps in the cumulative distributions at several points beyond the minimum wage. This leads us to believe that some wages may be affected by the minimum wage despite not being set exactly at its level. This effect, documented in the literature as the "lighthouse effect," has been found in several countries.[20] For the specific purpose of checking this hypothesis, we present Panel B, which draws the density function of wages for formal workers, along with vertical lines representing the minimum wage in the country as well as some of its multiples. Every jump documented in the cumulative distributions in Panel A should correspond to a hump in the density functions in Panel B. We check if these humps are found at multiples of the minimum wages to see if they are used as reference point to set wages at higher ends of the income distribution. Although the evidence found is not conclusive, some humps appear to be significantly close to minimum wage multiples. In Bolivia, three and four times as much as the minimum wage seem to be important references. In Ecuador, 25% and 50% more than the minimum appear as important levels. In Peru, minimum wages seem not to play a major role in wage determination. In contrast, Venezuela has a density of formal incomes with three clear clustering points: exactly at the minimum wage, at 1.5 times the minimum wage mark, and at 2 times the minimum wage mark.

Finally, to complete the picture of income insecurity faced by the employed workforce in the Andean countries, Panel C of Figure 2.5 reports the wage gaps of informal (both salaried and independent) and formal workers at different points of the income distribution. It shows the following:

- Compared to formal workers, the median income of informal salaried and self-employed workers is lower at any quintile of the income distribution (i.e., either poor or rich median formal workers earn more than poor or rich informal workers).
- At the lower end of the distribution, informal salaried workers are better off than self-employed workers, suggesting that for the poorest, salaried

[20] See Souza and Baltar (1979), Amadeo, Gill, and Neri (2000), and Maloney and Mendez (2004).

informality provides a more secure alternative (in terms of frequency of disbursements and amounts of payments) than self-employment.

- Self-employment is more profitable only for the upper quintiles (educational attainment should play a role, as the wealthier segment of the workforce is more likely to achieve more and obtain better-compensated freelance payment).
- Among informal workers, the magnitude of the wage gap is not symmetrically distributed for salaried and nonsalaried workers: a monotonically increasing wage gap in the income support is observed among nonsalaried workers, but a hump-shaped curve is observed for salaried workers. Thus, while the gap between the salaries of self-employed and formal workers gets smaller the higher the income, the gap between the salaries of rich formal and rich informal workers gets wider. Taking into account the high premia observed among richer formal workers (i.e., comparing the median income of a quintile with the median income of the next quintile), this reflects the very high premia among high-income independent workers.[21]
- The gap between the minimum wage and the median earnings of formal workers at each quintile shows that at the lower end, the minimum wage closes the gap with respect to the median poorer formal worker in Colombia and Venezuela (for those workers earning the minimum wage, which, as explained previously, are not a majority in the informal sector). In Bolivia and Ecuador, it would not close this gap and in Peru, the median formal worker of the poorest quintile does not even earn the legal minimum wage. It is also interesting to note that the inferred gap between minimum wages and (salaried and nonsalaried) informal wages is positive for the lower-income workers. Thus, it is not only the case that self-employment yields low earnings for the poorest workers, but also that these earnings do not reach the minimum wage.

To further examine the role of minimum wages in the income distribution of formal and informal workers, the next section provides a static analytical approach and formally tests whether wage behavior across different deciles of the earnings distribution is related to minimum wage changes.

---

[21] Bargain and Kwenda (2011) find that in Mexico and Brazil the gap of the mean income of the self-employed with respect to the mean income of formal salaried workers is consistently higher than the informal-formal gap across almost the entire spectrum of the distribution. We prefer to report median incomes rather than means, as outliers tend to influence the means at the lower and higher ends of the distribution.

Wage Inequality and the Effect of Minimum Wages on Inequality and Informality

Earnings distributions reported in this chapter show a stark contrast in the compensation of the salaried labor force according to its level of formality. Even among workers observed at the same formality level, the wage structure entails inequality in the allocation of monetary rewards. Although there can be several factors driving such inequality, two fundamentals mainly affect wage dispersion: first, productivity differences among workers,[22] and second, different rates of return to skills across labor markets (industries, locations, etc.). We address the implications of these fundamentals (productivity and observable characteristics) on worker flows and compensations in a dynamic framework in Chapters 3 and 4. Besides these factors, exogenous determinants (i.e., not necessarily fundamentally driven) can also affect the dispersion of salaries. Minimum wages can be one of these factors.[23] Indeed, the fact that lighthouse effects are observed among formal salaried workers in some of the countries under analysis (see previous section) is already symptomatic of the influence that minimum wages exert on salaries at specific clusters of the earnings distribution. This section is devoted to a static assessment of the effect of the minimum wage on the whole distribution of earnings and hence on income inequality observed within the Andean countries.

As Bosch and Manacorda (2010) do for Mexico, we follow the methodology proposed by Lee (1999) and Autor, Manning, and Smith (2009) in their studies of the United States. The objective is to identify what the wage distribution would have been in the absence of a minimum wage and then attribute the differences between that distribution and the real one to the presence of the minimum wage. In order to do this, we exploit the cross-sectional variation of wages at different percentiles across several cities within each country.

Figure 2.6 reports all the deciles of the distribution of log monthly earnings relative to the median.[24] Panel A shows that the distance between the upper deciles and the median has remained relatively stable for the general salaried population of Colombia, Ecuador, and Peru. In contrast, the distance between

---

[22] Within an environment of perfect competition (free entry, perfect information, and atomistic agents), workers earn wages equal to their marginal productivity on the job.

[23] See Chapter 1 for a brief assessment of the institutional set-up of minimum wages in each Andean country. As is explained there, there still might be de jure provisions to procure endogenously driven real adjustments to minimum wages (essentially tracking changes in productivity); de facto updates come after following more discretionary judgments.

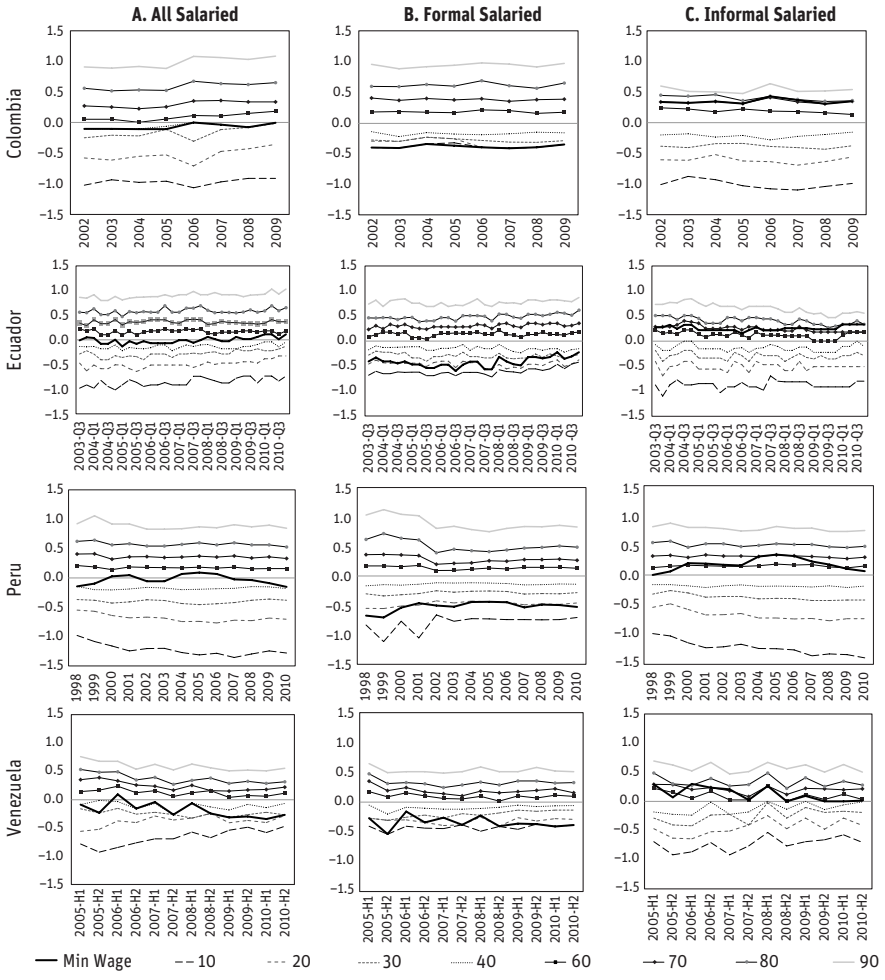
[24] The data refer to the average across all cities in each country at each period.

the lower deciles and the median has declined in Colombia and declined very noticeably in Ecuador and Venezuela. In Peru, the distance between the lower deciles remained broadly stationary during the 2000s. At the same time, the real minimum wage has been catching up with the median wage over this time period in most of the countries under analysis (the exception being Venezuela). Thus, Panel A shows an ongoing process of intra-generational income redistribution in some Andean countries, but apparently in none does this process seem to be engineered by adjustments in the minimum wage. That is, the evolution of the bold line in Panel A is not mimicked by the evolution of earnings at a single decile. As was shown in previous sections, most of the salaried population works informally in the Andean region, and among informal salaried workers the minimum wage is less of a binding institution in the labor market. That is not the case for formal salaried workers. Indeed, when we separate this information between formal and informal workers (Panels B and C of Figure 2.6), and focus on the formal salaried (Panel B), we observe two features. First, the minimum wage lies well below the median and defines a floor above which the rest of the income distribution lies, that is, minimum wages are binding in the formal sector in most of the countries (as was shown in Figure 2.5, a small fraction of Peruvian and Ecuadorean formal worker earns less than the legal minimum wage). Second, in the formal sector the minimum wage seems to be driving the adjustment patterns of wages only at the lowest decile of the formal sector (Colombia and Ecuador in particular). On the other hand, Panel C shows that the minimum wage is above the informal median and that it does not drive the evolution of earnings at any decile of the distribution. Thus, the rationale behind the specification we implement below is to see if minimum wages have led the evolution of earnings at distinct parts of the distribution at a city level in each sector.

Figure 2.7 shows the same distances as Figure 2.6, but standardized to the distance of the first period, so as that all distances should begin at zero. With this standardization it is easier to see the patterns of anonymous[25] income mobility. Once more, Panel A shows the average mobility of salaried workers, whereas Panels B and C disentangle the evolution of mobility for formal

[25] Nonanonymous income mobility analysis requires longitudinal information (see Jenkins and Kerm 2006; Grimm 2007; Kerm 2009; Bourguignon 2010; and Araar 2011). Attempts to assemble a time series of income deciles for panel observations were made for all countries. Given the size of the panel samples, the exercise was possible only for Ecuador, Peru, and Venezuela at a national level. However, our identification strategy exploits cross-sectional variation across cities. Series of income deciles for the panel samples at a city level were not possible to conform due to stringent sample sizes.

FIGURE 2.6 | **Cutoff Wages at Different Percentiles**
(Distance to the median wage)



Source: National labor surveys. For details see Box 1.1.
Note: The panels depict the evolution of the gap between different percentiles of the log earnings distribution and the log of the median earning of the corresponding sample of workers (either salaried, formal, or informal). The line denoted by Min Wage reports the differential between the log minimum wage and the log of the median earning of the corresponding group of workers. Colombian figures combine harmonized information coming from the Encuesta Continua de Hogares (2002 to 2006) and Gran Encuesta Integrada de Hogares (2007 to 2009) surveys.

and informal salaried workers, respectively. Dashed (non-dashed) lines denote lower (higher) deciles. Increasing dashed lines denote reductions in the distance to the median compared to the distance observed in the first

period (i.e., increasing earnings for lower-income individuals). In contrast, increasing non-dashed lines denote increments in the distance to the median compared to the distance observed in the first period (i.e., increasing earnings for the higher income individuals). Thus, looking at Venezuela in Panel A, we observe that the average pattern of mobility among salaried workers has played in favor of the lowest decile groups and has adjusted toward the median to the upper tails of the distribution. Hence, wage compression and less inequality is observed in this country.[26] It is also seen that in this particular case, the minimum wage is not necessarily a driving factor responsible for this improvement in redistribution: the evolution of the minimum wage does not shape the evolution of the distance of the earnings at any point of the distribution among formal workers (Panel B). In other cases, like Colombia and Ecuador, it happens that the evolution of the earnings observed at the formal lowest deciles closely follows that of the minimum wage (first decile earnings in Colombia almost overlap with the de-median minimum wage during the whole period under analysis; something similar happens in Ecuador starting in 2007). In Peru, the income distribution is worse, with lower-income earners departing from the median in the dominant informal sector. Slight improvements are observed among formal workers. Whereas the covariance between formal lower deciles earnings and minimum wages in Peru seems high, the variance of minimum wages is higher than that observed at any cutoff of the income distribution, suggesting a scanty overall influence of minimum wage adjustments on income redistribution.

In order to formally test whether wage behavior across different deciles of the earnings distribution is related to the minimum wage changes, we use the following model. First, it is assumed that if w_{ct}^{q} is the logarithm of the *q-th* percentile of the wage distribution in region *c* at time *t*, then w_{ct}^{*q} is the latent or possible percentile in that distribution. It is also assumed that everybody with latent earnings below the minimum wage ends up earning this minimum, and all workers with latent earnings above the minimum earn their latent wage. This censored model can express the difference between w_{ct}^{q} and w_{ct}^{p} (where *p* is the first percentile for which the minimum wage does not affect wages) as the following:

$$\begin{cases} \left(w_{ct}^{q} - w_{ct}^{p}\right) = \left(w_{ct}^{*q} - w_{ct}^{*p}\right) \; if \; w_{ct}^{*q} \geq MW_{t} \\ \left(w_{ct}^{q} - w_{ct}^{p}\right) = \left(MW_{t} - w_{ct}^{p}\right) \; if \; w_{ct}^{*q} < MW_{t} \end{cases},$$

[26] This is also observed in Panel B of Figure 2.4.

where *MW* is the logarithm of the minimum wage. Following Bosch and Manacorda (2010), we operationalize the previous equation with the following specification:[27]

$$\left(w_{ct}^{q} - w_{ct}^{p}\right) = \alpha_{c}^{q} + \alpha_{t}^{q} + \beta^{q}\left[MW_{t}^{q} - w_{ct}^{p}\right] + X_{ct}^{'}\gamma^{q} + \varepsilon_{ct}^{q}. \qquad (2.1)$$

This model implies that for the *p*-th percentile (and all higher), β^{p} should be equal to 0 as the minimum wage no longer has an effect. Our estimates for β^{p} for Colombia, Ecuador, Peru, and Venezuela are found in Table 2.4. Constraining the sample to formal salaried exclusively (Columns 2, 5, 8, and 11) we find consistent results with those anticipated in the graphical analysis of Figure 2.7: only the lowest deciles of the earnings distribution of formal salaried workers of two countries are directly correlated to the evolution of minimum wages. In Ecuador, wages are sensitive to the minimum wage until the third decile, and in Colombia at just the first one.[28] Thus, evidence suggests that minimum wages exert little influence on income redistribution in the Andean countries.

Conclusions and Policy Recommendations

Labor informality is high in the Andean countries. Regardless of the empirical measure used to approximate it, and even in contrast with out-of-region countries at comparable economic development levels, informality in Andean labor markets is high: 7 of 10 Andean urban workers do not contribute to pension funds (in Bolivia, only 1 of 10 contributes). This figure is of concern not only because it exposes informal workers to risks (at episodes of health problems, unjustified layoffs and temporary unemployment) during their working age, but especially because after retirement, informal workers are less likely to be able to hedge income risks and hence may impose financial and social burdens on younger generations of formal compliers.

Labor informality can manifest itself in several ways and with distinct intensities according to specific characteristics of workers. In the Andean countries, unpaid workers who are relatives, salaried informal workers, and nonsalaried (i.e., independent) informal workers are the three main ways in which informality is seen. Each type of informal employment displays

---

[27] A simpler specification abstracting from the control *X* renders similar results.
[28] Mondragon, Pena and Wills (2013) find similar results for Colombia.

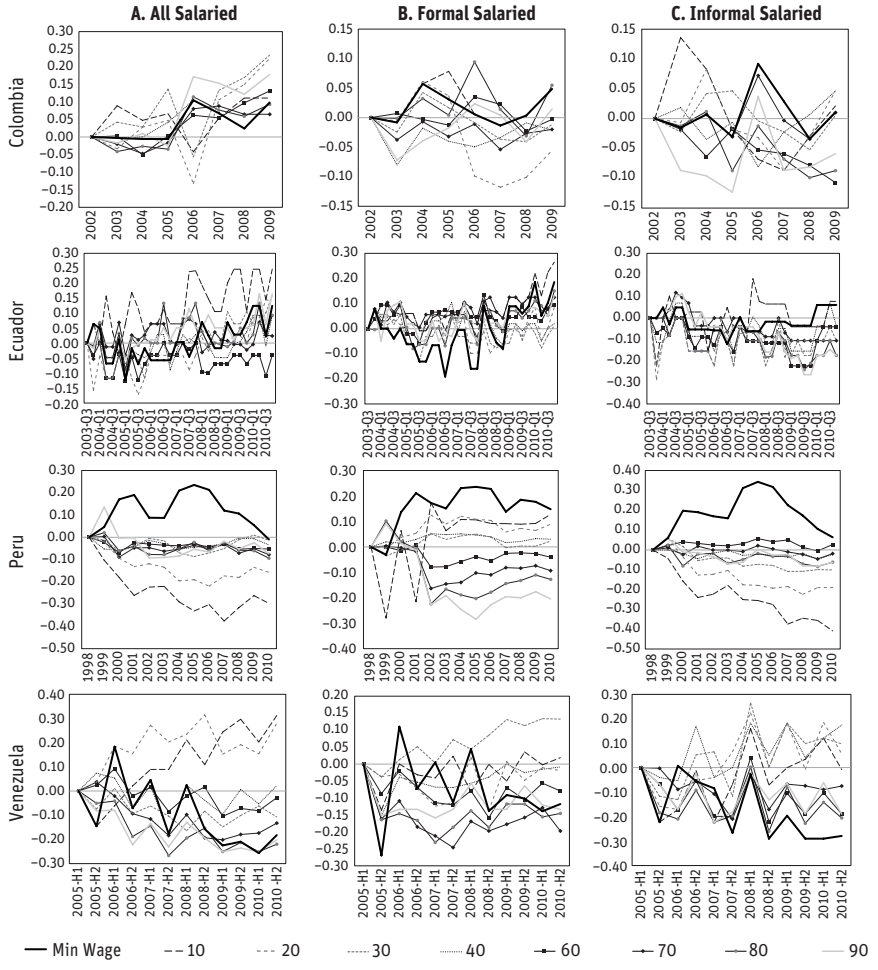
TABLE 2.4 | Effect of Minimum Wage on Inequality

	Colombia			Ecuador			Peru			Venezuela		
	Salaried (1)	Formal (2)	Informal (3)	Salaried (4)	Formal (5)	Informal (6)	Salaried (7)	Formal (8)	Informal (9)	Salaried (10)	Formal (11)	Informal (12)
p10-pm	−0.993	0.517*	−14.228	0.287	−0.309	−1.777	0.141	1.755	0.156	−1.483	0.1	−4.008
	[1.910]	[0.300]	[61.293]	[1.360]	[1.652]	[4.126]	[0.390]	[3.242]	[0.326]	[1.660]	[0.557]	[13.230]
p20-pm	−1.709	1.089	−4.892	−0.165	1.107*	−1.328	0.132	−0.44	−0.057	−1.179	−0.498	−6.126
	[1.405]	[0.743]	[21.300]	[1.212]	[0.640]	[2.588]	[0.317]	[1.624]	[0.262]	[1.457]	[0.589]	[18.000]
p30-pm	−0.666	0.524	−6.278	0.767	0.885*	1.049	0.037	−0.648	0.048	0.066	−0.295	−5.634
	[1.494]	[0.403]	[26.741]	[0.969]	[0.486]	[1.179]	[0.204]	[1.141]	[0.204]	[0.659]	[0.573]	[16.961]
p40-pm	−0.919	−0.288	2.646	2.072	0.521	0.972	−0.009	−1.371	−0.215**	−0.076	−0.573	−7.764
	[1.006]	[0.660]	[12.649]	[1.571]	[0.459]	[1.333]	[0.156]	[1.870]	[0.089]	[0.593]	[0.477]	[22.942]
px-pm	0.053	0.809	2.326	1.764	0.473	0.452	−0.008	−0.674	−0.084	−0.989	−0.226	−4.361
	[0.626]	[0.801]	[12.146]	[1.410]	[0.408]	[0.742]	[0.083]	[0.960]	[0.064]	[0.931]	[0.493]	[13.763]
px'-pm	0.021	0.417	1.835	0.22	−1.043	0.671	−0.084	−0.625	−0.04	−0.798	0.102	−4.01
	[0.876]	[0.374]	[7.986]	[0.504]	[1.088]	[1.091]	[0.184]	[1.272]	[0.073]	[0.755]	[0.357]	[12.812]
p80-pm	−0.605	0.268	1.617	−0.116	−0.74	1.526	0.007	−0.606	0.013	0.662*	0.028	−2.488
	[1.106]	[0.660]	[6.570]	[1.209]	[1.012]	[1.645]	[0.180]	[1.595]	[0.123]	[0.353]	[0.379]	[8.043]
p90-pm	−0.636	−0.701	5.674	−0.816	−0.943	1.235	0.053	−1.128	−0.174	0.833*	0.347	−4.048
	[0.966]	[1.153]	[22.131]	[1.469]	[1.336]	[1.753]	[0.130]	[2.390]	[0.277]	[0.474]	[0.571]	[11.960]
Obs.	168	168	168	546	546	546	291	262	285	240	240	240

Source: National labor surveys. For details see Box 1.1.

Note: The table reports the coefficient β^q of Equation 2.1. Each coefficient of the table comes from a different regression where the dependent variable is the wage at percentile q (after removing the "effective median" of the corresponding sample of workers: either salaried, formal ,or informal), where q goes from p10 to p90. The "effective median" is set such that earnings at or above that level are unaffected by the minimum wage for the average salaried worker. Specifically: pm = p50, px = p60, px' = p70 for Colombia; pm = p60, px = p50, px' = p70 for Ecuador and Peru; and pm = p70, px = p50, px' = p60 for Venezuela. Instrumental Variable estimation (de-median minimum wage is internally instrumented with its first annual lag). Robust clustered standard errors are in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

FIGURE 2.7 | **Cutoff Wages at Different Percentiles**
(Distance to the median wage standardized to the origin)



Source: National labor surveys. For details see Box 1.1.
Note: The panels depict the evolution of the gap between different percentiles of the log earnings distribution and the median. The line denoted by Min Wage reports the differential between the log minimum wage and the median for the particular group of workers (either all salaried, formal salaried, or informal salaried). Colombian figures combine harmonized information coming from the Encuesta Continua de Hogares (2002 to 2006) and Gran Encuesta Integrada de Hogares (2007 to 2009) surveys.

distinctive features, the most salient of which is the degree of hedging or risk pooling that workers can do through their employers (family, firms, or neither depending on the type of labor). This chapter focused mainly on paid informality (either salaried or nonsalaried). The intensity of labor informality in each

of its manifestations varies according to the specific characteristics of the workers. For example, nonsalaried informality increases with age and salaried informality is highest among younger workers and among the less educated. This chapter has provided a full-fledged static characterization of the informal state of employment for distinct group of workers in the Andean countries and thus identifies the populations most vulnerable to income insecurity after retirement.

However, labor informality as conventionally defined (lack of pensions) is not the only source of concern. The characterization presented in this chapter also allows us to realize that the population most vulnerable to post-retirement income risk is also the most vulnerable to pre-retirement income insecurity. The unconditional exposure of salaried informal workers to pre-retirement income insecurity—measured by the concentration of informal workers with salaries below the national minimum wage—is very high. No less than 70% of informal salaried workers earn wages less than or equal to the legal minimum in Colombia, Ecuador, and Peru; and no less than 60% in Venezuela. The median wage for informal workers grouped according to most characteristics is well below the minimum wage in most of the Andean countries (Bolivia is the exception as minimum wages are very low and not binding). Minimum wages seem not to be binding in Peru (where about 30% of formal salaried workers earn below the minimum wage), and in countries where they are binding, like Ecuador or Colombia, they do not help reduce income inequality within the formal sector.

Most of the policy discussions aimed at reforming social security systems in the Andean countries visit and revisit the pension schemes and the potential reforms that would make contributions incentive-compatible. But they are oftentimes silent about the income insecurity that target populations face during pre-retirement age. This chapter shows that, indeed, the group of workers lacking pension benefits in the Andes is huge, but also that an important mass of those informal salaried workers earn well below the minimum wage. Hence they are very unlikely to channel part of their current income away from current consumption. At this low end of the income distribution, a pension securing a minimum consumption level could actually improve the expenditure capacity that a full replacement pension would yield. In other words, for this most vulnerable population, the goal of pension reform should be not precisely to smooth consumption but to prevent poverty at post-retirement age either through a universal minimum pension or targeted transfers to the elderly population (as exists in some Andean countries, see Chapter 1). Yet it is clear that, given the income levels of this population, such minimum pensions should not be financed by direct contributions but rather either by noncontributory transfers

or by regressive indirect contributions. Something similar happens in the nonsalaried (independent) informal sector, where the median earnings of the lowest quintiles are below the minimum wage in almost every Andean country (except Bolivia). For wealthier informal workers (salaried or nonsalaried), the challenge is not to prevent post-retirement poverty and secure a minimum consumption level, but to preserve expenditure capacities through intertemporal consumption smoothing. For this sector, the challenge of formalization is even bolder, as it must persuade workers who may have voluntarily opted out of the formal labor market—and who conceive the informal sector as a valuable option—to become formal again and contribute to a pension system.

References

Amadeo, E., Gill, I. and Neri, M. 2000. "Do Labor Laws Matter? The "Pressure Points" in Brazil's Labor Legislation." In: I. Gill and C. Montenegro, editors. *Readdressing Latin America's "Forgotten Reform": Quantifying Labor Policy Challenges in Argentina, Brazil and Chile*. World Bank. Mimeographed document.

Araar, A. 2011. "Pro-poor Growth in Andean Countries." Inter-American Development Bank. Mimeographed document.

Autor, D., Manning, A. and Smith, C. 2009. "The Minimum Wage's Role in the Evolution of U.S. Wage Inequality over Three Decades: A Modest Re-Assessment." Mimeographed document.

Bargain, O. and Kwenda, P. 2011. "Earnings Structures, Informal Employment and Self-employment: New Evidence from Brazil, Mexico and South Africa." *International Association for Research in Income and Wealth*. 57: 100–122.

Bassi, M., Busso, M., Urzúa, S., and Vargas, J. 2012. *Disconnected Skills, Education and Employment in Latin America*. Washington, DC, United States: Inter-American Development Bank.

Bosch, M. and Manacorda, M. 2010. "Minimum Wages and Earnings Inequality in Urban Mexico." *American Economic Journal: Applied Economics.* 2(4): 128–49.

Bourguignon, F. 2010. "Non-anonymous Growth Incidence Curves, Income Mobility and Social Welfare Dominance: A Theoretical Framework with an Application to the Global Economy." Paris School of Economics. Mimeographed document.

Chaudhuri, S. and Mukhopadhyay, U. 2009. *Revisiting the Informal Sector. A General Equilibrium Approach*. New York, United States: Springer.

Coudouel, A., Cunningham, W. and Mason, A. 2010. "Informality in Colombia. Implications for Worker Welfare and Firms Productivity." Report No. 42698-CO. Washington, DC, United States: World Bank.

Fields, G. 2004. "A Guide to Multisector Labor Market Models." Working Paper No. 86. New York, United States: Cornell University.

Gasparini, L. and Tornarolli, L. 2007. "Labor Informality in Latin America and the Caribbean: Patterns and Trends from Household Survey Microdata." Working Paper No. 0046. La Plata, Argentina: Centro de Estudios Distributivos, Laborales y Sociales (CEDLAS), Universidad Nacional de La Plata.

GRADE (Grupo de Análisis para el Desarrollo). 2012. "Apoyos al sector agropecuario en los países Andinos." Inter-American Development Bank. Mimeographed document.

Grimm, M. 2007. "Removing the Anonymity Axiom in Assessing Pro-poor Growth." *Journal of Economic Inequality.* 5(2): 179–97.

Gunther, I. and Launov, A. 2007. "Competitive and Segmented Informal Labor Markets." IZA. Mimeographed document.

Harris, J. and Todaro, M. 1970. "Migration, Unemployment and Development: A Theoretical Analysis." *American Economic Review.* 60(1): 126–42.

Herrera, C. and Bosch, M. 2012. "Perú frente al reto de incrementar la cobertura de la Seguridad Social." Inter-American Development Bank. Mimeographed document.

ILO Global Wage Database. 2013. Obtained from http://www.ilo.org/travail/info/db/lang--en/index.htm.

Jenkins, S. and Kerm, P. 2006. "Trends in Income Inequality, Proper Income Growth, and Income Mobility." *Oxford Economic Papers.* 58(3): 531–48.

Kerm, P. 2009. "Income Mobility Profiles." *Economics Letters.* 102(20): 93–95.

Köbrich, C. and Dirven, M. 2007. "Características del empleo rural no agrícola en América Latina con énfasis en los servicios." ECLAC Productive Development Series Paper No. 174. Santiago de Chile, Chile: Economic Commission for Latin America and the Caribbean.

Lee, D. 1999. "Wage Inequality in the United States during the 1980s: Rising Dispersion or Falling Minimum Wage." *Quarterly Journal of Economics.* 114(3): 977–1023.

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

Maloney, W. and Mendez, J. 2004. "Measuring the Impact of Minimum Wages. Evidence from Latin America." In: J. Heckman. and C. Pagés, editors. *Law and Employment: Lessons from Latin American and the Caribbean*. Massachusetts, United States: National Bureau of Economic Research.

Mondragon, X., Pena, X. and Wills, D. 2013. "Rigideces laborales y salariales en los sectores formal e informal en Colombia." In: L. Arango and F. Hamann, editors. *El Mercado de trabajo en Colombia: hechos, tendencias e instituciones*. Banco de la República de Colombia.

Narita, R. 2010. "Self Employment in Developing Countries: A Search-Equilibrium Approach." University College London. Mimeographed document.

Perry, G., Maloney, W., Arias, O., Fajnzylber, P., Mason, A. and Saavedra, J. 2007. *Informality: Exit and Exclusion*. Washington, DC, United States: World Bank.

Souza, P. and Baltar, P. 1979. "Salario minimo e taxa de salarios no Brasil." *Pesquisa e Planejamento Economico.* 9: 629–60.

World Development Indicators. 2012. Obtained from http://data.worldbank.org/data-catalog/world-development-indicators.

PART II

Quantifying Employment and Income Risk: A Dynamic Approach to Labor Informality and Income Volatility

Informality is a state, yet it is the outcome of dynamic forces shuffling workers from one sector to another. Despite the persistency observed in the high—oftentimes increasing—levels of informality across Andean countries, informality is far from being an absolute absorbing state. That is, informality is persistently high, but informal workers are not always the same. Entries and exits to and from informality are observed in every country across the region and at highly cyclical paces. Recent studies about the degree of voluntariness of such transitions suggest a rational choice of exit from formality rather than an inexorable exclusion toward informality amid a segmented market. In Andean countries this is not clear, especially among lower-income (mostly informal) workers who still lack better outside job options.

Whether driven by aggregate exogenous events or individual decisions, transitions in and out of informality merit close inspection. Intermittency in the absorption of (in)formal labor may undermine human capital accumulation (specialization, experience, on-the-job training) and influence workers' productivity; it also may prevent financial capital accumulation of at least levels (and frequencies) that would allow workers to achieve pensions after retirement. A thorough assessment of the extent of intermittent absorption of workers in the informal sector allows us to see how sustainable a reform of the social security system can be. Reforms paired to pre-retirement incentives (such as health insurance) would enhance the contributory base for post-retirement

pension protection in a more permanent way than those resetting statutory parameters alone.

Thus it is important to assess how big the informal sector is, but it is also important to know how permanent or intermittent the state of informality is. The intensity of such intermittency can vary according to the distinct phases of the economic cycle. A dynamic analysis of the flows of workers allows us to account for such cyclical intensities and foresee corresponding reactions in terms of the flows of workers. Conventional wisdom stresses the importance of expansive destruction rates during recessive episodes, yet recent studies of some Latin American countries found that contractive creation flows in the formal sector (relative to informal job creation rates) are more significant in explaining increases in the numbers of informal jobs. Recent studies have also found that highly correlated job-to-job movements within pairs of bilateral flows during expansive phases of the cycle suggest synchronized and simultaneous out-of-employment absorptions in both the formal and informal sectors, questioning the traditional view that qualifies informality exclusively as a buffer sector.

In part, the longstanding view of segmentation is based on downward rigidities of formal wages that prompt displacements toward informality (rather than to unemployment) in the face of adverse productivity shocks.[1] Yet evidence supports formality as a more active sector in creating jobs during expansive phases (and informality as a more active sector in separations during contractive phases). Evidence also suggests that the ins and outs to and from formality and informality starting from a state of employment are roughly equally likely at different phases of the cycle, jeopardizing the effectiveness of the argument of wage stickiness. In any case, a view on wage stickiness and income dynamics is a key component to complete the analysis of labor informality. In this sense, worker flows are interesting not only to explain the actual stock of informality but to understand the influence of mobility on wage bargaining and wage setting. For instance, economies with prominent participation of incumbent workers will likely face stringent wage agreements that would prevent wage adjustments in the face of productivity shocks, while economies relying heavily on short-tenured workers will have more flexibility to adjust wages according to the phase of the business cycle. Worker dynamics

[1] Think of the case portrayed in Chapter 4 about the influence of minimum wage variations on informality: cities with high concentrations of formal workers earning around the minimum wage will be keen to displace workers toward informality after a minimum wage increase that is not fully backed by a labor productivity gain.

can also shed light on the pre-retirement income risk that workers face: formal salaried and long-tenured workers are better insured against permanent shocks than independent entrants or informal movers. Recent panel datasets in the Andean region give us the opportunity to quantify these differences and better portray the Andean labor markets.

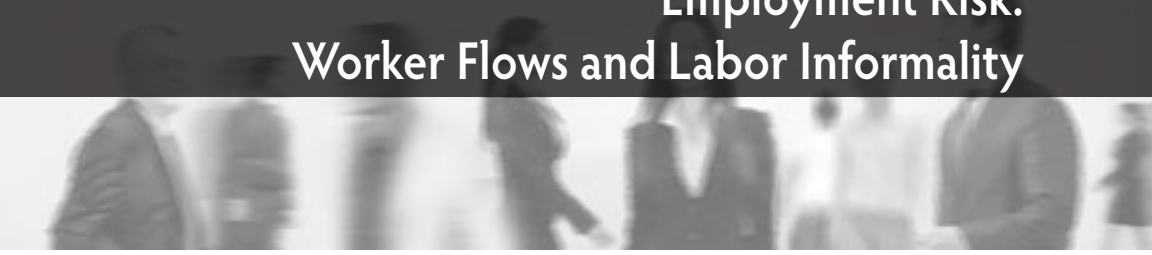
This part of the book is devoted to a comprehensive analysis of labor informality in Andean countries from a dynamic perspective in both areas.

Chapter 3 analyses the cyclical evolution of worker flows as well as the duration into each labor category at different phases of the cycle in the five countries under study. The chapter also aims to identify the most relevant transition(s) in the constitution of the size of the informal sector at a steady state, as well as the most relevant characteristics influencing such transitions.

Chapter 4 exploits cross-sectional and longitudinal variations of salaries of workers grouped according to formality and mobility criteria. Where possible, the chapter examines wage-productivity elasticities for three mobility groups: hires from unemployment, sector incumbents, and sector stayers. It then disentangles the income risk into permanent and transitory for formal, informal, and self-employed workers according to their mobility group. The chapter also quantifies the effects of minimum wage adjustments on intersectoral allocations (informalization).

3

Employment Risk: Worker Flows and Labor Informality



In most conventional labor economics studies there are three *states* to define the *status* of an individual in the labor market: out of the labor force, unemployed, or employed. This book is about three different substates of employment that are common and sizable in the developing world: salaried formality, salaried informality, and self-employment. Chapter 2 was devoted to the study of specific patterns and characteristics of workers belonging to each of those states in the Andean region during the latest available period. But those patterns and characteristics are not static. States of employment of varying size and composition reflect underlying dynamic forces that shape the actual structure of the labor market.

Recomposition of the labor force comes after several types of flows of workers and can be measured with different metrics. Increasing female participation, major migratory movements, more young people joining the labor force, or more elderly people working after retirement all translate into a decrease in the size of the out-of-the-labor-force sector (or equivalently an increase in participation). Aggressive rates of job creation along with dramatic contractions of separation rates translate into more employment. Longer durations of unemployment (searching for a suitable match) or longer durations of vacancies before a job is filled (looking for an appropriate hire in spite of available supply) render higher unemployment rates. By examining changes in the size of a state of employment, the net flows across states, or the duration in a state, one can see an intense activity of displaced workers across different labor sectors in every Andean country.

Whether voluntary or involuntary, transitions across states of employment implicitly carry uncertainty and hence risk. If voluntary, uncertainty about the employment state during the next immediate period is virtually removed, but income risk remains as productivity shocks (or any other sort of income shock) can still arrive and affect the wage distribution at either state. In addition, such shocks are not strictly independent of the state of employment, as, for instance, severe negative shocks can push productivity below minimum acceptable thresholds for formality or even constrain employment altogether (prompting job-to-job movements toward informality or job separations, respectively). Thus, uncertainty about a state of employment is not resolved even if the immediate transition is voluntary. If not voluntary, uncertainty about the state of employment during the immediate period (and afterward) is explained by the non-zero probability of arrival of a shock that may prompt job destruction, separation, or reallocation. Given that not all states of employment are equally desirable and some render less utility or lower payoffs, we define *employment risk* as the objective unconditional chance of transiting to a distinct (sometimes less desirable) state of employment (such as involuntary informality or unemployment).

Understanding labor dynamics and employment risk is crucial for several reasons. First, as stated earlier, the interaction of flows of workers moving from one sector to another determines the final size of a respective state of employment. In this interaction, more intense flows will exert a major effect on the size of a particular sector, and hence it is important to identify the flows: observing increasing informality due to falling formal hiring is not the same as observing increasing informality due to decreasing informal firing. Second, mobility groups—defined according to the states of origin and destination of workers across periods—will condition differentiated relations between relevant variables. For instance, wage elasticity (with respect to productivity) and income risk are not the same for long-tenured incumbents as for inexperienced fresh entrants or for experienced job-to-job movers. In other words, employment risk translates into income risk at different intensities according to the workers' degree of mobility and formality and, in turn, distinct intensities and permanency of income shocks will condition distinct behaviors like intensity of precautionary savings (pensions), investment in human capital accumulation, etc. Third, given the first two reasons as to why it is critical to understand labor dynamics and employment risk, policies aimed at addressing distinct types of flows are also distinct. Long durations of unemployment coupled with high rates of formal job creation may make unemployment insurance socially efficient, whereas higher rates of informal creation may not. Social assistance programs (such as conditional cash transfers) without graduation mechanisms in markets

with high formal-to-informal transitions could generate moral hazard and strong incentives to perpetuate informality (Camacho, Conover, and Hoyos 2010), whereas programs with well-defined graduation mechanisms would be more likely to contain it. Beyond social assistance, social security policies are also strongly dependent on the intensity and dynamics of informality: very informal labor markets with workers transiting frequently from/to informality tend to subsidize informality[1] (since contributions to finance the security system rely on formal funding) and do not accomplish the ultimate goal of social protection (because minimum requirements to qualify for protection in the long run are rarely met due to job instability).[2]

This chapter is devoted to studying the flow of workers across all the states of the labor market. That is, exclusive attention is given to the allocation and re-allocation of workers and to the quantification of employment risk. The analysis of the effects of dynamics on wages, income risk, and income distribution is left for Chapter 4. This chapter gives special attention to measuring the likelihood of transitions, the length of durations, the degree of procyclicality of flows (related to the business cycle), and the identification of the most relevant flows in determining the current size of the informal sector.

Workers Flows and Markov Processes

Empirical dynamic analysis is possible due to the existence of more than one occurrence of events for the same observed unit. Either in a continuum or in a discrete succession of occurrences, a comparison between the states of employment across such occurrences shows two types of outcomes: either unchanged states or transitions across states. A recent series of contributions along these lines has adopted typical two-period Markov chains as the machinery to measure transitions across states of employment in Latin American economies (Bosch, Goñi-Pacchioni, and Maloney 2007, 2012; Pagés, Pierre, and Scarpetta 2009; Bosch and Maloney 2010).

In particular, the by-now conventional approach assumes a homogenous discrete Markov process $X(t)$ defined over a discrete state-space $E = \{1,\ldots K\}$ where K is the number of possible employment states a worker could be found

[1] According to own estimates, about 9% of the income of Colombian informal workers is subsidized by contributions from formal workers to the subsidized social security regime.

[2] For instance, the Peruvian national pension system (a defined-benefit pension system that coexists with the defined-contribution private system) guarantees a pension only to those members who accumulate 240 monthly contributions during their working life.

in. Each worker can be observed at least during two discrete occurrences (periods). The combination of the information of the state in which workers are observed at each occurrence allows the creation of a discrete time transition matrix $p_{ij}(t, t + s)$ such that:

$$p_{ij}(t, t + s)=Pr(X(t+s)= j|X(t)=i) \text{ for } t =0, 1, 2,\ldots; s = 0, 1, 2,\ldots; i, j\in E, \quad (3.1)$$

where $p_{ij}(t,t + s)$ is simply the probability of moving from state i to state j in one step (s). Discrete time matrices are computed as the maximum likelihood estimator for $p_{ij}(t,t + s)$ as follows:

$$p_{ij}(t, t + s)=n_{ij}(t, t + s)/n_i(t),$$

where n_{ij} is the total number of transitions from state i to state j observed between period t and period $t + s$ and n_i is the total number of observations observed in state i at period t. In our case $K = 5$, as the states are (1) out of the labor force or *OLF*, (2) unemployment or *U,* (3) formal salaried or *F,* (4) informal salaried or *I,* and (5) self-employed or *SE* (or independent or nonsalaried workers).

In spite of recent contributions implementing transformation algorithms to approximate continuous time Markov processes from discrete objects (Fougere and Kamionka 2003, 2008; Shimer 2005; Elsby, Solon, and Michaels 2009; Bosch and Maloney 2010), this chapter only computes discrete estimates. Although in reality transitions happen at random moments within a continuum of time and at heterogeneous frequencies, little is intuitively and qualitatively gained by transforming discrete transitions to their continuous versions as, in any case, the primitive empirical inputs are discrete and even in the continuous version the transformations cannot really tell anything about the within-period unobserved transitions (that is, the transitions that may have happened in between the discrete periods that are observed through the labor surveys). Hence, some time aggregation bias would stem from fixed-period discrete analysis (Shimer 2005; Elsby, Solon, and Michaels 2009), but the information drawn from it is still useful to identify commonalities in the patterns observed across the Andean countries, measure the intensity of different transitions, compound time series, and evaluate cyclicality, etc. Discrete transitions also simplify the interpretation, as they are read as conventional probabilities, and given that they are inputs for further computations it is better to handle the information in a discrete manner.

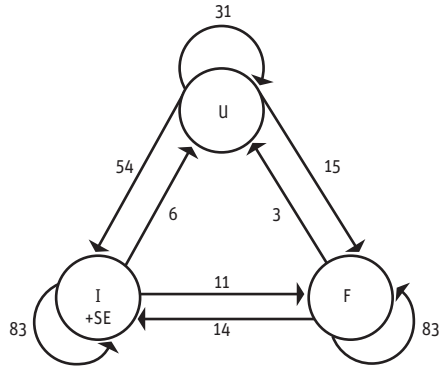
Markov chains are memory-less processes. As shown by Equation 3.1, the conditional probability distribution for the system at the next step depends only on the current state of the system, and it is independent of the state of the system

at any point in its previous history. This section exploits this Markov property to compare the one-year-ahead transition probabilities across our five Andean countries. In doing so, we give special attention to three kinds of situations. First, we look at the diagonal of the transition matrix, that is, the probabilities of staying at the same employment sector across two realizations. Second, we look at the inflows to a state. And third, we examine the outflows from a state. In a system defined by ordinary states, these situations are related to "persistence at" (and hence duration), "ins to," and "outs from" each state. In a system defined by employment states, these situations are especially meaningful. For instance, take the state of unemployment. Information summarized in the transition matrix relating unemployment state at the first occurrence to the states at the second occurrence would render measures of persistence at unemployment, ins to unemployment (or job separations), or outs from unemployment (or job findings). Something similar happens with the other states. A schematic of these transitions is depicted in Figure 3.1.

Figure 3.1 abstracts from out of the labor force (*OLF)* and collapses the remaining four states of the labor force into just three: unemployment (*U*), informal employment (*I* + *SE*), and formal employment (*F*) to provide a graphic representation of the dynamics of the Markov process governing the transitions in the Andean labor markets. In this simplified three-state representation, the reason why the process is called a chain becomes apparent. The figure shows that, on average, Andean workers stayed in their employment sectors with a probability of 83% between 2009 and 2010 (as shown, it is equally likely for an informal to stay informal as for a formal to remain formal). Considering that just 20% of the employed labor force in the region is formal, such high levels of persistence are not necessarily good news. For example, 31% of those who were unemployed in 2009 remained unemployed in 2010. These transitions suggest durations of (un)employment of about (1.4 years) 5.6 years.[3] More interestingly, intense inflows and outflows suggest more transient rather than absorbing states. Outs from unemployment (job finding rates) are almost four times more intense in the informal than in the formal sector, whereas job separations are twice as intense: unemployed workers find jobs in the (in)formal sector with

[3] Define d_i as the random duration for which an individual remains in a state i during t consecutive time periods. Based on a geometric distribution, where p_{ii} is the probability of remaining in the same employment category and $(1 - p_{ii})$ is the probability of not staying at the same state, the probability of uninterrupted duration is $P(d_i = t) = p_{ii}^{t-1}(1-p_{ii})$ for $t - 1$ events of unchanging states, followed by one change in state. Then, the average duration becomes $1/(1-p_{ii})$, which represents the average length of time (number of consecutive time periods) that an individual will remain in the same state given the underlying Markov process.

FIGURE 3.1 **Markov Chain of an Employment System with Three Labor States, 2009–10**
(Simple average for the labor force in the five Andean countries, annual transitions)



Source: National labor surveys. For details see Box 1.1.
Note: Figures are expressed as a percentage of the category of origin. F = formal; I = informal; SE = self-employed; U = unemployed.

a probability of (54%) 15%, while employed (in)formal workers lose their jobs with a probability of (6%) 3%. It becomes apparent that separations from the formal sector are not exclusively directed toward unemployment. In fact there are more formal workers going to informality than to unemployment, and it is also the case that the ins to formality from informality are less intense than the reciprocal outflows. Thus, on average, for the last period when information was available for this book, the informal sector was not only the largest sector across the Andean labor markets, but dynamic forces reshuffling workers across states also were fueling that informality.

Table 3.1 summarizes the annual labor transition matrices for the urban areas of our five Andean countries between 2009 and 2010 considering the five states of employment.[4, 5] The resemblance of the incoming and outgoing

[4] As was explained in Box 1.1, Venezuelan data include information for urban and rural workers, but it is not possible to distinguish between these two groups. As noted earlier, given the small participation of the rural population, rural workforce, and rural production in this country (based on United Nations 2011, the World Bank estimates that in 2010 Venezuela's rural population was 6.5% of the total population), we decided to coexist with the measurement error that may arise after including some rural observations, and we refer to the whole sample as if it were urban.
[5] Despite the fact that data across countries are collected at different frequencies (quarterly, semiannually or annually), it is possible to compute annual transitions for every case. Surveys of higher frequencies follow individuals for more than one period up to at least observing them again one year after. See Box 1.1 in Chapter 1 for a description of the data sources.

TABLE 3.1 | **Unconditional Annual Transition Probabilities, 2009–10**
(Population at working age, urban areas)

	Bolivia					Colombia					Ecuador					Peru					Venezuela				
	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F
Out of the Labor Force	89	2	6	3	0	75	8	7	6	3	85	3	5	5	2	62	10	12	13	2	78	5	8	4	4
Unemployed	35	27	16	18	4	24	25	15	19	16	32	16	14	28	10	31	19	16	25	8	26	23	23	14	15
Self-Employed	16	2	73	8	1	18	6	58	12	7	14	2	67	12	5	9	3	74	11	3	11	4	70	9	7
Informal Salaried	13	5	16	60	7	16	10	16	39	18	12	5	17	50	16	10	5	16	55	12	12	6	22	41	19
Formal Salaried	3	2	3	11	81	6	7	4	9	75	3	1	4	7	85	3	3	7	8	79	5	3	7	7	77

Source: National labor surveys. For details see Box 1.1.
Note: Figures are expressed as a percentage of the category of origin. Annual figures are computed using the following periods: 2009Q4–2010Q4, 2009–10, 2009Q4–2010Q4, 2009–10 and 2009H2–2010H2 for Bolivia, Colombia, Ecuador, Peru, and Venezuela, respectively. The sample is limited to workers between 14 and 65 years old (except in Ecuador, where the working age starts at 10). Urban figures are based on the panel sample of each country survey. The geographical coverage is described in Box 1.1. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

flows across the employment states in all five cases is already symptomatic of institutional commonalities driving workers in similar directions within the labor markets of each country.[6] For instance, analyzing the outer border of the transition matrix, it is clear that engagement into formal employment coming straight from outside of the labor force is very unlikely in every country (at best a 4% likelihood in Venezuela and at worst 0% in Bolivia), and that absorption from outside the labor force into the informal sector (either salaried or self-employed) is significantly higher than in the formal sector. It also happens that separations from informal employment toward outside the labor force are higher than from the formal sector. Overall, separations toward outside the labor force are higher than findings from that sector. More interestingly, in the second layer of the matrices (which correspond to the ins and outs of unemployment) the intensity of movements is much higher than in the outside-of-the-labor-force state. Less than a fourth of those unemployed in 2009 remained unemployed in 2010, by far the lowest value in the matrix diagonal.[7] About a third of those unemployed in 2009 go outside of the labor force in 2010 and about 40% move to informal employment. It is evident that the formal sector is the least likely destination for unemployed workers: for example, in Bolivia only 4% of those unemployed in 2009 were formally employed in 2010. While the outs from unemployment are more active than the outs from outside the labor force, the ins to unemployment are less active. The informal sector separates more workers than the formal sector but the separations are two or three times more intense toward outside the labor force than toward unemployment. In other words, among informal and self-employed workers, those dropping from the employed workforce are more likely to drop out of the labor force than to keep looking for jobs. Among informal employed workers we observe nontrivial bilateral flows across self-employed and informal salaried workers with a stronger intensity of the flows from informal salaried to self-employed than vice-versa. With respect to formal to/from informal transitions, there are important flows going from informal to formal salaried workers (Bolivia is an exception). Overall, self-employed workers rarely transit to formality. Finally outflows from formal to informal jobs are less intense than the corresponding inflows. Interestingly, the probability of staying formal is about 80% across the whole region. That is, while it is difficult to achieve formality, once it is achieved it is likely for workers to stay formal for a while. Thus, although formality is not an absorbing state, it is by far the least transient of all the employment sectors.

---

[6] See Chapter 1 for a comprehensive assessment of this matter.

[7] Ecuador and Peru have the lowest durations of unemployment (1.2 years).

Table 3.2 reports the same transition matrices in national, urban, and rural areas for those countries for which such information was collected. While finding a job happens more often in the informal sector than in the formal one irrespective of the area, comparing the intensities of finding a job in each type of area reveals important differences between them. For instance, rural informal job finding rates are higher than urban ones, whereas urban formal job finding rates are higher than rural ones. Persistence of formality is also much higher in urban areas, yet informal separation toward unemployment also happens at a higher pace in these areas. Employment-to-employment transitions also reveal stark asymmetries in specific flows. For instance, in Ecuador and Peru, formalization of informal salaried workers among urban workers happens twice as much as among rural workers. In Ecuador, the likelihood of rural formal salaried workers becoming informal salaried workers is more than double that observed in urban areas.

A similar analysis can be done conditioning the transitions by specific characteristics (i.e., by specific groups of individuals), one at a time. Table 3.3 shows transitions for workers grouped by gender, age, education, and firm size. A number of interesting patterns emerge.

TABLE 3.2 **Unconditional Annual Transition Probabilities, 2009–10**
(Population at working age, national and rural areas)

		National					Urban					Rural				
		OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F
Ecuador	Out of the Labor Force	86	2	5	6	1	85	3	5	5	2	86	2	5	6	1
	Unemployed	34	14	15	29	8	32	16	14	28	10	37	9	18	32	4
	Self-Employed	14	2	66	15	3	14	2	67	12	5	14	1	65	19	1
	Informal Salaried	12	4	17	56	12	12	5	17	50	16	11	3	17	62	7
	Formal Salaried	3	1	4	9	83	3	1	4	7	85	3	2	7	18	70
Peru	Out of the Labor Force	61	8	13	15	2	62	10	12	13	2	60	5	15	19	2
	Unemployed	32	18	16	26	8	31	19	16	25	8	33	14	15	33	6
	Self-Employed	7	2	79	10	2	9	3	74	11	3	4	1	84	9	1
	Informal Salaried	11	4	18	57	10	10	5	16	55	12	13	3	21	59	5
	Formal Salaried	4	3	8	8	78	3	3	7	8	79	7	2	15	7	70

Source: National labor surveys. For details see Box 1.1.

BOX 3.1. THE INS AND OUTS OF STATES OF EMPLOYMENT AROUND THE WORLD

Worker mobility across states of employment in the Andean countries is very intense. Is this the case elsewhere? How similar are the patterns of mobility with respect to those observed in other Latin American countries and in other developing economies? How dissimilar are they with respect to those observed in the developed world?

Box Table 3.1.1 provides figures on the persistence of different states of employment, on the ins and outs to/from unemployment, and on the ins and outs to/from formal employment in several countries around the world. It shows that persistence in unemployment is similar across the Andean countries and comparable to that observed in other Latin American economies. The implicit duration of unemployment is about 1.3 years. Implicit durations are longer in more developed countries, where persistence of unemployment runs between 40% and 60%. Unfortunately, the figure for the United States does not allow us to disentangle unemployment from those out of the labor force. However, it seems clear that for Western Europe (continental and noncontinental) the average duration of unemployment is 1.7 years, probably explained in part by the unemployment insurance mechanisms that allow workers to afford longer unemployment periods. Other developing economies in the Eurasian region also can afford similar periods of unemployment (about 1.7 years).[a] Implicit durations in formal employment are clearly different across regions: while US, UK, and EU workers stay 14 years at jobs in the formal sector, workers only stay for about seven years in developing regions and only five years in Andean countries. The average duration at informal sector jobs in the Andean countries, in other Latin American economies, and in other developing countries is about two years. Finally, implicit duration of self-employment is higher in the Andes than in other Latin American or developing economies (three versus two years) but not as high as that observed in developed countries (about five years).

Transitions toward employment are more intense in the informal sector in all the developing countries of the sample except for Hungary and Ukraine. It is worth noting that in Latin America (except for Venezuela), finding a job in the informal salaried sector is more likely than in the self-employment sector (a very similar pattern is observed in other developing countries). In turn, in developed countries, finding a job in the self-employment sector is not as likely as in the formal salaried sector. The reciprocal is observed in the inflows to unemployment: more intense separations happen in the informal salaried sector. With the exception of Colombia, separations from the formal sector towards unemployment are quite low in the Andean countries compared with the rest of the sample.

Finally, there is a considerable displacement from the formal sector toward the informal salaried sector in all Latin American countries. The same transitions in developing countries of the sample are not as high (except for Russia). The reverse flow (transitions from the informal salaried to the formal salaried sector) is also very active, especially in the out-of-the-region developing countries.

[a] OECD StatExtracts reports about 19 months of observed duration of unemployment in Europe for 2006 and 2007 and about 15 months for 2011. It also reports about 11 months of duration of unemployment for Mexico. Inferred durations from the transition rates, reported in Box Table 3.1.1, are 20 and 15 months for Europe and Mexico, respectively.

(continued on next page)

BOX 3.1. THE INS AND OUTS OF STATES OF EMPLOYMENT AROUND THE WORLD (*continued*)

BOX TABLE 3.1.1 | **Annual Labor Transitions around the World**

	Bolivia	Colombia	Ecuador	Peru	Venezuela	Chile[1]	Argentina[2]	Mexico[3]	Albania[4]	Georgia[4]	Hungary[4]	Poland[4]	Russia[4]	Ukraine[4]	Korea[5]	US[6]	UK[7]	EU[8]
Persistence in each state (measured as the elements of the main diagonal of Pij)																		
Out of Labor Force	0.89	0.75	0.85	0.62	0.78	0.62	0.75	0.75	0.75	0.78	0.84	0.90	0.76	0.76	0.75	0.68	0.79	0.87
Unemployed	0.27	0.25	0.16	0.19	0.23	0.29	0.21	0.22	0.29	0.51	0.39	0.67	0.34	0.33	0.11		0.45	0.39
Self-employed	0.73	0.58	0.67	0.74	0.70	0.37	0.61	0.65	0.69	0.52	0.63	0.86	0.18	0.50	0.82	0.70	0.91	0.94
Informal Salaried	0.60	0.39	0.50	0.55	0.41	0.82	0.53	0.59	0.48	0.46	0.40	0.49	0.43	0.47	0.83	0.93	0.92	
Formal Salaried	0.81	0.75	0.85	0.79	0.77		0.87	0.84	0.83	0.89	0.86	0.90	0.82	0.86				
Outflows from unemployment toward different states (measured as a percentage of the initial unemployment)																		
Out of Labor Force	0.35	0.24	0.32	0.31	0.26	0.26	0.28	0.30	0.34	0.24	0.23	0.14	0.19	0.25	0.36	0.68	0.17	0.25
Unemployed	0.27	0.25	0.16	0.19	0.23	0.29	0.21	0.22	0.29	0.51	0.39	0.67	0.34	0.33	0.11		0.45	0.39
Self-employed	0.16	0.15	0.14	0.16	0.23	0.04	0.11	0.09	0.15	0.12	0.04	0.03	0.03	0.03	0.06	0.04	0.04	0.36
Informal Salaried	0.18	0.19	0.28	0.25	0.14	0.34	0.25	0.22	0.16	0.06	0.11	0.10	0.23	0.13	0.48	0.28	0.34	
Formal Salaried	0.04	0.16	0.10	0.08	0.15		0.14	0.17	0.06	0.07	0.23	0.06	0.21	0.26				
Inflows to unemployment from different states																		
Out of Labor Force	0.02	0.08	0.03	0.10	0.05	0.18	0.07	0.29	0.05	0.07	0.06	0.06	0.06	0.10	0.03	0.68	0.07	0.04
Unemployed	0.27	0.25	0.16	0.19	0.23	0.29	0.21	0.22	0.29	0.51	0.39	0.67	0.34	0.33	0.11		0.45	0.39
Self-employed	0.02	0.06	0.02	0.03	0.04	0.13	0.03	0.02	0.02	0.03	0.05	0.06	0.08	0.11	0.01	0.05	0.02	0.02
Informal Salaried	0.05	0.10	0.05	0.05	0.06	0.06	0.05	0.04	0.05	0.04	0.14	0.16	0.09	0.08	0.02	0.04	0.03	
Formal Salaried	0.02	0.07	0.01	0.03	0.03		0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.04				

(continued on next page)

BOX 3.1. THE INS AND OUTS OF STATES OF EMPLOYMENT AROUND THE WORLD (*continued*)

BOX TABLE 3.1.1 | **Annual Labor Transitions around the World**

	Bolivia	Colombia	Ecuador	Peru	Venezuela	Chile[1]	Argentina[2]	Mexico[3]	Albania[4]	Georgia[4]	Hungary[4]	Poland[4]	Russia[4]	Ukraine[4]	Korea[5]	US[6]	UK[7]	EU[8]
Outflows from formal salaried toward different states (measured as a percentage of the initial formal salaried)																		
Out of Labor Force	0.03	0.06	0.03	0.03	0.05	0.04	0.03	0.04	0.05	0.03	0.06	0.03	0.02	0.06	0.11	0.04	0.04	0.04
Unemployed	0.02	0.07	0.01	0.03	0.03	0.06	0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.04	0.02		0.03	0.02
Self-employed	0.03	0.04	0.04	0.07	0.07	0.02	0.02	0.02	0.04	0.04	0.01	0.00	0.02	0.01	0.05	0.03	0.01	
Informal Salaried	0.11	0.09	0.07	0.08	0.07	0.82	0.06	0.08	0.06	0.03	0.03	0.02	0.10	0.03	0.83	0.93	0.92	0.94
Formal Salaried	0.81	0.75	0.85	0.79	0.77		0.87	0.84	0.83	0.89	0.86	0.90	0.82	0.86				
Inflows to formal salaried from different states																		
Out of Labor Force	0.00	0.03	0.02	0.02	0.04	0.13	0.03	0.04	0.02	0.02	0.06	0.01	0.07	0.09	0.18	0.28	0.13	0.09
Unemployed	0.04	0.16	0.10	0.08	0.15	0.34	0.14	0.17	0.06	0.07	0.23	0.06	0.21	0.26	0.48		0.34	0.36
Self-employed	0.01	0.07	0.05	0.03	0.07	0.16	0.05	0.04	0.04	0.07	0.13	0.03	0.46	0.12	0.09	0.25	0.04	
Informal Salaried	0.07	0.18	0.16	0.12	0.19	0.82	0.17	0.12	0.14	0.26	0.23	0.25	0.31	0.32	0.83	0.93	0.92	0.94
Formal Salaried	0.81	0.75	0.85	0.79	0.77		0.87	0.84	0.83	0.89	0.86	0.90	0.82	0.86				
GDP growth[9]	4.1	4.0	3.6	8.8	−1.5	5.60	8.5	5.5	5.9	2.9	3.1	1.4	7.3	12.1	5.1	1.8	1.8	0.9

Sources: [1] Cea et al. (2009) for 2004–05; [2] Tornarolli and Conconi (2007) for 2005–06 (informal self-employed considered as self-employed); [3] Arceo (2011) weighted average of men and woman transitions for 2008–10; [4] Duryea et al. (2006) one-year transitions for Albania (2002–04), Georgia (1998–99), Hungary (1993–97), Poland (2000–02), Russia (1994–2003), and Ukraine (2003–04); [5] Cheon (2012) for 2005–07; [6] Fairlie (2005) cumulative two year-by-two year transitions for 1994–2002; [7] Meager and Carta (2011) for 2009–11; [8] Kaiser (2006) cumulative year-by-year transitions for 1994–2002; [9] The average annual growth rate corresponds to the period for which the transition is reported at each country.

Note: For those cases in which the sources do not distinguish the five categories, we report the transitions that correspond to salaried employment rather than to informal salaried and formal salaried employment (in Chile and the United States); to employment rather than self-employment and salaried employment (in the European Union); and to nonemployment rather than out of the labor force and unemployment (in the United States).

TABLE 3.3 | **Conditional Annual Transition Probabilities, 2009–10**
(Population at working age, urban areas)

			Bolivia					Colombia					Ecuador					Peru					Venezuela				
			OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F
By gender	Male	Out of the Labor Force	89	2	4	5	1	78	5	7	6	4	86	3	2	7	2	60	11	9	16	3	72	7	8	7	5
		Unemployed	37	14	22	24	3	14	29	21	15	20	20	19	15	36	10	25	23	16	29	7	15	24	27	18	16
		Self-Employed	12	1	71	14	2	8	7	63	12	9	4	1	74	15	6	3	2	76	14	4	4	4	74	10	7
		Informal Salaried	14	2	25	49	9	9	12	19	39	22	6	6	19	57	13	7	5	17	58	13	7	7	25	42	19
		Formal Salaried	3	8	6	10	73	4	6	4	10	76	1	2	4	8	85	2	4	8	9	77	3	4	10	9	73
	Female	Out of the Labor Force	85	3	7	3	1	74	9	7	7	3	85	3	6	4	2	63	9	14	12	2	80	4	9	3	4
		Unemployed	47	20	15	14	5	32	22	10	23	12	43	13	13	20	11	38	15	17	22	9	40	21	17	9	13
		Self-Employed	22	1	71	5	1	26	5	53	11	5	26	3	59	9	3	15	3	73	8	2	22	3	63	6	6
		Informal Salaried	22	6	16	48	8	22	9	13	39	16	24	5	13	39	20	15	6	16	52	11	20	5	17	39	20
		Formal Salaried	5	10	4	7	74	8	7	4	7	74	5	1	4	5	85	5	2	4	7	83	7	2	5	5	81

(continued on next page)

TABLE 3.3 | **Conditional Annual Transition Probabilities, 2009–10**
(Population at working age, urban areas) (*continued*)

			Bolivia					Colombia					Ecuador					Peru					Venezuela				
			OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F
By age	25 or less	Out of the Labor Force	76	7	7	9	1	78	8	3	7	3	89	3	1	5	2	68	11	6	14	2	81	5	4	5	4
		Unemployed	53	14	11	20	3	25	26	10	22	17	36	18	7	31	7	36	20	7	32	5	32	22	14	17	15
		Self-Employed	36	3	45	14	1	26	5	38	19	12	28	9	31	23	8	21	4	49	22	4	19	7	51	14	9
		Informal Salaried	28	1	14	50	6	20	13	14	40	14	18	8	5	54	15	17	7	12	53	11	18	9	18	40	15
		Formal Salaried	7	30	0	14	49	7	10	5	12	67	4	4	3	13	76	13	9	8	18	52	11	6	7	12	63
	25 to 65	Out of the Labor Force	65	7	18	8	3	70	8	14	5	4	76	3	13	6	3	54	9	22	13	3	73	5	14	4	5
		Unemployed	31	21	24	19	5	23	24	22	16	14	27	14	22	23	14	37	18	25	19	11	22	23	28	11	15
		Self-Employed	11	1	77	10	2	16	6	62	10	6	13	1	71	11	4	7	2	78	9	3	9	3	73	8	7
		Informal Salaried	9	4	27	50	10	14	9	17	39	21	9	4	23	48	16	7	5	19	57	13	9	5	24	41	21
		Formal Salaried	4	6	6	8	77	6	5	4	7	77	3	1	4	6	87	2	2	6	7	82	4	2	8	6	79

(continued on next page)

TABLE 3.3 | **Conditional Annual Transition Probabilities, 2009–10**
(Population at working age, urban areas) (*continued*)

			Bolivia					Colombia					Ecuador					Peru					Venezuela				
			OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F
By educational attainment	Less than high school grad	Out of the Labor Force	89	2	6	3	0	88	3	4	4	0	88	2	5	4	1	67	9	13	10	0	82	3	9	4	2
		Unemployed	49	12	19	19	0	31	17	17	26	9	32	17	15	31	4	35	21	18	22	3	27	21	27	17	9
		Self-Employed	19	1	71	8	1	24	10	31	24	10	14	1	70	13	2	9	2	78	10	1	11	4	71	9	5
		Informal Salaried	16	4	28	48	4	27	16	20	31	7	11	5	19	54	11	9	6	21	60	5	10	6	23	44	15
		Formal Salaried	6	24	3	7	60	9	9	9	27	45	4	2	4	10	81	7	5	12	17	60	6	4	11	12	68
	High school grad or more	Out of the Labor Force	90	2	6	2	0	68	11	9	7	5	80	4	3	8	4	58	10	11	16	4	72	7	8	5	8
		Unemployed	50	12	19	19	0	23	27	15	18	17	32	15	13	23	17	29	18	16	27	11	26	24	19	11	20
		Self-Employed	19	0	72	8	1	17	5	61	10	6	13	4	60	9	13	9	3	71	12	4	11	4	67	7	11
		Informal Salaried	17	4	28	47	4	14	9	15	41	21	16	6	10	38	29	11	5	14	53	16	15	6	19	34	26
		Formal Salaried	6	25	3	7	60	6	6	4	8	76	2	1	4	4	89	3	3	6	7	82	5	3	6	5	81

(continued on next page)

TABLE 3.3 | **Conditional Annual Transition Probabilities, 2009–10**
(Population at working age, urban areas) (*continued*)

			Bolivia					Colombia					Ecuador					Peru					Venezuela				
			OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F	OLF	U	SE	I	F
By firm's size	Less than 10 workers	Out of the Labor Force	87	3	6	4	1			57	35	8			47	47	6	31	4	36	27	1		0	67	26	7
		Unemployed	42	17	18	19	4			49	42	9			40	55	5	15	5	40	39	1	1	2	63	27	7
		Self-Employed	41	0	49	8	2	20	6	63	8	2	15	2	72	11	1	10	3	80	8	0	12	4	75	7	2
		Informal Salaried	16	2	16	51	16	19	10	21	39	11	14	6	22	52	6	11	5	25	56	2	13	6	31	42	8
		Formal Salaried	4	4	5	9	78	4	8	15	19	55	3	2	21	16	58	3	2	43	29	24	6	3	38	22	32
	10 or more	Out of the Labor Force								18	9	73			1	44	56	1			69	30		0	3	24	72
		Unemployed									19	81				54	46	1			55	43		1	4	24	71
		Self-Employed	12	2	75	10	1		11	11	11	67		1	9	34	56		1	6	56	36	2	1	33	17	48
		Informal Salaried	17	5	25	48	5	11	14	8	30	38	5	2	1	46	45	6	3		58	34	10	7	3	38	41
		Formal Salaried	5	1	8	13	74	10	5	1	4	80	1	0	0	5	94	1	1	0	5	94	5	3	1	4	87

Source: National labor surveys. For details see Box 1.1.
Note: Figures are expressed as a percentage of the category of origin. Workers between 14 and 65 years old are considered in the computations (except in Ecuador, where the working age starts at 10). Figures are based on the panel sample of each country survey. The geographical coverage is described in Box 1.1. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

Gender differentiation reveals that ins to out of the labor force are much more intense for females than for males (two to five times higher). That is, female workers separating from the employment state (especially from informality) are very likely to drop out of the labor force. Another notable pattern is that outs from unemployment generally are higher for males than for females (in Peru, this holds only for outs from unemployment toward salaried informality). Bilateral movements within informality—that is, flows to/from self-employment and salaried informality—are also more intense among men, suggesting less risk aversion for entrepreneurship and salary independence among men.

Age differentiation suggests that between one-fourth and one-fifth of young workers in informality in 2009 abandoned the labor force by 2010. This pattern is consistent across countries and with the fact that at younger ages transitions between working activities and exclusive learning activities are quite likely. Separation rates (ins to unemployment) are also noticeably higher among the young. On the other hand, job finding rates in the informal salaried sector are higher for younger people than for more experienced workers, while the opposite happens in the self-employment sector. These generational dynamics are consistent with the life-cycle static pattern observed across generations discussed in Chapter 2, where we observed that in the 2010 cross-section, workers belonging to younger age cohorts were mostly concentrated in the informal salaried sector, while the premium age cohort was mostly concentrated in the formal salaried sector and the older cohort was mostly concentrated in self-employment.

Differentiation by educational attainment renders many systematic patterns: creation of self-employed jobs is more intense among the less educated across the five countries; formal job finding is far more intense among more educated individuals; transitions from the formal sector toward the informal sector (both self-employed and informal) are much higher (almost twice as large) among the less educated than among the educated; transitions from informal salaried to formal salaried are between two and three times higher among the educated than among the less educated; and duration in formality is much higher (about 20% more) among more educated workers. Given that the starkest contrasts across transitions are pinpointed after conditioning by this criterion, it is not surprising that the educational attainment covariate will exhibit the most significant influence on the probability of transitioning across states of employment in the multinomial analysis that follows.

Finally, differentiation in terms of firm size also provides some generalized patterns: job finding in small firms mostly happens in the informal sectors; transitions from formal to informal jobs are much more intense in small firms; and rates of formalization are noticeably high in large firms. This is a source of deep concern given that in the Andean region, the small enterprise sector absorbs most of the labor force (see Chapter 1).

Table 3.4 combines the information exploited in Table 3.3 and inspects the marginal effect of all the aforementioned individual characteristics on the probability of transiting across states of employment. As explained earlier, the most salient characteristic influencing the annual transitions is educational attainment. Except for the Colombian case, for which the marginal effects are mostly nonsignificant,[8] educational attainment contributes significantly and positively to transit from unemployment and salaried informality toward salaried formality. Likewise, it contributes significantly and negatively to transit from salaried formality toward salaried informality.

Another characteristic with influence on the bilateral flows between salaried formality and informality is firm size. Firm size has positive marginal effects on transitions from informality to formality and negative marginal effects on transitions from formality to informality. Age and gender mainly influence transitions toward being out of the labor force: younger workers and female workers are more likely to transit toward inactivity.

TABLE 3.4 Marginal Effects of Individual Characteristics on Annual Transition Probabilities

BOLIVIA (2009:Q4–2010:Q4)				
	From OLF			
Variable	To U	To SE	To I	To F
Female	0.001	0.048*	–0.047**	0.012
Age	0.010**	0.021***	0.014**	0.002
Age Squared	–0.000**	–0.000***	–0.000***	0.000
University Education	0.009	–0.043*	0.022	0.036***
Technical Education	0.067	0.004	0.071	–0.174
Secondary Education	–0.002	–0.027	0.016	0.029**
Female 25 to 45	–0.040	–0.061*	–0.023	–0.010
Female 46 to 65	–0.044	–0.084*	–0.074	–0.005

(continued on next page)

[8] Most likely due to the thin data support.

TABLE 3.4 Marginal Effects of Individual Characteristics on Annual Transition Probabilities (*continued*)

Bolivia (2009:Q4–2010:Q4) (*continued*)

	From Unemployment			
Variable	**To OLF**	**To SE**	**To I**	**To F**
Female	0.062	0.061	–0.103	0.002
Age	–0.060***	0.039**	0.023	0.012
Age Squared	0.001***	–0.000*	0.000	0.000
University Education	–0.159	–0.158	–0.199	0.565
Technical Education	–0.164	–0.188	–0.166	0.569
Secondary Education	–0.196	–0.029	–0.148	0.530
Female 25 to 45	0.061	–0.194*	–0.005	0.020
Female 46 to 65	0.400	–0.143	0.054	–0.510
	From Self-Employed			
Variable	**To OLF**	**To U**	**To I**	**To F**
Female	0.138***	0.040*	–0.074	0.017
Age	–0.029***	0.001	–0.002	0.001
Age Squared	0.000***	0.000	0.000	0.000
University Education	0.021	0.009	0.007	0.020*
Technical Education	0.020	0.024*	0.005	0.012
Secondary Education	0.017	–0.042	–0.006	0.014
Female 25 to 45	–0.010	–0.026	–0.037	–0.019
Female 46 to 65	–0.051	–0.022	–0.053	–0.025
Primary Sector	0.068	0.011	0.061	–0.001
Secondary Sector	–0.001	–0.013	0.040*	–0.010
11 to 20 employees	–1.289	–0.323	0.125	0.054
21 to 50 employees	0.278	–0.235	–0.967	–0.152
51 to 100 employees	–1.025	–0.254	–0.956	–0.157
101 to 500 employees	–2.896	0.274	–2.988	0.159
More than 500 employees	–0.889	–0.191	–0.920	–0.160
	From Informal			
Variable	**To OLF**	**To U**	**To SE**	**To F**
Female	0.054*	0.050*	–0.096	–0.048
Age	–0.045***	0.004	0.014*	0.005
Age Squared	0.001***	0.000	0.000	0.000
University Education	0.069**	–0.014	–0.117***	0.084***
Technical Education	–0.017	–0.026	–0.069	0.103***
Secondary Education	0.009	–0.035	–0.036	0.076**
Female 25 to 45	0.042	–0.027	–0.004	0.040
Female 46 to 65	0.034	0.011	0.085	0.017
Primary Sector	0.033	–0.009	–0.005	0.039

(continued on next page)

TABLE 3.4 | **Marginal Effects of Individual Characteristics on Annual Transition Probabilities** (*continued*)

Bolivia (2009:Q4–2010:Q4) (*continued*)				
Secondary Sector	0.015	−0.038*	−0.045	−0.011
11 to 20 employees	0.063*	−0.012	−0.066	0.020
21 to 50 employees	−0.053	0.015	−0.082	0.090***
51 to 100 employees	0.003	0.029	−0.202*	0.044
101 to 500 employees	−0.004	0.019	−0.045	0.043
More than 500 employees	0.078	0.056	−0.050	0.014
	From Formal			
Variable	**To OLF**	**To U**	**To SE**	**To I**
Female	0.037*	−0.005	−0.017	−0.003
Age	−0.019***	−0.004	0.012	−0.004
Age Squared	0.000***	0.000	0.000	0.000
University Education	−0.021	0.006	0.031	0.009
Technical Education	−0.029	−0.196	0.026	0.071
Secondary Education	−0.026	−0.001	0.059	0.098*
Primary Sector	0.001	−0.208	0.086	0.112
Secondary Sector	−0.016	0.003	0.029	0.026
11 to 20 employees	0.045	−0.209	0.001	0.002
21 to 50 employees	0.012	−0.011	−0.012	−0.037
51 to 100 employees	0.058	0.016	−0.044	0.016
101 to 500 employees	0.023	0.003	−0.104	−0.007
More than 500 employees	0.114	−0.206	−0.025	−0.064

COLOMBIA (2009–2010)				
	From OLF			
Variable	**To U**	**To SE**	**To I**	**To F**
Female	0.050*	−0.058	0.006	−0.005
Age	0.025***	0.012*	0.006	0.008
Age Squared	−0.000***	−0.000*	0.000	0.000
University Education	0.047	0.021	0.060*	−0.021
Technical Education	0.065*	0.032	0.013	−0.011
Secondary Education	0.016	0.014	−0.048	−0.046*
Female 25 to 45	−0.086*	0.020	−0.054	−0.012
Female 46 to 65	−0.043	0.031	0.082	−0.058
	From Unemployment			
Variable	**To OLF**	**To SE**	**To I**	**To F**
Female	0.067	−0.115	0.163*	−0.069
Age	−0.062*	0.018	0.010	0.041
Age Squared	0.001*	0.000	0.000	−0.001

(continued on next page)

TABLE 3.4 Marginal Effects of Individual Characteristics on Annual Transition Probabilities (*continued*)

Colombia (2009–2010) (*continued*)				
University Education	0.060	0.008	–0.222	0.161
Technical Education	–0.056	0.017	–0.037	0.062
Secondary Education	0.074	0.133	0.042	–0.003
Female 25 to 45	0.251*	–0.030	–0.161	–0.012
Female 46 to 65	0.579	0.337	0.231	–1.276
	From Self-Employed			
Variable	**To OLF**	**To U**	**To I**	**To F**
Female	0.180*	0.001	–0.003	0.034
Age	–0.017	0.008	–0.005	0.001
Age Squared	0.000	0.000	0.000	0.000
University Education	–0.040	–0.016	0.026	0.034
Technical Education	–0.042	–0.025	0.020	–0.010
Secondary Education	–0.041	0.017	0.042	0.017
Female 25 to 45	–0.009	–0.002	–0.003	–0.104
Female 46 to 65	0.292	0.087	0.106	–0.911
11 to 20 employees	–0.429	1.244	–0.331	1.206
21 to 50 employees	–1.510	–0.581	–0.861	–0.458
51 to 100 employees	–0.461	–0.141	2.111	–0.107
101 to 500 employees	0.574	–0.833	0.342	–0.795
	From Informal			
Variable	**To OLF**	**To U**	**To SE**	**To F**
Female	0.165*	–0.066	–0.003	–0.054
Age	–0.021	–0.008	0.007	0.053*
Age Squared	0.000	0.000	0.000	–0.001*
University Education	–0.001	0.089	–0.125	–0.018
Technical Education	0.112	0.037	–0.045	–0.049
Secondary Education	0.393	0.280	0.370	–1.805
Female 25 to 45	–0.029	0.116	–0.067	–0.040
Female 46 to 65	0.334	–1.234	0.135	0.195
11 to 20 employees	–0.149	0.088	0.051	–0.033
21 to 50 employees	1.034	–0.918	–1.422	–1.244
51 to 100 employees	0.242	0.356	0.437	–1.696
101 to 500 employees	–0.089	0.002	0.005	0.186***
	From Formal			
Variable	**To OLF**	**To U**	**To SE**	**To I**
Female	0.042	–0.010	–0.057	–0.119*
Age	–0.026*	–0.015	0.005	0.006
Age Squared	0.000*	0.000	0.000	0.000

(continued on next page)

TABLE 3.4 | **Marginal Effects of Individual Characteristics on Annual Transition Probabilities** (*continued*)

Colombia (2009–2010) (*continued*)				
University Education	–0.035	0.005	0.107*	0.006
Technical Education	0.008	0.031	0.062	0.061
Secondary Education	0.082	0.085	–0.585	0.044
Female 25 to 45	0.045	0.066	–0.032	0.092
Female 46 to 65	0.034	–0.836	0.055	0.549
11 to 20 employees	0.011	–0.006	0.025	0.032
21 to 50 employees	0.075	–0.049	0.017	–0.097
51 to 100 employees	0.111*	–0.057	–0.005	–0.116
101 to 500 employees	0.035	–0.004	–0.037	–0.086*

ECUADOR (2009:Q4–2010:Q4)				
	From OLF			
Variable	**To U**	**To SE**	**To I**	**To F**
Female	–0.001	0.004	–0.039***	0.003
Age	0.010***	0.013***	0.018***	0.006***
Age Squared	–0.000***	–0.000***	–0.000***	–0.000***
University Education	0.017**	0.006	–0.019*	0.032***
Technical Education	0.038	–0.002	–0.029	–0.192
Secondary Education	0.013*	0.006	0.009	0.014**
Female 25 to 45	–0.042***	–0.026*	–0.066***	–0.033***
Female 46 to 65	–0.025	–0.028*	–0.061***	–0.032***
	From Unemployment			
Variable	**To OLF**	**To SE**	**To I**	**To F**
Female	0.243***	–0.063	–0.123*	–0.007
Age	–0.059***	0.027**	0.007	0.026
Age Squared	0.001***	–0.000*	0.000	0.000
University Education	–0.020	–0.013	–0.165**	0.165**
Technical Education	–0.991	–0.497	2.384	–0.219
Secondary Education	–0.024	–0.039	–0.036	0.088
Female 25 to 45	0.028	0.031	–0.058	0.001
Female 46 to 65	0.095	–0.061	0.014	0.014
	From Self-Employed			
Variable	**To OLF**	**To U**	**To I**	**To F**
Female	0.231***	0.006	–0.059***	–0.019*
Age	–0.023***	–0.004**	–0.008*	–0.004
Age Squared	0.000***	0.000**	0.000	0.000
University Education	0.003	0.020**	–0.076***	0.075***
Technical Education	0.153	–0.182	–0.011	0.049

(continued on next page)

TABLE 3.4 Marginal Effects of Individual Characteristics on Annual Transition Probabilities (*continued*)

Ecuador (2009:Q4–2010:Q4) (*continued*)				
Secondary Education	0.013	0.006	−0.041**	0.022
Primary Sector	−0.008	−0.006	−0.006	0.005
Secondary Sector	−0.020	−0.008	−0.033*	−0.012
11 to 20 employees	−1.416	0.081	0.215	0.137
21 to 50 employees	−1.481	−0.202	−1.542	0.299
51 to 100 employees	−1.884	−0.251	−1.918	0.400
101 to 500 employees	−1.133	−0.160	0.455	−0.510
	From Informal			
Variable	**To OLF**	**To U**	**To SE**	**To F**
Female	0.146***	−0.003	−0.101*	0.065**
Age	−0.036***	−0.002	0.026***	0.010*
Age Squared	0.000***	0.000	−0.000***	−0.000*
University Education	0.022	0.014	0.007	0.131***
Technical Education	−1.109	0.173	0.324	0.341
Secondary Education	−0.017	0.008	0.015	0.072***
Female 25 to 45	0.068**	−0.020	0.030	−0.054
Female 46 to 65	0.071*	−0.017	0.054	−0.042
Primary Sector	0.002	−0.039	−0.019	−0.079**
Secondary Sector	−0.003	−0.007	0.006	−0.015
11 to 20 employees	−0.022	−0.036	−0.076*	0.106***
21 to 50 employees	−0.043	−0.013	0.001	0.126***
51 to 100 employees	−0.015	0.037	−0.028	0.143**
101 to 500 employees	−0.030	−0.007	−0.025	0.174***
	From Formal			
Variable	**To OLF**	**To U**	**To SE**	**To I**
Female	0.046*	0.003	−0.002	−0.001
Age	−0.013***	−0.002	−0.001	−0.005
Age Squared	0.000***	0.000	0.000	0.000
University Education	0.002	−0.002	−0.004	−0.057***
Technical Education	0.036	−0.182	−0.502	0.012
Secondary Education	0.010	0.005	−0.002	−0.052***
Female 25 to 45	0.027	−0.014	0.004	−0.022
Female 46 to 65	−0.027	−0.005	−0.001	−0.027
Primary Sector	0.032	0.004	0.030	0.036
Secondary Sector	0.010	−0.002	0.000	0.015
11 to 20 employees	0.010	−0.003	0.001	−0.027
21 to 50 employees	−0.019	0.000	−0.020	−0.004
51 to 100 employees	0.012	−0.201	0.001	−0.001
101 to 500 employees	−0.008	−0.008	−0.031	−0.043***

(continued on next page)

TABLE 3.4 | **Marginal Effects of Individual Characteristics on Annual Transition Probabilities** (*continued*)

PERU (2009–2010)				
	From OLF			
Variable	**To U**	**To SE**	**To I**	**To F**
Female	–0.011	–0.038	–0.013	–0.001
Age	–0.006	0.024***	0.025***	0.005**
Age Squared	0.000	–0.000***	–0.000***	–0.000*
University Education	0.033	–0.065**	–0.045*	0.039**
Technical Education	0.037	–0.048*	0.010	0.050***
Secondary Education	0.017	–0.015	0.002	0.027*
Female 25 to 45	–0.010	0.036	–0.127***	–0.035*
Female 46 to 65	–0.004	0.038	–0.132**	–0.044*
	From Unemployment			
Variable	**To OLF**	**To SE**	**To I**	**To F**
Female	0.186***	–0.055	0.024	–0.007
Age	–0.049***	0.019*	0.015	0.024**
Age Squared	0.001***	0.000	0.000	–0.000*
University Education	0.019	–0.080	–0.064	0.099*
Technical Education	–0.088	0.014	–0.033	0.092*
Secondary Education	–0.014	0.036	–0.056	0.062
Female 25 to 45	0.044	0.024	–0.185**	0.004
Female 46 to 65	–0.001	0.030	–0.190	–0.025
	From Self-Employed			
Variable	**To OLF**	**To U**	**To I**	**To F**
Female	0.121***	0.003	–0.045	–0.025
Age	–0.023***	–0.006***	–0.004	0.001
Age Squared	0.000***	0.000***	0.000	0.000
University Education	0.017	–0.002	0.026	0.033**
Technical Education	–0.003	0.008	–0.006	0.024*
Secondary Education	–0.013	0.004	–0.016	0.013
Female 25 to 45	0.035	0.013	–0.016	0.015
Female 46 to 65	0.014	0.006	–0.008	–0.047
Primary Sector	0.017	–0.006	0.009	–0.027
Secondary Sector	0.030	0.002	0.015	–0.001
11 to 20 employees	–0.880	0.084	0.107	0.064
21 to 50 employees	–1.219	0.174	–1.779	0.179
	From Informal			
Variable	**To OLF**	**To U**	**To SE**	**To F**
Female	0.072***	0.025	–0.056	0.039
Age	–0.024***	–0.008**	0.008	0.018***

(continued on next page)

TABLE 3.4 Marginal Effects of Individual Characteristics on Annual Transition Probabilities (*continued*)

Peru (2009–2010) (*continued*)				
Age Squared	0.000***	0.000*	0.000	−0.000***
University Education	0.048*	0.004	−0.050	0.046
Technical Education	0.013	−0.011	0.001	0.085***
Secondary Education	0.017	−0.011	−0.016	0.060**
Female 25 to 45	0.030	−0.002	0.040	−0.091**
Female 46 to 65	−0.020	−0.029	0.086	−0.096
Primary Sector	0.041	0.014	0.001	0.009
Secondary Sector	−0.009	0.010	−0.008	−0.003
11 to 20 employees	−0.008	−0.015	0.000	0.107***
21 to 50 employees	0.005	−0.004	−0.044	0.107***
51 to 100 employees	0.000	0.018	−0.022	0.093*
101 to 500 employees	−0.063	−0.007	−0.038	0.179***
More than 500 employees	−0.016	0.028	−0.108**	0.147***
	From Formal			
Variable	**To OLF**	**To U**	**To SE**	**To I**
Female	0.074	0.032	−1.238	0.171
Age	−0.012***	−0.005	0.000	0.001
Age Squared	0.000**	0.000	0.000	0.000
University Education	−0.020	−0.024	−0.020	−0.026
Technical Education	−0.019	−0.021	−0.024	−0.069**
Secondary Education	−0.012	−0.025	−0.023	−0.001
Female 25 to 45	−0.036	−0.051	1.205	−0.183
Female 46 to 65	−0.036	−0.400	1.236	−0.118
Primary Sector	0.041**	−0.001	0.012	0.003
Secondary Sector	0.016	0.013	0.028	0.029
11 to 20 employees	−0.028	−0.025	−0.048	0.006
21 to 50 employees	−0.006	−0.024	−0.065	−0.003
51 to 100 employees	−0.001	−0.019	−0.055	−0.029
101 to 500 employees	−0.027	−0.005	−0.046	−0.034
More than 500 employees	−0.008	−0.009	−0.073	−0.088***

VENEZUELA (2010:H1–2010:H2)				
	From OLF			
Variable	**To U**	**To SE**	**To I**	**To F**
Female	−0.021***	−0.039***	−0.041***	−0.011**
Age	0.010***	0.018***	0.010***	0.012***
Age Squared	−0.000***	−0.000***	−0.000***	−0.000***
University Education	0.025***	−0.021***	−0.011*	0.056***

(continued on next page)

TABLE 3.4 | **Marginal Effects of Individual Characteristics on Annual Transition Probabilities** (*continued*)

Venezuela (2010:H1–2010:H2) (*continued*)				
Technical Education	0.049***	−0.006	−0.010	0.064***
Secondary Education	0.015***	0.002	0.002	0.045***
Female 25 to 45	−0.031***	−0.004	−0.019**	−0.027***
Female 46 to 65	−0.050***	−0.017	−0.013	−0.032***
	From Unemployment			
Variable	**To OLF**	**To SE**	**To I**	**To F**
Female	0.199***	−0.077**	−0.075***	−0.017
Age	−0.050***	0.024***	0.001	0.022***
Age Squared	0.001***	−0.000***	0.000	−0.000***
University Education	−0.047*	−0.077**	−0.055**	0.124***
Technical Education	−0.062*	−0.090**	−0.074**	0.147***
Secondary Education	−0.025	0.007	−0.032*	0.074***
Female 25 to 45	0.096***	0.008	−0.027	−0.083**
Female 46 to 65	0.197***	0.015	−0.014	−0.074
	From Self-Employed			
Variable	**To OLF**	**To U**	**To I**	**To F**
Female	0.165***	−0.004	−0.041**	−0.004
Age	−0.025***	−0.001	−0.001	0.003
Age Squared	0.000***	0.000	0.000	−0.000**
University Education	−0.023*	0.004	−0.022*	0.062***
Technical Education	−0.046**	0.007	−0.047**	0.051***
Secondary Education	0.000	−0.010*	−0.022**	0.028***
Female 25 to 45	0.014	−0.008	0.005	−0.019
Female 46 to 65	0.002	−0.019	0.008	−0.016
Primary Sector	0.196	0.075	−0.997	0.131
Secondary Sector	0.012*	0.016***	−0.007	0.009*
11 to 20 employees	−0.077	−0.022	0.039	0.012
More than 20 employees	−0.026	−0.027*	−0.014	0.029**
	From Informal			
Variable	**To OLF**	**To U**	**To SE**	**To F**
Female	0.123***	−0.007	−0.035	0.009
Age	−0.035***	−0.006***	0.014***	0.020***
Age Squared	0.000***	0.000**	−0.000***	−0.000***
University Education	0.024	0.007	−0.026	0.097***
Technical Education	−0.017	−0.008	−0.008	0.142***
Secondary Education	0.024*	−0.018	0.007	0.074***
Female 25 to 45	0.067***	0.012	−0.067*	−0.062*
Female 46 to 65	0.039	−0.027	−0.051	−0.075*
Primary Sector	−1.148	0.132	0.425	0.184
Secondary Sector	0.029**	0.032***	0.018	0.035**

(continued on next page)

TABLE 3.4 Marginal Effects of Individual Characteristics on Annual Transition Probabilities (*continued*)

Venezuela (2010:H1–2010:H2) (*continued*)				
11 to 20 employees	−0.043	−0.004	−0.076*	0.089***
More than 20 employees	−0.036***	0.015	−0.055***	0.118***
	From Formal			
Variable	**To OLF**	**To U**	**To SE**	**To I**
Female	0.045***	0.001	−0.059***	−0.016
Age	−0.019***	−0.003**	0.003	−0.006***
Age Squared	0.000***	0.000	0.000	0.000**
University Education	−0.005	−0.008	−0.034***	−0.061***
Technical Education	−0.011	−0.010	−0.043***	−0.070***
Secondary Education	0.002	−0.005	−0.014*	−0.021***
Female 25 to 45	0.006	−0.011	0.018	−0.003
Female 46 to 65	0.007	−0.026*	0.024	−0.008
Primary Sector	−0.012	0.004	0.022	−0.034
Secondary Sector	0.006	0.018***	0.028***	0.002
11 to 20 employees	−0.016	0.006	−0.026*	−0.029**
More than 20 employees	−0.024***	−0.002	−0.056***	−0.081***

Source: National labor surveys. For details see Box 1.1.
Note: Multinomial probit. * significant at 10%; ** significant at 5%; *** significant at 1%. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

Persistence

The previous section showed the probabilities of workers transiting from one employment state to another in a one-year window. Results show high mobility across states of employment in all countries under study and thus it is natural to wonder about how persistent those transitions are in a context of high mobility. High destruction rates could be only temporary and unemployment could be an intermediate state before job improvements. High transitions toward informality could be persistent and last beyond a one-period transition. Informal findings could also be temporary and hence suboptimal—even if voluntary—if they end up leading workers toward self-employment or toward unemployment again. In general, ins or outs to or from different states of employment can be temporary or persistent, and the temporariness or permanency of the flows can be of different intensity according to the state of employment and formality. Thus, the duration or persistence of workers in an employment state is also important to understanding the behavior of the informal sector and to designing suitable interventions. An analysis of persistence is also interesting to shed

some light on the time aggregation bias that some low-frequency transitions may prompt.

The previous section showed the one-year-ahead transition matrix for all the Andean countries exploiting the Markov property of memory-less stochastic processes. Information in the diagonal of the matrix allowed for inferring average durations of each labor state starting from the probabilities of persisting at each state under the assumption of a Markov chain. Here we depart from the assumption that the path followed across occurrences is only dependent on the immediate preceding occurrence but independent of the history (we will return to the assumption in the next section to study the intertemporal evolution of one-period-ahead transitions). The purpose is to exploit the longer periods that longitudinal data or rotational panels span and that allow for seeing the actual path a worker followed during many periods (in some cases years). In this sense, this section is devoted to the analysis of persistence, understood as the probability of observing a worker in the same employment state beyond the immediate subsequent period.[9] Given that the labor surveys are not all administered at the same frequency, high frequency surveys (say, quarterly) will allow us to learn about the importance of the aggregation bias, but not learn much about the medium-term duration of workers in specific states of employment (unless the observation is followed for many periods covering long periods). On the contrary, low-frequency surveys (say, annual) will not help us learn much about time aggregation but will provide information about medium-term persistence.

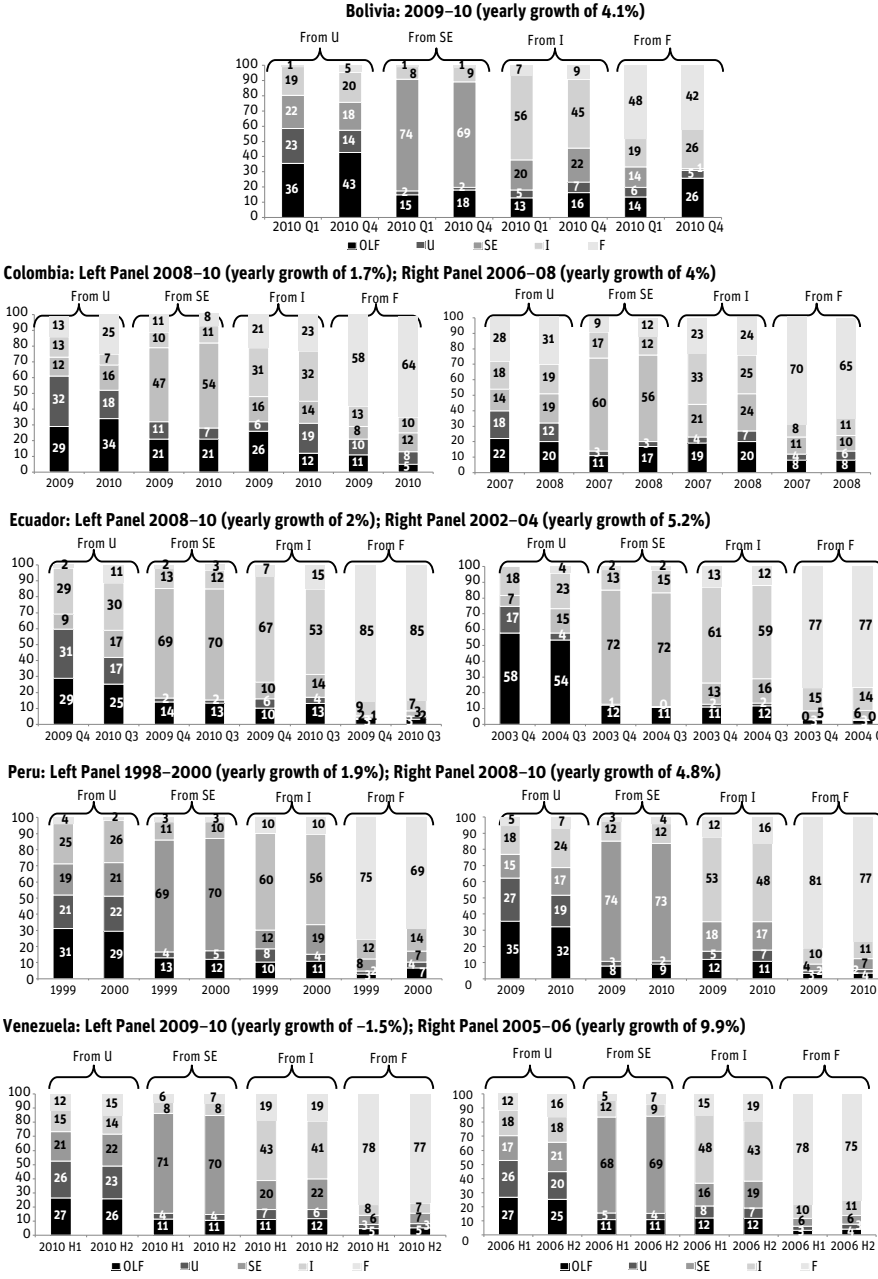
Figure 3.2 reports the one-period-ahead and the one-year-after transitions for the Andean countries. For each country we report transitions observed during a low or negative growth period (panels to the left) and transitions observed during an expansionary period (panels to the right). For each state of origin we report two transitions, one corresponding to an immediate transition[10]

---

[9] In a similar vein, Davis and Haltiwanger (1999) define an indicator of persistence of *n* period job creation (destruction) as the percentage of jobs created (destroyed) in period *t* that are still in existence (have not reappeared) at the end of period $t + n$. They find that in G5 countries, job creation and destruction are persistent (70% of jobs created in one year were not destroyed a year later). However they point out that job creation and destruction are clustered in a relatively small segment of firms that are expanding or contracting. Unfortunately, we cannot do an analysis of creation and destruction (as we lack data about firms), but we attempt an approximation using job finding rates, job separation rates, and employment transitions.

[10] That is, when the states of destination are those observed right after the state of origin. For instance, in Ecuador, the first graph takes as the baseline period to the third quarter of 2009, then reports the transitions between that period and the fourth quarter of 2009.

FIGURE 3.2 | **One Period After and One Year After Transitions**
(Percent of workers from sector of origin)



Source: National labor surveys. For details see Box 1.1.
Note: OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

and another to one year after transition.[11,12] We observe that transitions from unemployment are the least permanent and the most sensitive to the phase of the cycle. On the other hand, transitions starting from an employment state are quite persistent (with informal salaried the most transient group).

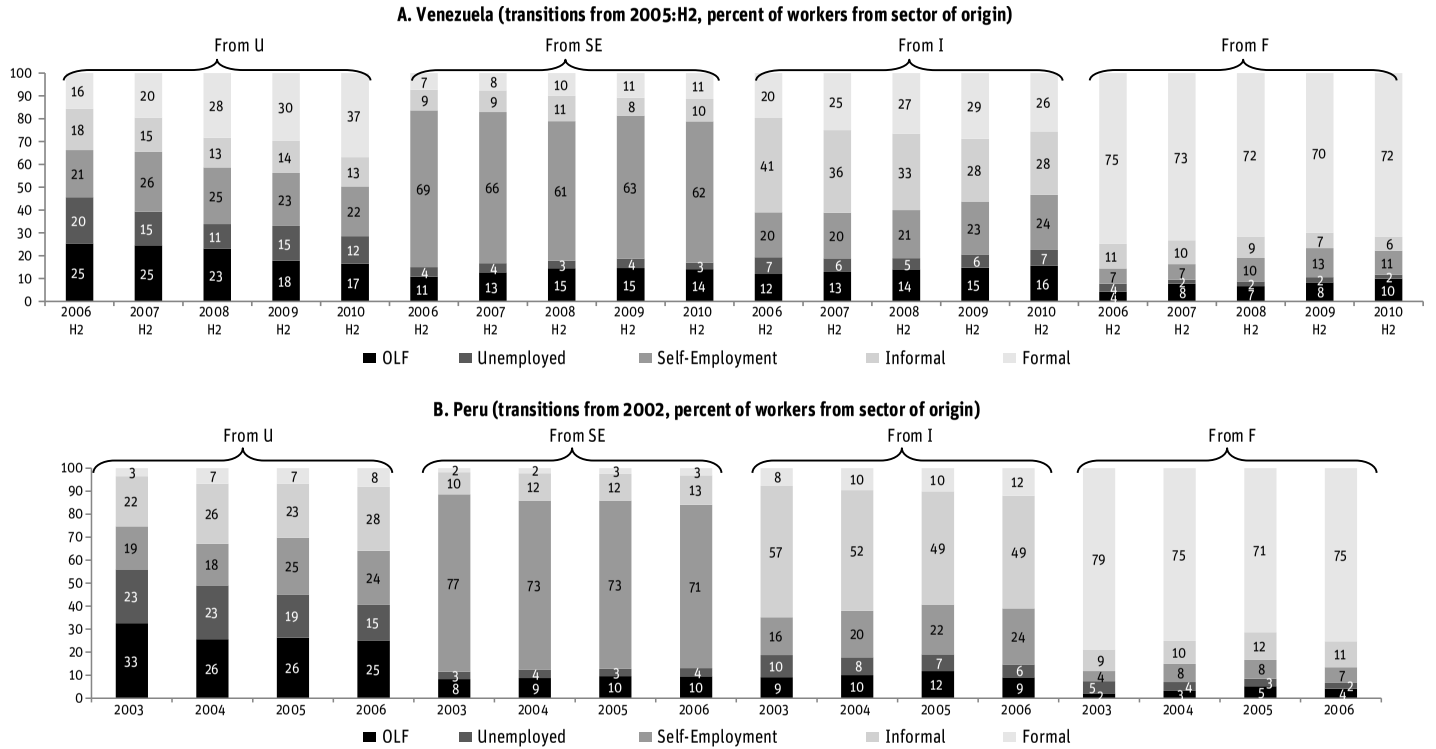
A close inspection of the flows from unemployment reveals that even during upsurges, finding a job in the formal sector is difficult in Ecuador and Peru, while in Colombia, there is gradual improvement (formalization) over time, especially during upsurges. A cross-country comparison also reveals that persistence of unemployment is higher during troughs (e.g., 18% of Colombian unemployed remain unemployed two years after troughs, while about 12% remain so during upsurges; 17% of Ecuadorean unemployed remain unemployed a year after troughs, while only 4% remain so during upsurges). More interestingly, the figures show that although unemployment is the least permanent labor state, it still takes more than a year for an important share of workers to get employed. For instance, after one year, about one fifth of those observed in unemployment remain there during slow (or negative) growth episodes in every country. The figure improves slightly during upsurges but still hovers around 20%, with the exception of Ecuador (where unemployment persists for a year only among 4% of individuals looking for jobs during upsurges). As will be explained later (when discussing Figure 3.3), we take advantage of the availability of long periods in Peru and Venezuela to track unemployed individuals for longer periods and infer conclusions about the actual duration of unemployment, and not just that inferred from one-period-ahead Markov chains.

Figure 3.2 also sheds light on the quality of job finding. Only 38% of Colombian workers starting from unemployment in 2008 found employment one year after (48% two years after). Of that 38%, only 13% headed to the formal sector. After two years, the placement of unemployed in the formal sector doubled to 25%. If instead we look at a more favorable period (2006–08), we notice that 60% of those Colombian workers observed in unemployment in 2006 were already employed in 2007, and almost 70% during 2008. Among those, about 30% managed to get formal jobs. Among all countries this is the most affluent case. In Ecuador, almost nobody coming from unemployment manages to get formal work one quarter after. A year after, less than 10% obtain a formal job. In Peru, one year after being observed in unemployment

[11] That is, as in the case of Ecuador, the transitions between the baseline period and the third quarter of 2010.

[12] When the data are at an annual frequency we report one-year and two-year transitions (e.g., Colombia and Peru).

FIGURE 3.3 | Employment Risk Duration



Source: National labor surveys. For details see Box 1.1.
Note: OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

it is less than 5% likely to be observed in formality. Two years after, the probability barely rises to 7%. In contrast, job finding is intense in the informal sector and in particular in the informal salaried subsector. That is, it is more likely for the unemployed to find informal salaried jobs than to become self-employed.

As mentioned earlier, while unemployment happens to be a very transient state, employment states are not, so a very high degree of persistence is observed, especially in self-employment and formality. Indeed, among those workers first observed in self-employment, about 70% are still observed there after a quarter, half a year, or even a year. It is also interesting that separations from self-employment are lower than from salaried informality. Workers starting in formality stay there with almost 80% probability (Bolivian and Colombian formal worker outflows from formality are more intense than in the rest of the region). A stark contrast between self-employment and formality regarding transitions and persistence is that while workers can be displaced toward informality, they are unlikely to be displaced to unemployment or out of the labor force, whereas the self-employed can be found in those states one period or one year after. Finally, workers first observed in salaried informality have strong chances to transit toward self-employment, unemployment, and being out of the labor force. It is interesting to observe that those chances increase over time, suggesting that among all the employment sectors, salaried informality is the most risky (in terms of sectoral displacements). It is also the case that workers starting in informality have more chances over time to become formal than those starting in unemployment or self-employment. Evidently, explanations for these patterns are highly influenced by the characteristics of workers found in each employment state. Conditioning by workers' characteristics (as was done in Table 3.3 for the one-year-ahead transitions) would render starker contrasts in the persistence of each state of employment.

Figure 3.3 extends the previous analysis to cases for which we have panels with longer periods. In particular, Venezuelan and Peruvian surveys follow workers for longer periods and hence one can trace the history of the same individuals for as many as five years (Peru[13]) or eleven semesters (Venezuela). Panel A reports the case of Venezuela, the country with the highest number of waves per panel in our sample. It shows that Venezuelan workers observed in unemployment in 2005 transit gradually to formality. Starting with a modest 16% in 2006, the figure more than doubles by 2010. It is worth

[13] In the case of Peru, as is explained in Chapter 1, there are three independent panels between 1998 and 2010: 1998–2001, 2002–06, and 2007–10.

noting that during the first transition, unemployment and being out of the labor force were the more absorbing states for those workers coming from unemployment (20% + 25%); afterwards, these two sectors (unemployed and out of the labor force) release about a third (17% + 12% – 45%) of those workers. These workers escaping from unemployment and from being out of the labor force are seen joining the formal workforce two (or more) years after. This suggests that workers staying a bit longer in unemployment or out of the labor force managed to get formal placements, possibly after investing some time in training or education.[14] Workers starting in self-employment or in salaried informality also transit toward other states of employment after the first transition. For those who started in self-employment, the second medium-term main destination is being out of the labor force and the third is formality. For those starting in informality, the path is less stable, and after five years less than a third of those originally informal are still informal. They are observed transiting toward formality and self-employment at almost even rates. Their transition toward being out of the labor force intensifies uniformly over time but is less noticeable than the movements toward self-employment and formality. Finally, those workers with formal jobs in 2005 mostly remain there (70% of them stay formal after five years). Their second main destination is self-employment, which becomes a focal destination for formal workers over time, as already suggested in Chapter 2.

Panel B of Figure 3.3 shows the case of Peru for its longest period (2002–06).[15] Contrary to the case of Venezuela, Peruvian workers who start in unemployment do not show a path toward formalization. After four years, only 8% of workers starting in unemployment manage to make their way to formality. It is also worth noting that about one-fifth of those workers starting in unemployment are seen in unemployment again one, two, and three years later (and 15% four years later). Thus, unemployment can persist among Peruvian unemployed workers for a long time. While salaried informality in Peru is, as in Venezuela, the second most transient labor state, it retains 1.6 times more workers than in Venezuela (50% of informal workers remain so after five years, whereas in Venezuela that figure is 30%).

---

[14] We observe a recomposition in educational attainment among those Venezuelans found in unemployment during the second semester of 2005, which indicates that there is a gradual increase in the share of those unemployed in 2005 holding a tertiary education degree. Indeed, the share starts at 14% and gradually increases to 21% over the six-year period. For those Peruvians unemployed in 2002 we observe instead a stable composition of educational attainment across the five-year period.

[15] The analysis is virtually identical for the other two available spells.

Cyclicality

This chapter started with the analysis of one-period-ahead Markov chains built upon a system of five states of employment during a single period (2009–10). To explore the persistence of workers in each state of employment, the chapter then examined transitions of longer periods, departing from the memory-less assumption imposed in the Markovian setup. Mindful of the limitations imposed by the few years for which panel observations can be found in every Andean country, this section reinstates the Markovian assumption in order to study the behavior of time series of one-period-ahead transitions along the business cycle. Once more, our attention is focused on three types of flows: (1) entries into unemployment, (2) exits from unemployment, and (3) employment-to-employment transitions,[16] whose evolution is expected to reveal certain correlations with the business cycle.

Several studies of the cyclicality of worker flows are available for the developed world (Anderson and Meyer 1994; Davis, Haltiwanger, and Schuh 1996; Burda and Wyplosz 1994; Mortensen and Nagypal 2005; Shimer 2005; Petrongolo and Pissarides 2008; Elsby, Solon, and Michaels 2009; Fujita and Ramey 2009; Pissarides 2009). In general, most of these studies find that entries into and exits from employment are procyclical in developed countries. As noted by Cahuc and Zylberberg (2004), however, while procyclical entries into employment are consistent with the conventional view that hires are expected to rise during upturns and fall during contractions, procyclical exits are puzzling. Since separations are expected to be countercyclical, movements between jobs should be highly procyclical to accommodate the observed procyclical job exits. These findings are compelling and raise the question of what would be observed for similar job-to-job flows in less-developed countries, where there is more than a single state of employment. Indeed, two contending traditions prescribe opposite behaviors of movements between jobs along the business cycle in economies with informal sectors. Canonical matching models predict that positive stochastic shocks to overall productivity of the economy increase vacancies and hence enhance overall creation flows. In contrast, traditional segmentation models argue that an expansion should, first, lead to a decline in the likelihood of an involuntary transition from a formal job into an informal job, and then the increased availability of more desirable formal jobs should lead to increased flows from informality toward formality, implying a negative correlation across bilateral transition rates. This section aims to confirm

[16] Formal to informal (and vice-versa) and formal to self-employment (and vice-versa).

or contest one of these traditions in the context of Andean labor markets, while drawing attention as well to the behavior of entries into and exits from employment.

While the sample period of our analysis is too short to prescribe long run systematic patterns in any country,[17] observed patterns are consistent with those envisaged by matching models and with those reported for other Latin American countries.[18] Figure 3.4 and Columns 1–4 of Table 3.5 show that job findings exhibit strong procyclical patterns (with the exceptions of anticyclical informal findings in Ecuador, and acyclical self-employment and formal findings in Peru). Separations from employment (ins to unemployment) exhibit strong anticyclicality in all labor sectors of the whole region, whereas employment-to-employment transitions are strongly procyclical, favoring the matching model prescriptions. This last assessment is less categorical in Peru, where procyclical job-to-job flows are less correlated to the cycle than in other countries of the region. The countercyclical pattern that outflows from formal to self-employment in Ecuador is also notable. Given the procyclical behavior of the opposite flow (inflows to formal employment from self-employment), this is suggestive of a negative correlation between the bilateral flows and more supportive of a segmented self-employed sector in that country.

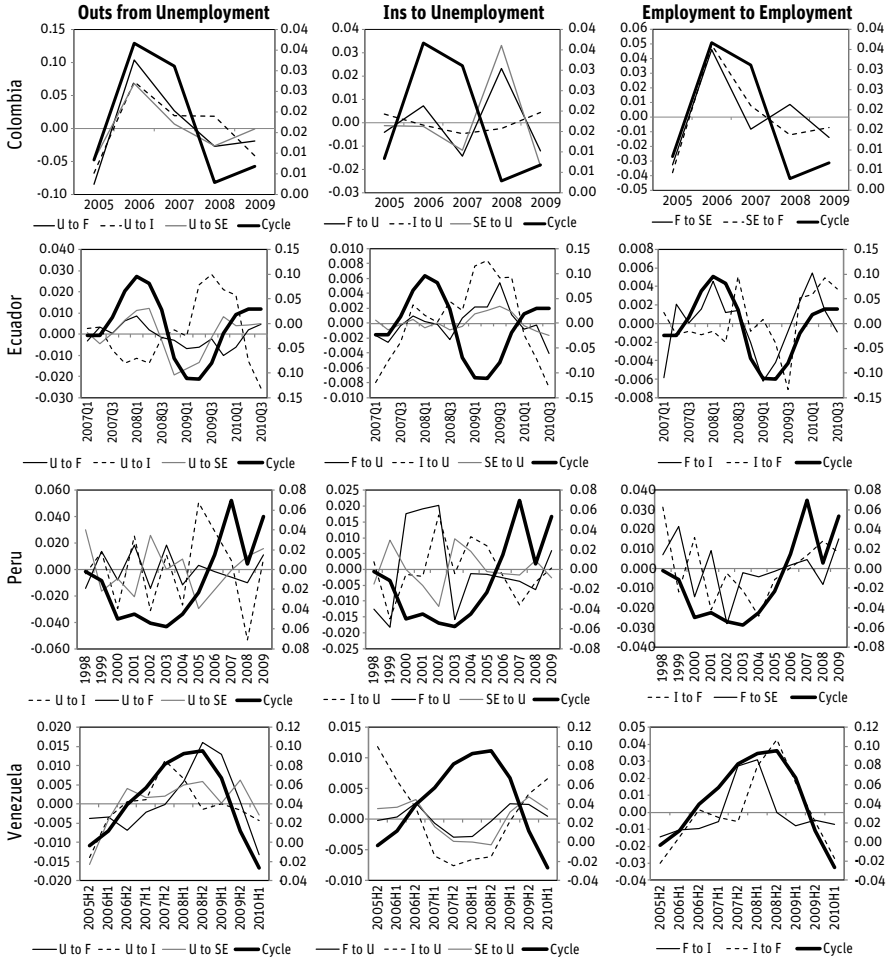
Table 3.5 also reports the standard deviations of each flow as an indicator of volatility (Columns 5 to 8). Venezuela is the only country in our sample where we find patterns similar to those found for Brazil and Mexico by Bosch and Maloney (2008), that is, (less) more active (in)formal job finding flows and less (more) active (in)formal separation flows. In Colombia, results are mixed. On the one hand, job finding rates take place at a higher intensity in the formal sector, consistent with more middle-income countries; on the other, among salaried workers separations also happen with more intensity in the formal sector. Ecuador and Peru exhibit more responsive job finding rates in the informal salaried sector. It is important to emphasize that Ecuadorean informal job finding rates are strongly countercyclical, suggesting that during economic downturns, the informal salaried sector absorbs labor with significant intensity. The responsiveness of Ecuadorean informal flows is also seen in the volatility of separation flows. Ecuadorean informal salaried workers face more active separations than self-employed and formal salaried workers. In contrast, formal separations are more active than in the informal sectors among Peruvian workers.

---

[17] In fact, Bolivia is removed from our sample in this section due to the very short time horizon (2009–10) covered by the data sources.

[18] See Bosch and Maloney (2008) for results for Brazil and Mexico, and Maloney (2004) for results for Argentina.

FIGURE 3.4 | Selected Transitions and the Economic Cycle



Source: National labor surveys. For details see Box 1.1.
Note: All discrete transitions—left axis—have been first smoothed with moving averages (two or four periods for semiannual and quarterly series; annual series are not smoothed) and then de-trended using the Hodrick and Prescott (HP) filter with adjustment parameters equal to 100, 400, and 1,600 for yearly, semiannual, and quarterly data. The series labeled as "Cycle"—right axis—corresponds to HP-filtered real GDP per capita (indexed to the earliest year of the labor series of each country), except for Ecuador where it corresponds to the index of economic activity (*Indice de nivel de actividad registrada*). OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

Flows and Stocks

The evolution of bilateral flows of workers—as shown in the series of transition probabilities studied in the previous section—provides information about

TABLE 3.5 | Volatility of Employment Flows and Correlation between Flows and the Economic Cycle

	Correlation with the economic cycle				Standard deviation of flows			
	Colombia (1)	Ecuador (2)	Peru (3)	Venezuela (4)	Colombia (5)	Ecuador (6)	Peru (7)	Venezuela (8)
A. Job finding								
U to SE	0.654	0.844	0.052	0.598	0.040	0.010	0.018	0.007
U to I	0.558	−0.648	0.192	0.706	0.051	0.016	0.030	0.007
U to F	0.683	0.699	−0.032	0.770	0.067	0.005	0.012	0.009
B. Job separation								
SE to U	−0.331	−0.597	−0.100	−0.791	0.020	0.001	0.006	0.003
I to U	−0.399	−0.454	−0.415	−0.906	0.004	0.005	0.008	0.007
F to U	−0.215	−0.490	−0.220	−0.426	0.015	0.002	0.013	0.002
C. Employment to employment								
I to F	0.592	0.304	0.348	0.864	0.064	0.003	0.014	0.023
F to I	0.479	0.698	0.126	0.651	0.018	0.003	0.019	0.016
SE to F	0.660	0.398	0.150	0.597	0.031	0.002	0.003	0.004
F to SE	0.458	−0.249	0.435	0.021	0.029	0.003	0.012	0.005

Source: National labor surveys. For details see Box 1.1.
Note: All discrete transitions have been first smoothed with moving averages (two or four periods for semiannual and quarterly series; annual series are not smoothed) and then de-trended using the Hodrick and Prescott (HP) filter with adjustment parameters equal to 100, 400, and 1,600 for yearly, semiannual, and quarterly data. OLF = out of the labor force; U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

the correspondence between the business cycle and the dynamics of the workforce within and across labor sectors. Recurrent and likely deterministic correspondences allow for predicting the reaction of the flows amid booms and crises. Also of interest, the evolution of the transitions during a reasonable number of periods (at the very least a whole cycle) allows steady-state analysis by mapping the behavior of the distinct flows to the status of each of the states of employment under the assumption of general equilibrium.

Abstracting for a moment from the difference between being out of the labor force and unemployment (pooling both into a single group of "non-employment") and between self-employed and informal (pooling both into a single group of "informality"), and following the notation introduced earlier in this chapter, we can define the law of motion of the number of informal jobs as follows:[19]

$$\dot{n}_i = (n_n p_{ni} + n_f p_{fi}) - n_i (p_{in} + p_{if}). \tag{3.2}$$

Equation 3.2 indicates that the change in the total number of informal jobs is determined by two sets of flows. First, the ins to informality: the number of nonemployed (n_n) and formal (n_f) workers that find informal jobs at rates p_{ni} and p_{fi}, respectively. Second, the outs from informality of informal workers (n_i) who may transit toward nonemployment and formality at rates p_{in} and p_{if}, respectively. The analogous law of motion for formal jobs is:

$$\dot{n}_f = (n_n p_{nf} + n_i p_{if}) - n_f (p_{fn} + p_{fi}). \tag{3.3}$$

The steady state relative size of the informal to formal sector can be written using Equations 3.2 and 3.3 as:

$$\gamma^{SS} = RI_i / RO_i, \tag{3.4}$$

where RI_i and RO_i represent the relative inflows and outflows of informal workers, which in the steady state are:

$$RI_i = \frac{n_n p_{ni} + n_f p_{fi}}{n_n p_{nf} + n_i p_{if}} \tag{3.5}$$

$$RO_i = \frac{p_{in} + p_{if}}{p_{fn} + p_{fi}}.$$

[19] Some of the notation is borrowed from Bosch, Goñi-Pacchioni, and Maloney (2012).

Hence, the steady-state value of the share (measured as a percentage of total employment) of informal employment can be computed as:

$$i^{SS} = \frac{\gamma^{SS}}{1+\gamma^{SS}}. \tag{3.6}$$

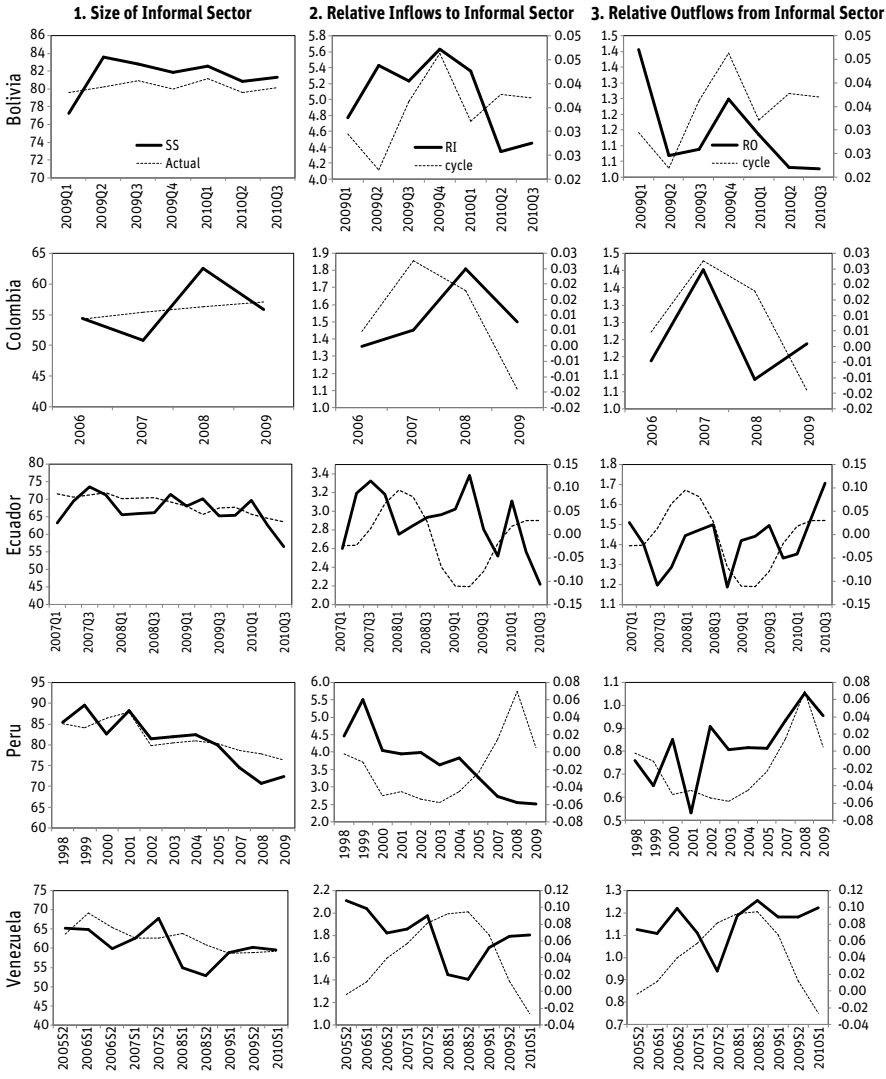
Figure 3.5 shows the steady state (that is, the estimates for Equation 3.6) along the actual values of the share of the informal sector.[20] The steady-state estimates track closely the actual evolution of the size of the sector. In Bolivia and Colombia, upward trends are predicted in tandem with the observed increase in informality, while in Ecuador, Peru, and Venezuela predicted contractions of informality also closely follow the evolution of the actual values. Indeed, our simple representation allows us to intuitively track the major contributors to the actual size of each sector: either relative inflows or relative outflows. In particular, changes in the share of informal employment can be attributed to changes in the relative inflows and to changes in relative outflows given that:

$$\frac{\dot{\gamma}^{SS}}{\gamma^{SS}} = \frac{\dot{RI}_i}{RI_i} - \frac{\dot{RO}_i}{RO_i}.$$

Columns 2 and 3 of Figure 3.5—which report the evolution of RI_i and RO_i (as defined in Equation 3.5) alongside economic growth for the five Andean countries—enable us to compare the evolution of these two determinants of the size of the informal sector. In particular, increasing levels of informality should correspond to increasing relative inflows to informality, to decreasing relative outflows from informality, or to a concomitant influence of both. For Ecuador, Peru, and Venezuela—countries where a contraction of the informal sector is observed during the period under analysis—a secular decay of relative inflows to informality, complemented by a sustained increase of relative outflows from the sector, help explain the evolution of the sector. In Bolivia and Colombia—countries where informality increased during the years under

[20] Once more, the unfulfilled qualification about the sample size in the time dimension limits our analysis, as the steady-state approximation is constrained by having information from only small windows of time, especially for Bolivia and Colombia, or by the low frequency of information (annual transitions) in Colombia and Peru. With richer datasets (higher frequency and longer horizons), the steady-state estimates would be more accurate. However, by exploiting the limited available longitudinal information for Andean countries we draw important lessons about the main forces driving the size of the sector.

FIGURE 3.5 | **Simulated Size of the Informal Sector: Relative Inflows and Outflows**
(In percent)



Source: National labor surveys. For details see Box 1.1.
Note: Shares reported in Column 1 represent the percentage of individuals observed in the informal sector (informal salaried and self-employed as a percentage of the employed population). Dashed lines in Column 1 correspond to the actual size of the share, and the bold lines correspond to the solution of Equation 3.6. Relative inflows and relative outflows are computed according to Equation 3.5. Dashed lines in columns 2 and 3 correspond to the economic cycle defined in Figure 3.4 and their values are read in the right axis (for Bolivia, figures correspond to annual growth rates). RI = relative inflows to informal sector; RO = relative outflows from informal sector; SS = simulated size.

study—the opposite happens, as the increase in relative inflows is reinforced with a contraction of relative outflows.[21]

Table 3.6 shows such a decomposition comparing the values of relative inflows to informality *(RI)*, relative outflows from informality *(RO)*, and γ computed for the earliest and latest available periods.[22] We observe three distinct behaviors. First, Bolivia and Colombia—countries where informality is growing—experience a noticeable dominant contribution (70%) of relative outflows, in other words, informality increases in these countries mostly because of a reduction in the outflows that drain the sector and slightly because of an increase in the inflows that broaden it. Second, Ecuador—a country where informality is decreasing—experiences a balanced influence of both types of determinants. That is, informality is decreasing because of a balanced contribution of reduced inflows and increased outflows. Third, Peru and Venezuela—countries where informality is contracting—experience a noticeable dominant contribution (63%) of relative inflows. That is, the informal sector mainly gets smaller after reductions of relative inflows into the sector and somewhat because of an increase in the outflows.

In the preceding discussion, individuals transit across three employment states (nonemployment, formal employment, and informal employment). Following a similar reasoning as above for the full set of employment states (that is, breaking down nonemployment into being out of the labor force and unemployment, and putting self-employment back as a different employment state than informal salaried), we refine the analysis and construct the predicted steady-state values of our five possible states of employment for each period by solving the following system:[23]

$$\begin{cases} o\left(p_{ou}+p_{oi}+p_{os}+p_{of}\right)=up_{uo}+ip_{io}+sp_{so}+fp_{fo}, \\ u\left(p_{uo}+p_{ui}+p_{us}+p_{uf}\right)=op_{ou}+ip_{iu}+sp_{su}+fp_{fu} \\ i\left(p_{io}+p_{iu}+p_{is}+p_{if}\right)=op_{oi}+up_{ui}+sp_{si}+fp_{fi} \\ s\left(p_{so}+p_{su}+p_{si}+p_{sf}\right)=op_{os}+up_{us}+ip_{is}+fp_{fs} \\ o+u+i+s+f=1 \end{cases} \tag{3.7}$$

[21] For expositional purposes, we focus in the period from 2009Q1–2010Q1 in Bolivia and from 2007–09 in Colombia.

[22] For Bolivia, Colombia, and Ecuador we focus our attention to points that allow for an explanation consistent with the evolution of the sector size. For the Ecuadorean case, we take 2007 as the initial period to avoid any inconsistency induced by the methodological change implemented in the surrounding periods. In the cases of Bolivia and Colombia, we try to preserve a window where the relative inflows and outflows depict secular trends consistent with those observed in the size of the sector.

[23] See Shimer (2005) for an application to the United States, and Bosch and Maloney (2008) for an application to Mexico and Brazil.

TABLE 3.6 | Contribution of Relative Inflows and Outflows to the Steady-State Size of the Informal Sector

			Relative inflows (RI) to informality		Relative outflows (RO) from informality		Size of the informal sector at steady state		Contibution of RI	Contribution of RO
	t	T	t	T	t	T	t	T	t to T	t to T
Bolivia	2009Q1	2010Q1	4.78	5.36	1.41	1.14	77.26	82.52	38.61	61.39
Colombia	2007	2010	1.45	1.50	1.40	1.19	50.84	55.80	18.03	81.97
Ecuador	2007Q1	2010Q4	2.60	2.22	1.51	1.71	63.27	56.52	53.00	47.00
Peru	1998	2009	4.47	2.51	0.76	0.95	85.46	72.46	63.10	36.90
Venezuela	2005H2	2010H1	2.11	1.80	1.13	1.22	65.22	59.60	62.73	37.27

Source: National labor surveys. For details see Box 1.1.
Note: The figures correspond to the values of RO, RI and the size of the informal sector at steady state, all computed according to Equations 3.5 and 3.6.

where p_{ab} is defined as earlier in this chapter; and *o, u, s, i* and *f* have been normalized by the working-age population and hence represent the share of inactive, unemployed, self-employed, informal salaried, and formal salaried workers. Each equation postulates that at steady state the sector sizes are still (the states are steady) and hence the inflows toward each state equal the outflows from the state. Thus, taking $p_{ab} \forall\ a,b \in \{o,u,i,s,f\}$ as inputs, one can solve for $\{o,u,i,s,f\}$ at each period. The system can be re-expressed as:

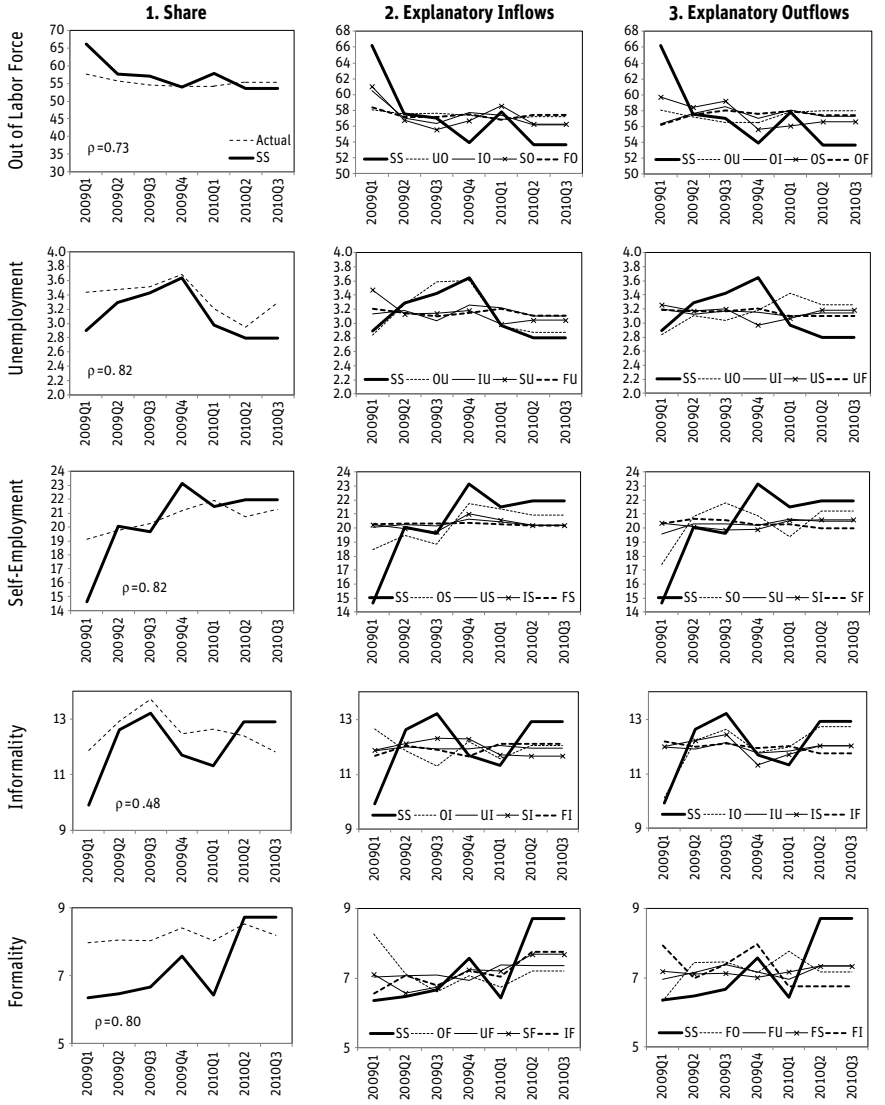
$$\begin{bmatrix} (1-p_{oo}) & -p_{uo} & -p_{io} & -p_{so} & -p_{fo} \\ -p_{ou} & (1-p_{uu}) & -p_{iu} & -p_{su} & -p_{fu} \\ -p_{oi} & -p_{ui} & (1-p_{ii}) & -p_{si} & -p_{fi} \\ -p_{os} & -p_{us} & -p_{is} & (1-p_{ss}) & -p_{fs} \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} o \\ u \\ i \\ s \\ f \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}.$$

The solution for the steady-state shares of the previous system along the actual shares of each sector for the five Andean countries is shown at the first columns of Figures 3.6a to 3.6e.

Then, following Shimer (2005), we simulate the size of the sector that would result if we were to allow one particular transition to vary (e.g., transitions from formal salaried work into unemployment) and leave all the other transitions constant at their historical average values. This allows us to isolate the impact of that particular type of gross flow on the simulated aggregate sector sizes. Results of this exercise are shown in Columns 2 and 3 of Figures 3.6a to 3.6e. Due to the stringent constraints imposed by the reduced dimensionality of the data, the simulations are run with some limitations to identify the principal flows contributing to the conformation of each employment state. In spite of this, we are still able to identify in many cases clear determinants of the size of the actual states. Column 2 shows the simulated shares of the distinct states when transitions into the respective state are allowed to float, fixing the rest of the transitions to their historic means. Column 3 reports the results of a similar exercise but now when transitions out of the respective state are allowed to float. Simulations mimicking more accurately the steady-state shares unveil the most influential transitions in the determination of the actual state.

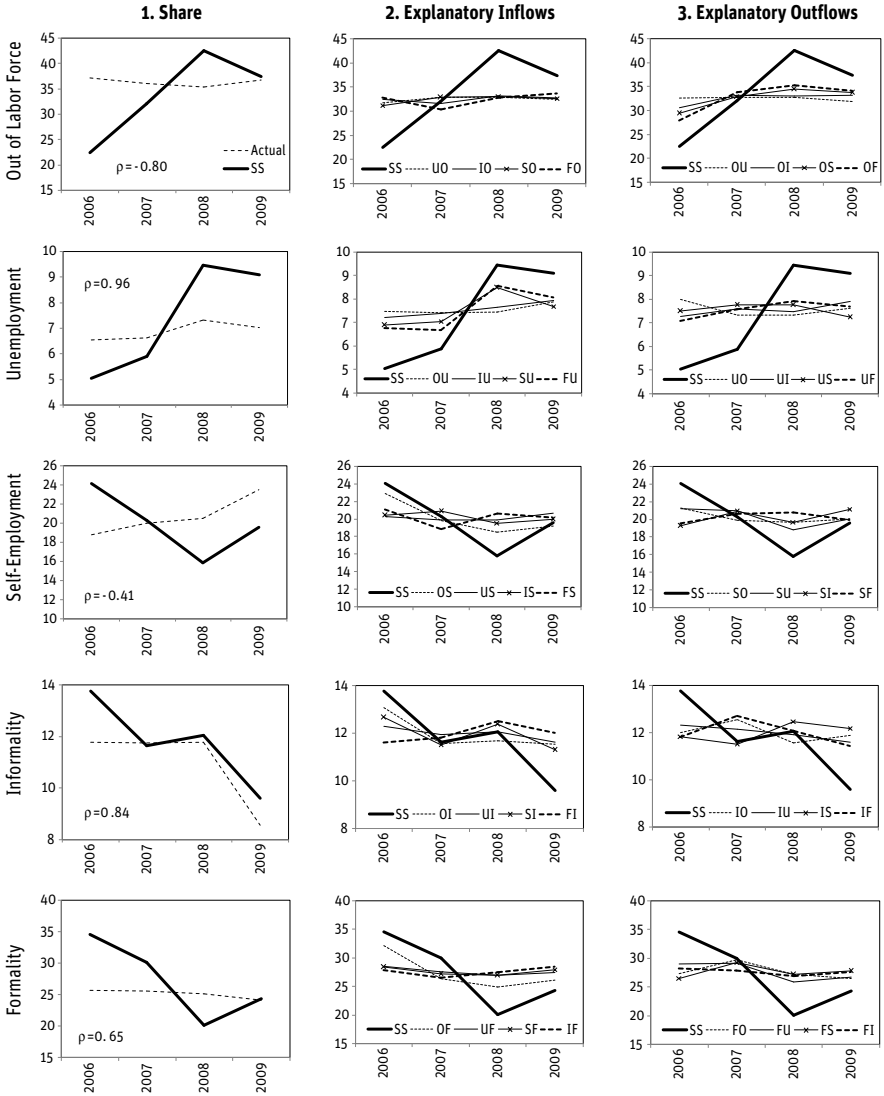
We focus on those cases in which the steady-state shares hover around levels similar to those observed for the actual values: unemployment, self-employment, and salaried informality in Bolivia; salaried informality in Colombia; all states of employment in Ecuador; unemployment, salaried informality, and salaried formality

FIGURE 3.6a | **Simulated Size of Labor States: Bolivia**
(In percent)



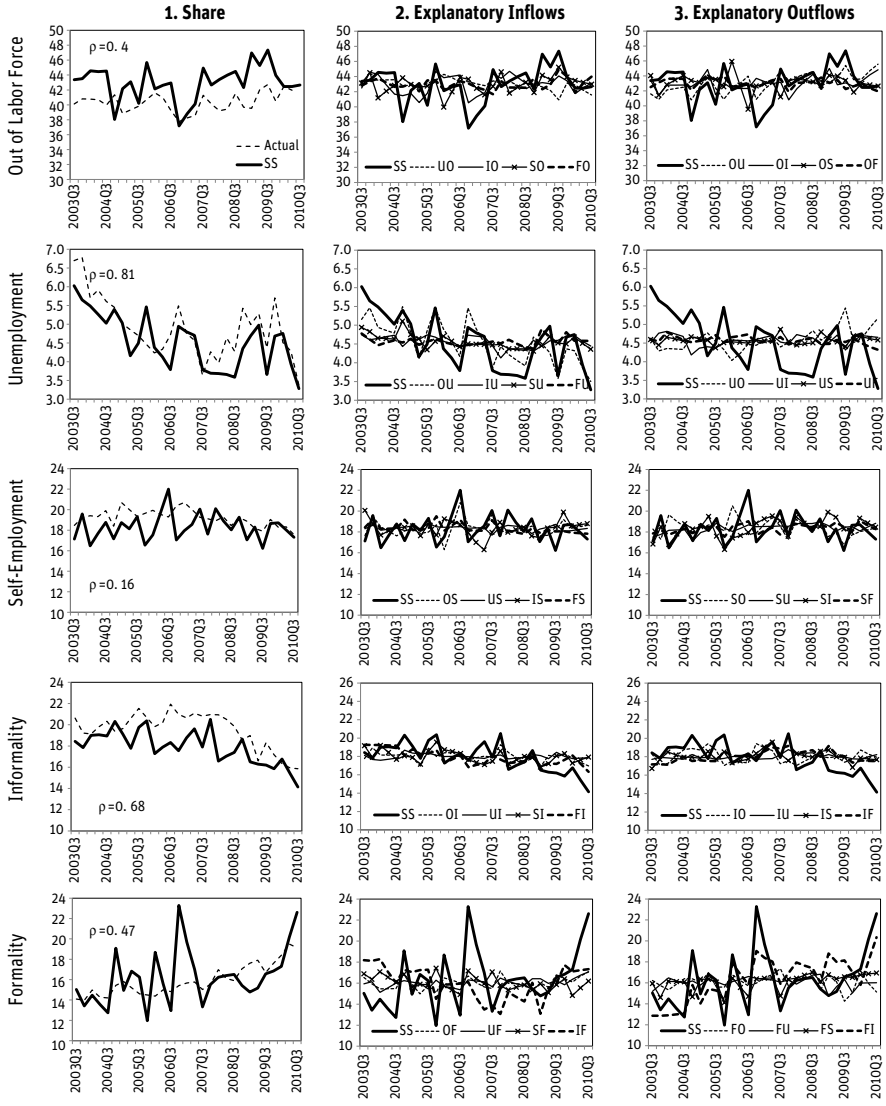
Source: Quartely Employment Survey 2009–2010 (or ETE in Spanish).
Note: Shares reported in column 1 represent the percentage of individuals observed in each labor state (as a percentage of the working-age population). Dashed lines correspond to the actual size of the share, bold continuous lines correspond to the solution of the system of Equation 3.5. Columns 2 and 3 simulate the solution of Equation 3.5, anchoring all transition probabilities at their historical means except that indicated in the figure (which is allowed to vary freely according to its observed values) to quantify its exclusive contribution to the size of the sector. ρ corresponds to the correlation between the actual shares and their steady-state values.

FIGURE 3.6b | **Simulated Size of Labor States: Colombia**
(In percent)



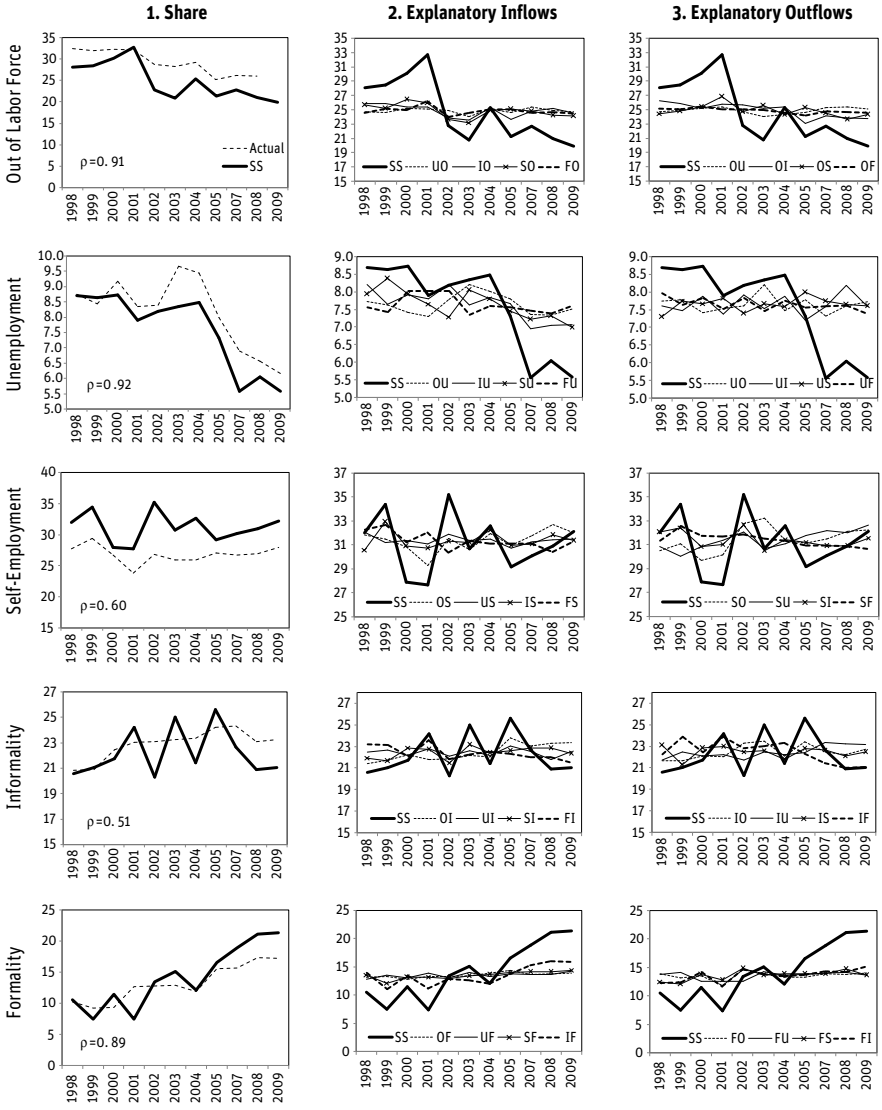
Source: Social Longitudinal Survey (Encuesta Social Longitudinal-ESLF) 2006–2010.
Note: Shares reported in column 1 represent the percentage of individuals observed in each labor state (as a percentage of the working-age population). Dashed lines correspond to the actual size of the share, bold continuous lines correspond to the solution of the system of Equation 3.5. Columns 2 and 3 simulate the solution of Equation 3.5, anchoring all transition probabilities at their historical means except that indicated in the figure (which is allowed to vary freely according to its observed values) to quantify its exclusive contribution to the size of the sector. ρ corresponds to the correlation between the actual shares and their steady-state values.

FIGURE 3.6c | **Simulated Size of Labor States: Ecuador**
(In percent)



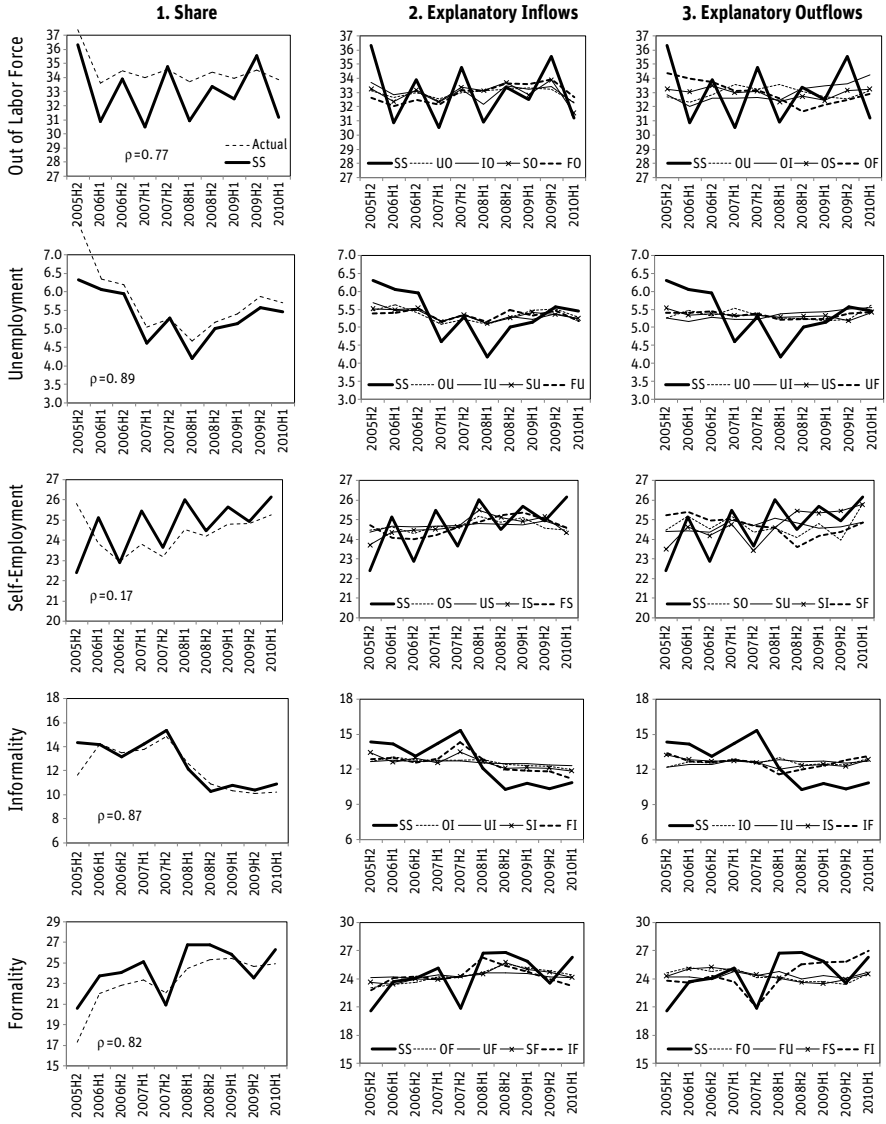
Source: Employment, Unemployment and Underemployment Survey (ENEMDU in Spanish).
Note: Shares reported in column 1 represent the percentage of individuals observed in each labor state (as a percentage of the working-age population). Dashed lines correspond to the actual size of the share, bold continuous lines correspond to the solution of the system of Equation 3.5. Columns 2 and 3 simulate the solution of Equation 3.5, anchoring all transition probabilities at their historical means except that indicated in the figure (which is allowed to vary freely according to its observed values) to quantify its exclusive contribution to the size of the sector. ρ corresponds to the correlation between the actual shares and their steady-state values.

FIGURE 3.6d | **Simulated Size of Labor States: Peru**
(In percent)



Source: National Household Survey (ENAHO in Spanish).
Note: Shares reported in column 1 represent the percentage of individuals observed in each labor state (as a percentage of the working-age population). Dashed lines correspond to the actual size of the share, bold continuous lines correspond to the solution of the system of Equation 3.5. Columns 2 and 3 simulate the solution of Equation 3.5, anchoring all transition probabilities at their historical means except that indicated in the figure (which is allowed to vary freely according to its observed values) to quantify its exclusive contribution to the size of the sector. ρ corresponds to the correlation between the actual shares and their steady-state values.

FIGURE 3.6e | **Simulated Size of Labor States: Venezuela**
(In percent)



Source: Household Survey by Sampling (EHM in Spanish).
Note: Shares reported in column 1 represent the percentage of individuals observed in each labor state (as a percentage of the working-age population). Dashed lines correspond to the actual size of the share, bold continuous lines correspond to the solution of the system of Equation 3.5. Columns 2 and 3 simulate the solution of Equation 3.5, anchoring all transition probabilities at their historical means except that indicated in the figure (which is allowed to vary freely according to its observed values) to quantify its exclusive contribution to the size of the sector. ρ corresponds to the correlation between the actual shares and their steady-state values.

in Peru; and all states of employment except out of the labor force in Venezuela. It is clear that countries with richer information enable a closer estimation of the steady-state values and hence allow us to perform a finer simulation.

Figure 3.6a shows that within the tight 2009–10 window, Bolivia's shares of unemployment and self-employment are principally driven by inflows from out of the labor force, whereas the share of informality is partially driven by outflows from out of the labor force. Looking at the actual values of the share of workers out of the Bolivian labor force, we observe a reduction during 2009 and a slight increase during 2010 (nevertheless, during the whole period, the share of those out of the labor force went down). The reduction of the out-of-the-labor-force share translates into inflows of previously inactive working-age individuals to some of the active states of employment (either unemployment or employment). Consistent with this, inflows from out of the labor force to unemployed induce first an increase and then a decrease in the share of unemployment. Outflows from out of the labor force also fuel inflows toward self-employment, which account for a rise in this state during 2009 and then a moderate stagnation. On the other hand, informality during 2009 is closely predicted by the steady-state estimates (2010 estimations are off track) and again, a reduction in the outflows from informal to out of the labor force (consistent with the reduction of the out-of-the-labor-force share during that period) appears as the main determinant of the increase of the size of the Bolivian informal salaried sector.

Figure 3.6b reports the results for Colombia. Given the few data points, steady-state estimates are poor for all sectors except informality, whose decrease is mainly explained by reductions of inflows from self-employment. Considering that in Bolivia and Colombia the size of the aggregate informal sector (informal salaried and self-employment) is increasing, it is worth noting that the strengthened self-employed sector is responsible for this overall increase in informality in both countries, with noticeable inflows from out of the labor force in the first case and a recomposition of the informal sector stopping absorptions from self-employment in the second case.

Figure 3.6c reports results for Ecuador. The first point to highlight is the greater accuracy in the steady-state estimates due to the availability of richer datasets. Indeed, actual observed trends and cyclical movements are followed closely by the steady-state estimates. Only formal employment simulations exhibit high variance for the pre-2007 period. There is not a clear determinant of the size of the out of the labor force sector. For the post-2007 period, the increase of this sector seems to be engineered by an increase in the inflows from self-employment (consistent with the contraction observed in self-employment

across the same period). Unemployment movements are better explained by inflows from out of the labor force. That is, unemployment is not decaying due to more job findings but due to more people who are staying out of the labor force rather than transiting from out of the labor force to unemployment. More interesting, the secular increase of salaried formality is mostly driven by an increase in the inflows from informality and a contraction in the outflows toward informality. Thus, in Ecuador, since 2007, a process of formalization among salaried workers can be clearly identified.[24]

Figure 3.6d shows the results for Peru, where, with the exception of salaried formality, it is difficult to identify a clear contribution from a specific flow toward the size of the employment sectors. The dramatic increase in salaried formality is noticeably driven by increased inflows from salaried informality, especially since 2004. The contraction of unemployment is also remarkable and mostly driven by a reduction of the inflows from all other sectors, consistent with the strong and sustained economic growth experienced in the country during the last decade.

Finally, Figure 3.6e reports the results for Venezuela, another case of rich labor data. In this case, steady-state estimates are very close to the actual observed values for all the employment states. However, individual transitions are only useful to predict the size of self-employment, salaried informality, and salaried formality. In the first case, the observed upsurge would be explained by an increase in the inflows of workers coming from the salaried sectors (both informal and formal) and by a decrease in the outflows of workers toward salaried informality (which as a sector experiences a noticeable contraction). Contraction of salaried informality is mainly driven by reductions of the inflows from salaried formality, and reciprocally, the increase in the size of the salaried formal sector is mostly shaped by an increase in the inflows from informality and a decrease of the outflows toward informality. In summary, in Venezuela, both salaried formality and self-employment are growing mainly at the expense of the salaried informal sector.

Conclusions and Policy Recommendations

Labor informality is very dynamic and far from being an absolute absorbing state. That is, labor informality is persistently high but informal workers are not

[24] See Chapter 1 for a description of the institutional setup and the regulation governing labor markets in the Andean countries.

always the same. Entries and exits to and from informality are observed in every country across the region and at highly cyclical rates. But this behavior is not exclusive to the region. Worker mobility across employment states is a natural feature of labor markets, either because it reflects the degree of economic activity at different phases of the cycle or because it reflects adaptive learning and re-optimization of firms and workers who re-match after updating their respective priors. Thus, a call on how good or bad high mobility is depends on the context. Voluntary job-to-job transitions prompted by re-matching opportunities after firms and workers have learned about their true needs and characteristics are healthy and allow efficiency gains.[25] On the other hand, unexpected or undesired job-to-job replacements usually affect pre-retirement incomes and, more importantly, endanger post-retirement pensions: workers continuously switching in and out of the formal sector may not be able to accumulate the minimum number or amount of contributions that would entitle them for a pension. In the same way, voluntary temporary transitions toward unemployment could help workers look for better matches or gain skills to qualify for better jobs. But involuntary long periods of unemployment can depreciate the human capital of workers and force them to look for jobs that may be socially suboptimal in the long run. Thus, risks due to intense transitions across states of employment do not only affect pre- and post-retirement income distributions; they also affect pre- and post-retirement conditions of the welfare for both workers and society. It is in this sense that we claim that transitions across employment states reflect *employment mobility risks*. That is a reason why better understanding of the workers' dynamics is worthwhile.

In order to better understand the dynamics observed in the Andean labor markets, five different exercises studying the patterns of worker mobility have been presented in this chapter.

First, we studied the intensity of transitions across states of employment. Conventional Markov chains of one-year-ahead transitions for 2009–10 suggest common patterns of mobility across states of employment in the Andean region: similar duration of formal and informal employment (between five and six years),[26] more active job finding in the informal sector, and comparable separation rates for the formal and informal sectors. Thus informality is not an issue only because it is high but also because it plays a very active role

[25] Serafinelli (2012) examines the role of labor mobility as a mechanism for the transfer of efficiency-enhancing knowledge.

[26] Distinguishing between salaried and nonsalaried informality, the durations of each of these are noticeably lower.

in displacing workers across states of employment. Job finding is also more active in the informal sector, where, as shown in Chapter 2, average earnings are below the legal minimum wage for most countries and, as will be shown in Chapter 4, these low earnings are even worse for entrants.

Second, we studied what characteristics have the most influence on these transitions. We examined the marginal effect of several individual characteristics (age, gender, educational attainment, size of employer firm, etc.) on the annual probability of transiting across states of employment. The most salient characteristic influencing annual transitions was found to be educational attainment. In most Andean countries, educational attainment contributes significantly and positively to transit from unemployment and salaried informality toward salaried formality. It also contributes significantly and negatively to transit from salaried formality toward salaried informality.

Third, we looked at whether the intensity of these transitions is similar between shorter and longer periods and we traced workers' paths for several years. Taking advantage of the panel datasets covering longer periods for Peru and Venezuela, we estimated finer measures of persistence in each employment state. For example, 16% of Venezuelan workers observed in unemployment in 2005 transited to formality in 2006 and 37% did so in 2010. In contrast, Peruvian workers who started in unemployment did not show a path toward formalization. After four years, only 8% of workers starting in unemployment managed to make their way to formality. About one-fifth of those workers starting in unemployment are seen in unemployment again one, two, and three years later (and 15% four years later). Thus, unemployment persists among an important share of Peruvian unemployed workers for a long time.

Fourth, the chapter examined whether changes in the intensity of transitions over time are influenced by the phases of a business cycle. By stacking all available one-period-ahead transitions, we analyzed the evolution of worker flows during the business cycle. Job finding exhibited strong procyclical patterns; separations from employment (ins to unemployment) exhibited strong anticyclicality in all labor sectors of the whole region; and employment-to-employment transitions were strongly procyclical.

Finally, we integrated the dynamic and static analysis and studied the contribution of the flow of workers in determining the size of each employment state. By solving a steady-state system, we simulated the size of each sector, moving a single flow at a time and keeping the remaining flows at their historic averages. The results vary according to each country. For example, in Bolivia and Colombia, the size of the aggregate informal sector (informal salaried and self-employment) is increasing due to a strengthened self-employed sector that is growing at the

expense of noticeable inflows from out of the labor force in the first case and a recomposition of the informal sector stopping absorptions from self-employment in the second case. In Ecuador, the secular increase of salaried formality is mostly driven by an increase in the inflows from informality and a contraction in the outflows toward informality. In Peru, the dramatic increase in salaried formality is noticeably driven by increased inflows from salaried informality, especially since 2004. In Venezuela, both salaried formality and self-employment are growing mainly at the expense of the salaried informal sector (due to increases in the inflows from informality and decreases of the outflows toward informality).

Two main prescriptions follow these findings. First, a significant mass of workers is constantly transiting across sectors, and the intensity of these transitions is related to the business cycle. Hence, regardless of whether the informal sector is good or bad, it certainly absorbs workers intermittently and with stronger intensity during troughs. While this intermittency may or may not undermine human capital accumulation (specialization, experience, on-the-job training), it most likely prevents financial capital accumulation of at least levels (and frequencies) that would allow workers to achieve pensions after retirement. Thus, labor market reforms aimed at engrossing the contributory base should bear in mind the likelihood of eventual separations when promoting formalization of the worker supply. That is, efforts should not be placed on prompting just formality but *persistent* or *permanent* formality (which again, is not achieved by mere enrollment). Further research could be done comparing the difference between transition intensities of workers whose pension contributions are compulsorily related to health insurance contributions and those of workers whose formality status is only measured in terms of post-retirement protection. Presumably, workers receiving nondeferred protection (health insurance or other benefits) will transit less frequently across sectors (at least voluntarily).

A second finding is that evidence suggests that education is a significant determinant of better reallocations within the labor market. In most Andean countries, more educated workers manage to transit from informal to formal employment.[27] In Venezuela, unemployed workers who improved their educational attainment during the unemployment period managed to get formal jobs after a few years. Thus, as is usually the case, improving the labor factor quality has positive (and presumably) permanent payoffs, in this case fostering *persistent* formalization of the labor market.

---

[27] El Badaoui and Rebière (2012) study the impact of access to education on labor market flows in a search-matching model of a labor market representing a developing economy. They find that an increase in education raises the size of the formal sector and reduces that of the lower-tier sector, but also that more educated workers enter into informality.

References

Anderson, P. and Meyer, B. 1994. "The Extent and Consequences of Job Turnover." *Brookings Papers on Economic Activity: Microeconomics.* Washington, DC, United States: The Brookings Institution.

Arceo, E. 2011. "Estudio cuantitativo sobre desempleo en México y sus implicaciones para la participación laboral femenina." Working Paper No. 2. Mexico DF, Mexico: Instituto Nacional de las Mujeres.

Bosch, M., and Maloney, W. 2008. "Cyclical Movements in Unemployment and Informality in Developing Countries." Working Paper No. 3514. Bonn, Germany: Institute for the Study of Labor (IZA).

Bosch, M., and Maloney, W. 2010. "Comparative Analysis of Labor Market Dynamics Using Markov Processes: An Application to Informality." *Labour Economics.* 17(4): 621–31.

Bosch, M., Goñi-Pacchioni, E. and Maloney, E. 2007. "The Determinants of Rising Informality in Brazil: Evidence from Gross Worker Flows." Working Paper No. 2970. Bonn, Germany: Institute for the Study of Labor (IZA).

Bosch, M., Goñi-Pacchioni, E. and Maloney, W. 2012. "Trade Liberalization, Labor Reforms and Formal-Informal Employment Dynamics." *Labour Economics.* 19(5): 653–67.

Burda, M. and Wyplosz, C. 1994. "Gross Worker and Job Flows in Europe." *European Economic Review.* 38(6): 1287–315.

Cahuc, P. and Zylberberg, A. 2004. *Labor Economics.* Massachusetts, United States and London, United Kingdom: The MIT Press.

Camacho, A., Conover, E. and Hoyos, A. 2010. "Effects of Colombia's Social Protection System on Worker's Choice between Formal and Informal Employment." Working Paper No. 2009–08. Bogotá, DC, Colombia: Centro de Estudios sobre Desarrollo Económico (CEDE), Universidad de los Andes.

Cea, S., Contreras, M., Martínez, C. and Puentes, E. 2009. "Trabajadores por Cuenta Propia: ¿Quiénes Son? ¿De Dónde Vienen? ¿Para Dónde Van?" Working Paper No. 308. Santiago de Chile, Chile: Facultad Economía y Negocios, Universidad de Chile.

Cheon, B. 2012. "Labour Market Transitions in Korea Compared with those of EU." Hanshin University. Mimeographed document.

Davis, S. and Haltiwanger, J. 1999. "Gross Job Flows." In: O. Ashenfelter and D. Card, editors. *Handbook of Labor Economics*, Vol. 3B. Amsterdam, Netherlands: Elsevier Science.

Davis, S., Haltiwanger, J. and Schuh, S. 1996. *Job Creation and Destruction.* Massachusetts, United States: The MIT Press.

Duryea, S., Marquéz, G., Pagés, C., Scarpetta, S. and Reinhart, C. 2006. "For Better or for Worse? Job and Earnings Mobility in Nine Middle- and Low Income Countries." In: S. Collins and C. Graham, editors. *Brookings Trade Forum 2006, Global Labor Markets?* Massachusetts, United States: Brooking Institution Press.

El Badaoui, E. and Rebière, T. 2012. "Informal Labor Market and Access to Education in Developing Economies." Université de Paris Ouest Nanterre. Mimeographed document.

Elsby, M., Solon, G. and Michaels, R. 2009. "The Ins and Outs of Cyclical Unemployment." *American Economic Journal: Macroeconomics.* 1(1): 84–110.

Fairlie, R. 2005. "Self-employment, entrepreneurship, and the NLSY79." Monthly Labor Review of Bureau of Labor Statistics. Washington, DC, United States: Bureau of Labor Statistics.

Fougère, D. and Kamionka, T. 2003. "Bayesian Inference for the Mover-Stayer Model in Continuous Time with an Application to Labour Market Transition Data." *Journal of Applied Econometrics.* 18(6): 697–723.

Fougère, D. and Kamionka, T. 2008. "Econometrics of Individual Labor Market Transitions." In: L. Matyas and P. Sevestre, editors. *The Econometrics of Panel Data: A Handbook of the Theory with Applications*, 3rd Edition. New York: Springer.

Fujita, S. and Ramey, G. 2009. "The Cyclicality of Separation and Job Finding Rates." *International Economic Review.* 50(2): 415–30.

Kaiser, L. 2006. "Female Labor Market Transitions in Europe." Discussion Paper No. 2115. Bonn, Germany: The Institute for the Study of Labor (IZA).

Maloney, W. 2004. "Informality Revisited." *World Development.* 32(7): 1159–178.

Meager, N. and Carta, E. 2011. "Skills for self-employment." Evidence Report No. 39. London, United Kingdom: UK Commission for Employment and Skills, Institute for Employment Studies.

Mortensen, D. and Nagypál, E. 2005. "More on Unemployment and Vacancy Fluctuations." Working Paper No. 1765. Bonn, Germany: Institute for the Study of Labor (IZA).

Pagés, C., Pierre, G. and Scarpetta, S. 2009. *Job Creation in Latin America and the Caribbean: Recent Trends and Policy Challenges.* New York, United States: Palgrave MacMillan and World Bank.

Petrongolo, B., and Pissarides, C. 2008. "The Ins and Outs of European Unemployment." *American Economic Review.* 98(2): 256–62.

Pissarides, C. 2009. "The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?" *Econometrica.* 5(77): 1339–369.

Serafinelli, M. 2012. "Good Firms, Worker Flows and Productivity." University of California at Berkeley. Mimeographed document.

Shimer, R. 2005. "Reassessing the Ins and Outs of Unemployment." Review of Economic Dynamics, Elsevier for the Society for Economic Dynamics. 15(2): 127–148.

Tornarolli, L. and Conconi, A. 2007. "Informalidad y Movilidad Laboral: Un Análisis Empírico para Argentina." Working Paper No. 59. La Plata, Argentina: Centro de Estudios Distributivos, Laborales y Sociales.

United Nations. 2011. *World Urbanization Prospects, the 2011 Revision*. New York, United States: United Nations.

4

Income Risk: Worker Mobility, Productivity Shocks, and the Persistence of Income Shocks

Worker flows and sector dynamics studied in Chapter 3 revealed contrasts and similarities among workers pertaining to different states of formality and different groups of mobility. Important findings of the chapter were that (1) among Andean countries, Venezuela is the only one with (less) more active (in)formal job finding flows and less (more) active (in) formal separation flows;[1] (2) in those countries where informality is growing (Bolivia and Colombia) there is a dominant contribution of relative outflows from informality (i.e., informality increases mostly because of a relative reduction in the outflows that drain the informal sector compared to the variation of the outflows draining the formal sector); (3) informality in Ecuador is decreasing thanks to a balanced contribution of reduced relative inflows and increased relative outflows; (4) in other countries where informality is contracting (Peru and Venezuela) there is a dominant contribution of relative inflows (i.e., informality gets smaller mainly after reductions of relative inflows into the sector); (5) the duration of unemployment varies notably across countries yet the duration in all employment sectors is broadly similar; (6) bilateral flows from and into formal/informal employment are highly correlated everywhere in the Andes; and (7) education is the most significant characteristic influencing transits toward formality.

[1] A pattern also observed in Mexico and Brazil (Bosch and Maloney 2008).

These findings are interesting because they enable a better understanding of employment displacements and duration and their implications for the size of the formal sector—what we have called *employment mobility risk*. Allocations of workers are equilibrium outcomes and hence they influence and are influenced by wage bargaining and wage setting. Indeed, canonical search and matching models suggest that the optimal strategy for job seekers is to accept offers that lie above their reservation wages, which in turn are influenced by market dynamics such as destruction rates or arrival rates of job offers. Not only that, reservation wages, and thus wage setting, are influenced by institutional setups that also affect worker mobility, such as unemployment insurance (which affects duration of unemployment and intensity of the job search). In a less-developed context with high informality, unemployment insurance schemes are thin (Alaimo and Franco 2012) and not as influential as other institutions such as labor contracts. In fact, labor contracts can influence the length of job tenure, job-to-job reallocations, degree of (income) risk sharing between firms and salaried workers, etc. Nonsalaried (independent) workers who lack contractual arrangements—and who account for about 40% of the Andean employed labor force (see Chapter 2)—are even more exposed to income risk because the within-the-firm risk mitigation mechanism is not available to them. Thus, more mobility across employment states (and hence more exposure to employment mobility risk) and more volatility of earnings (and hence more exposure to income risk) is expected among these workers.

All in all, employment mobility risk and income risk are closely related and worker mobility is one of the most logical criteria to identify the different types of shock transmission and persistence for different kinds of workers. For instance, different degrees of mobility across worker groups translate into different degrees of wage stickiness or wage/productivity elasticities. Incumbent workers with long tenures may display more inelastic salaries, whereas new hires would split surpluses with firms that are mindful of the productivity achieved at the time of bargaining. In the same vein, workers transiting across states of employment with high frequency could be more exposed to income shocks than those steadily remaining in the formal sector. Beyond the transmission of shocks, their permanency may also be subject to variations depending on the status of formality and mobility. Long-tenured formal salaried workers are likely subject to less acute permanent shocks than their informal and independent counterparts. Informal salaried and independent workers frequently moving from one job to another are most likely subject to more acute temporary shocks than formal movers and incumbents workers.

To date, considerable effort has been put into the empirical study of the unemployment and reallocation risks in Latin America (see Chapter 3), but little attention has been given to the empirical assessment of these dynamics in terms of workers' income volatility. This chapter is devoted to the analysis of the volatility of income and earnings of salaried and independent workers—what we call *income risk*—from a dynamic perspective on two specific fronts. It first explores the correspondence between productivity shocks and wage adjustments, stressing the fact that wage-productivity elasticity responds distinctly according to the degree of workers' labor mobility. The prior is that the higher mobility one observes among workers, the higher the correspondence between wages and productivity adjustments. Next, the chapter assesses the persistence of income shocks. Thus, it disentangles the variance of changes in conditional incomes (or earnings) of distinct groups of workers into a component that persists up to two periods (transitory) and into a component that persists across all the periods at which the same individual is observed (permanent). As in the previous chapter, the analysis in this chapter is novel within the Andean region and possible thanks to the longitudinal dimension of the datasets that allows for intertemporal/dynamic analysis of incomes at an individual level.

Worker Mobility

Chapter 3 already addressed many important issues about worker mobility across states of employment and employment risk. This chapter builds on those findings and exploits the classification of workers according to their mobility as a source of identification of differentiated effects of income shocks and the persistence of shocks across workers in distinct groups.

We start by characterizing each of the mobility groups across all the Andean countries. Table 4.1 reports summary statistics about distinct sets of workers grouped according to their formality and mobility status. The formality status corresponds to the same states of employment defined earlier.[2] Mobility status is defined by comparing the state of employment of a worker in two consecutive periods of time. For instance, new hires (or entrants from unemployment[3]) are

[2] See Box 1.1 in Chapter 1.

[3] Note that "entrants" here refers to workers coming from unemployment, regardless of their work experience or the time spent in unemployment. Thus, a new hire in this context is not related to new entrants in the job market (like youths) but rather to entrants coming to the employed workforce from unemployment.

TABLE 4.1 | Characterization of Workers from Different Mobility and Formality Groups

	Bolivia				Colombia				Ecuador				Peru				Venezuela			
	All (1)	Entrant (2)	Mover (3)	Stayer (4)	All (5)	Entrant (6)	Mover (7)	Stayer (8)	All (9)	Entrant (10)	Mover (11)	Stayer (12)	All (13)	Entrant (14)	Mover (15)	Stayer (16)	All (17)	Entrant (18)	Mover (19)	Stayer (20)
A. Salaried																				
Share of workforce	0.52	0.03	0.13	0.37	0.73	0.08	0.19	0.46	0.66	0.04	0.15	0.47	0.60	0.04	0.13	0.43	0.61	0.03	0.15	0.43
% Small firms	0.50	0.71	0.58	0.45	0.38	0.39	0.53	0.32	0.40	0.52	0.43	0.38	0.38	0.50	0.41	0.36	0.27	0.40	0.47	0.19
% Male	0.65	0.59	0.68	0.64	0.46	0.48	0.52	0.43	0.63	0.57	0.61	0.64	0.60	0.55	0.64	0.59	0.58	0.67	0.67	0.55
Educational attainment	11.76	10.62	11.52	11.95	12.00	11.35	11.52	12.30	10.90	10.84	10.74	10.96	11.81	11.61	11.06	12.06	10.41	10.19	9.07	10.89
Experience	18.05	12.74	19.22	18.06	9.01	7.57	10.35	8.82	20.46	11.09	19.95	21.33	18.91	10.38	18.68	19.76	20.70	14.52	21.33	20.91
Monthly hours	179.70	180.37	181.06	179.17	195.99	183.31	199.01	197.05	179.85	167.50	181.80	180.15	180.24	176.94	183.16	179.62	157.16	161.82	167.00	153.42
Monthly wage	294.15	195.01	266.83	310.89	329.29	251.68	316.73	348.40	414.01	302.09	380.57	433.29	318.00	245.08	303.58	329.12	215.76	196.42	192.29	225.23
A.1 Formal																				
Share of workforce	0.22	0.00	0.04	0.18	0.47	0.05	0.09	0.33	0.39	0.01	0.08	0.29	0.28	0.01	0.05	0.21	0.45	0.02	0.07	0.36
% Small firms	0.18	0.31	0.27	0.16	0.26	0.22	0.48	0.20	0.17	0.18	0.27	0.14	0.07	0.05	0.13	0.06	0.12	0.16	0.26	0.09
% Male	0.59	0.34	0.70	0.57	0.46	0.62	0.53	0.42	0.59	0.46	0.56	0.61	0.60	0.51	0.64	0.60	0.54	0.61	0.64	0.52
Educational attainment	14.01	17.36	13.84	13.98	12.29	11.44	11.98	12.51	12.37	12.40	11.85	12.52	13.33	12.90	12.20	13.63	11.22	11.39	9.59	11.55
Experience	20.40	5.83	16.41	20.40	9.28	8.11	9.63	9.28	21.99	10.60	17.46	21.99	21.71	12.48	15.62	21.71	21.13	13.90	21.12	21.13
Monthly hours	166.21	169.79	178.78	163.25	199.50	200.08	199.91	199.30	183.42	176.88	187.32	182.59	178.94	187.44	203.79	172.36	155.30	167.61	167.04	152.29
Monthly wage	371.55	310.88	291.40	390.61	371.06	305.59	344.80	387.31	525.20	439.59	449.74	550.33	385.51	309.93	343.85	398.98	235.11	228.55	209.84	240.67

(continued on next page)

TABLE 4.1 | Characterization of Workers from Different Mobility and Formality Groups (*continued*)

	Bolivia				Colombia				Ecuador				Peru				Venezuela			
	All (1)	Entrant (2)	Mover (3)	Stayer (4)	All (5)	Entrant (6)	Mover (7)	Stayer (8)	All (9)	Entrant (10)	Mover (11)	Stayer (12)	All (13)	Entrant (14)	Mover (15)	Stayer (16)	All (17)	Entrant (18)	Mover (19)	Stayer (20)
A.2 Informal																				
Share of workforce	0.30	0.02	0.09	0.19	0.26	0.04	0.10	0.12	0.28	0.02	0.07	0.18	0.32	0.03	0.08	0.21	0.16	0.01	0.07	0.07
% Small firms	0.73	0.76	0.72	0.73	0.61	0.62	0.57	0.65	0.72	0.71	0.62	0.76	0.64	0.63	0.60	0.67	0.70	0.69	0.68	0.72
% Male	0.68	0.62	0.67	0.70	0.45	0.29	0.50	0.46	0.68	0.63	0.67	0.70	0.59	0.57	0.65	0.58	0.70	0.75	0.71	0.68
Educational attainment	10.67	9.99	10.72	10.73	11.26	11.20	10.93	11.54	8.83	9.99	9.42	8.45	10.51	11.24	10.30	10.49	8.19	8.74	8.56	7.71
Experience	17.43	13.39	20.19	16.67	8.52	6.64	11.27	7.12	20.18	11.36	22.88	20.26	17.79	9.78	20.70	17.80	20.25	15.27	21.54	19.87
Monthly hours	189.19	181.71	182.07	193.45	189.59	161.21	198.18	191.04	174.80	162.39	175.29	176.19	181.35	173.93	169.54	186.89	162.26	154.82	166.97	158.88
Monthly wage	237.37	180.77	255.59	236.10	253.09	180.62	290.93	244.48	256.63	227.12	299.10	243.79	260.56	226.51	277.00	259.08	162.52	157.56	174.87	150.98
B. Non-salaried (independent)																				
Share of workforce	0.48	0.02	0.10	0.36	0.27	0.02	0.06	0.19	0.34	0.01	0.07	0.25	0.40	0.02	0.06	0.32	0.39	0.02	0.08	0.29
% Male	0.51	0.57	0.80	0.43	0.54	0.57	0.61	0.51	0.62	0.51	0.71	0.60	0.54	0.57	0.67	0.52	0.68	0.67	0.73	0.67
Educational attainment	8.68	10.03	9.69	8.36	11.19	11.14	11.00	11.29	9.34	11.18	9.53	9.20	9.41	10.45	10.61	9.13	8.23	8.87	8.67	8.07
Experience	29.15	23.67	23.99	30.73	9.76	5.40	9.74	10.36	29.47	17.73	25.72	31.12	27.52	24.29	20.51	29.06	27.00	22.10	22.71	28.54
Monthly hours	193.85	167.74	196.27	194.47	176.78	146.74	189.72	176.42	172.42	129.91	168.74	175.63	189.32	126.63	171.34	195.94	161.34	145.24	161.12	162.62
Monthly wage	231.13	232.03	263.69	222.52	254.25	165.84	253.15	266.25	306.45	175.17	300.14	314.87	277.86	167.97	264.99	285.80	192.19	164.05	193.03	194.10

Source: National labor surveys. For details see Box 1.1.
Note: The figures correspond to the panel sample and not to the whole cross-section sample. The mobility groups are built upon annual transitions reported for the last available period (e.g., 2009–10; or 2009Q4–2010Q4; or 2009H2–2010H2). Characteristics are measured at the arrival state. % Small firms and % Male represent the share of workers belonging to small firms and the share of male workers, respectively, of the corresponding group. Educational attainment and experience are measured in years. Average monthly wage is measured in current US$.

those workers who came into a state of employment (either formal, informal, or independent) exclusively from the unemployment state. Movers are those workers who are employed in the observed period and were also employed in the preceding period but in a different state of employment (for instance, workers moving from informal salaried to formal salaried jobs or from formal salaried to independent jobs would be classified as movers). Stayers are those employed workers who are observed in the same employment sector during the two periods under comparison.

We follow this approach for two reasons. First, the definition of mobility based on someone's state of employment rather than job is suitable for mapping risks from the employment space to the income space for the same group of workers. Provided that we define employment risk based on specific employment states, we are interested in learning how income shocks affect and persist among workers observed across the same array of specific employment states.

Second, the surveys used for this study do not necessarily ask workers about the length of tenure of their ongoing job for the whole period of the panel subsample.[4] Hence, the closer approximation to pin down mobility is based on the intertemporal comparison of employment states. That is, we cannot assert if a worker actually moved from one job to another, or if a worker stayed at the same job, but we can assert if the worker moved from one employment state to another or if the worker stayed in the same employment state. In spite of the unclear cut of groups of workers moving from or staying at their current jobs implicit in this approach, we still have a clear cut of mobility based on the formerly defined employment states and that cut is suitable for our purposes. For instance, new hires are workers coming straight from unemployment and hence they are entrants from both perspectives (jobs or employment states) and thus this mobility group is well defined. On the other hand, movers are in part actual job-to-job movers, but not all of them. Some workers can remain at their jobs but pass from staff to independent (or vice-versa) or from formal to informal (or vice-versa) and thus they are considered as movers for our purposes, given that they transited across states of employment (with the corresponding implications for employment and income risk that we are studying here). Some job-to-job movements are also left under the stayer cluster provided that they happened at the same state of employment (e.g., from one formal job to another). This

[4] The surveys of Bolivia, Colombia, and Ecuador do ask about length of job tenure during the entire period of analysis. However, Bolivia only covers two years and Colombia's panel sample is thin enough to impose an additional constraint to specifying mobility. The survey for Peru only starts asking about the length of job tenure as of 2004. Venezuela's survey does not ask about job tenure.

last caveat affects our first exercise (elasticity measures) but does not invalidate it. Indeed, the bias due to measurement here would provide bounds, and hence the estimation still carries information useful for our purposes. We elaborate on this point later.[5]

Table 4.1 reports basic summary statistics of workers belonging to each of the groups. Despite the dominance of the group of incumbents that represents about 70% of either the salaried or nonsalaried workforce, the remaining 30% of Andean urban workers are moving from one labor sector to another between two observed years. As suggested earlier, the dominant share of sector stayers probably distorts aggregate measures, which instead of carrying dynamic information about the effects of sector displacements end up reflecting the dominant participation of incumbents (e.g., adjustment of national average wages). Given that almost a third of the workforce transits across sectors from one year to another, a separate inspection is compelling. Panel A of Table 4.1 shows statistics for the whole group of salaried workers. In Bolivia, Ecuador, and Peru, at least half of entrants work at small firms. On the other hand, the majority of sector stayers are not found in small firms. It is also worth noting that in every country, incumbents hold more years of educational attainment. Regarding years of work experience, sector movers have more years of experience than incumbents in Bolivia, Colombia, and Venezuela. Sector movers also register the highest number of hours worked per month. Finally, regarding monthly incomes, entrants earn between 15% and 40% less than incumbents. These figures vary dramatically if we condition the estimates not only according to mobility but also according to formality. Panels A.1 and A.2 report the results for formal and informal salaried workers, respectively, and Panel B reports the results for independent (or nonsalaried) workers. As discussed earlier, there is a dominant participation of small-firm workers among the informal salaried group (see Chapter 2). Also consistent with previous analysis (Chapter 3), incumbents are very dominant among formal workers while entrants and movers account for from 35% to 55% of the informal salaried workforce. Among formal salaried workers, the educational attainment of entrants is usually lower than attainment for incumbents (Bolivia is the exception). Among informal salaried workers this is no longer true: informal entrants in Ecuador, Peru, and Venezuela have spent about one year more at school than informal incumbents. This is also reflected in monthly average wages: among informal salaried workers, movers are the best paid (and the most experienced) across the entire Andean region.

[5] Specifically, in this case the bias is due to omission rather than to just measurement, as we will explain later.

Table 4.2 shows the evolution of the participation of each group of workers. In contrast to the figures in Table 4.1, Table 4.2 exploits data at its highest available frequency. This is because while Table 4.1 aimed to provide a cross-country comparison of the characteristics of workers grouped by mobility and formality (making time standardization necessary), Table 4.2 instead is intended to provide a within-country perspective of the evolution of mobility/formality groups. In Bolivia, very slight variations in the composition of both formality and mobility groups are observed during the short time window covered by its available panel datasets. Groups are traced during a four-year window in Colombia and Venezuela and for almost a decade in Ecuador and Peru. In Colombia and Venezuela, persistence in the states of self-employment and salaried formality increases. In Ecuador, nonsalaried and salaried informality decreases for every mobility group. In Peru, there is a dramatic decrease in the number of incumbents in the informal sector (either salaried or nonsalaried). While this analysis resembles that reported in Chapter 3, here we report specific formality and mobility groups that are discussed in the income-risk analysis that follows.

Indeed, while Chapter 2 reported income (in)security among workers grouped by formality status within a static framework, this section addresses income risk from a dynamic perspective. Inspection of unconditioned income distribution of workers belonging to each formality/mobility group provides initial evidence favoring our prior about contrasting dispersions in such distributions. Figure 4.1 reveals a number of interesting facts. First, there is a clear cluster around the minimum wage for formal workers in every country of the Andean region except Bolivia and Peru. As discussed previously, the minimum wage in those countries does not provide any reference point for salaries. It is worth noting that the clustering around the minimum wage observed among formal workers is not generalized and is most likely exclusive of entrant workers. Thus, it is not only that in the Andean countries the formal sector creates few jobs (see Chapter 3), but also that the jobs it does create pay very little.

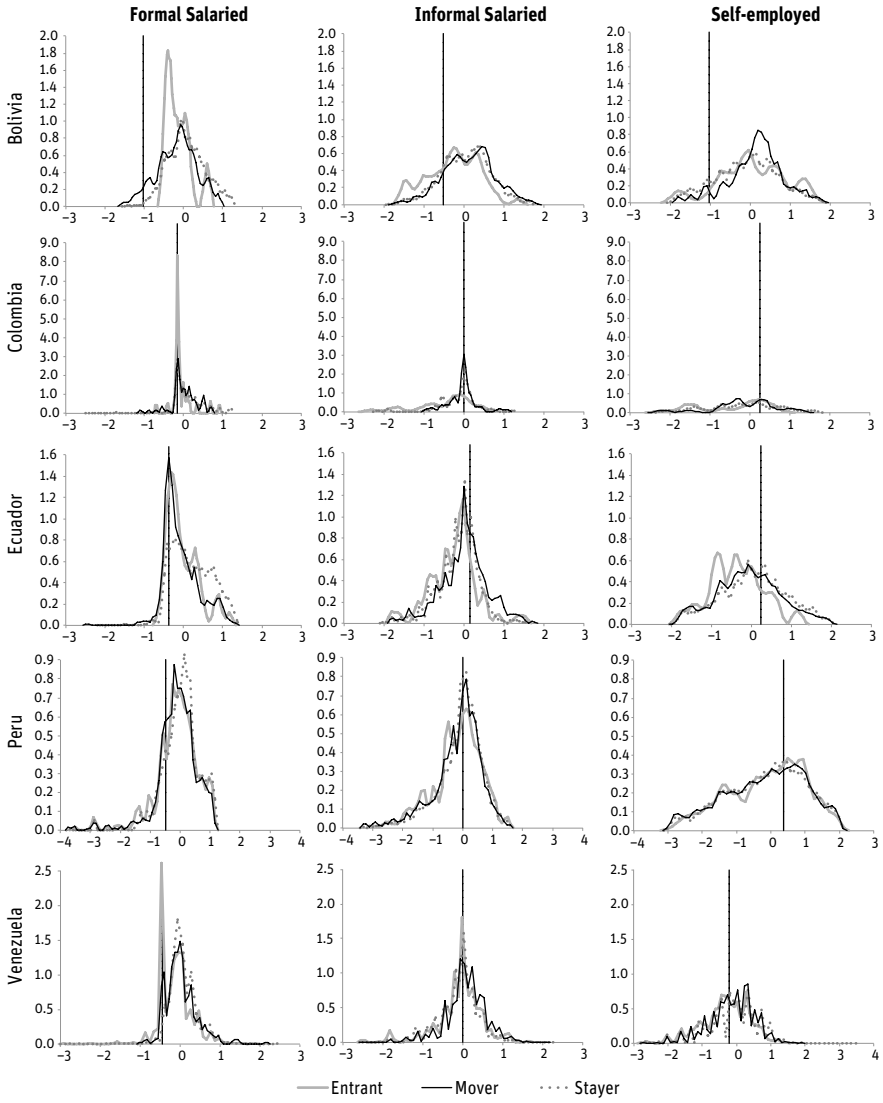
Second, entrants into other employment states (informal salaried and self-employed) are usually clustered around means below the minimum wage (Bolivia is an exception). Thus, although nonformal sectors have higher rates of job creation (see Chapter 3), the jobs that come available in these sectors are much more poorly remunerated than formal jobs. This is not only because the average entrant income is below the minimum wage, but also because salaried informal and self-employed workers are deprived of nonmonetary compensation and social benefits.

TABLE 4.2 | **Size of Groups of Workers according to Their State of Formality and Mobility**
(As a percentage of the employed labor force)

	Bolivia		Colombia		Ecuador		Peru		Venezuela	
	2009Q2	2010Q4	2007	2010	2003Q3	2010Q4	1999	2010	2007H1	2010H2
A. Workers grouped according to their status of formality										
SE	46.09	46.36	22.36	27.41	33.77	30.15	52.00	46.60	37.11	39.12
I	32.32	31.83	35.71	25.70	36.05	29.13	38.40	31.70	21.98	16.34
F	21.59	21.80	41.93	46.89	30.18	40.72	9.50	21.70	40.92	44.54
B. Workers grouped according to their status of mobility										
Entrant	3.80	2.48	11.11	10.73	4.19	2.76	9.30	6.00	5.06	4.06
Mover	16.41	15.73	32.23	24.80	23.34	15.67	26.20	47.67	23.22	18.57
Incumbent	79.79	81.78	56.67	64.47	72.47	81.57	64.50	46.40	71.74	77.37
C. Workers grouped according to their status of formality and mobility										
SE Entrant	1.47	0.93	1.41	2.46	1.26	0.49	2.70	2.10	1.80	1.56
SE Mover	6.22	5.98	8.58	6.25	7.30	4.59	7.20	19.30	6.16	5.74
SE Incumbent	38.40	39.45	12.37	18.70	25.21	25.07	42.20	25.20	29.15	31.82
I Entrant	2.12	1.43	4.46	3.57	2.25	1.39	6.70	2.10	1.90	1.28
I Mover	7.22	6.75	13.06	9.67	10.35	7.70	15.60	17.30	9.02	6.23
I Incumbent	22.98	23.65	18.19	12.46	23.45	20.05	16.20	12.30	11.06	8.83
F Entrant	0.20	0.13	5.24	4.70	0.69	0.89	0.00	1.80	1.36	1.22
F Mover	2.97	3.00	10.59	8.89	5.69	3.38	3.40	11.10	8.03	6.60
F Incumbent	18.42	18.68	26.10	33.30	23.81	36.45	6.20	8.80	31.52	36.72

Source: National labor surveys. For details see Box 1.1.
Note: The figures correspond to the panel sample and not to the whole cross-section sample. The mobility groups are built on high-frequency panel data (i.e., quarterly, annually, or biannually according to data availability). SE = self-employed; I = informal; F = formal.

FIGURE 4.1 | **Unconditioned Income Distribution according to Mobility and Employment Status**



Source: National labor surveys. For details see Box 1.1.
Note: The figures represent the kernel densities of the log of salaries and earnings of workers grouped by formality and mobility after removing the log of the median salary of each employment sector (formal salaried, informal salaried, and self-employed). The vertical lines correspond to the logged minimum wage (after removing the log of the median salary of each employment sector). Mobility groups correspond to the latest annual transition.

Third, compared to the case of salaried workers, both the center and the dispersion of earnings of independents are already suggestive of more exposure to income risk.

Fourth, workers staying in the same employment sector earn better incomes in every sector, country, and mobility group. Formal incumbents in Ecuador and especially in Peru are the most salient cases. Finally, sector movers broadly follow a similar dispersion as stayers.

It should be emphasized that movements of workers across states of employment have implications for individuals and across individuals. That is, flows of workers across states have intertemporal effects on income distribution (like the degree of persistence of shocks) but they also have spatial effects on aggregate income distribution (like social sorting, that is, individuals getting richer or poorer compared to other individuals) with evident welfare implications. In this sense, income distribution shown in Figure 4.1 combines time variation with spatial dispersion. That is, the variance of the distribution reflects income inequality within each group of workers and not along their working histories. However, the fact that we depict this income distribution for groups moving across states of employment at different periods conveys the dynamic dimension that is necessary to understand income risk. At this stage we do not claim ergodic distributions. Indeed, given the high transition rates across states of employment and the distinct characteristics of the average worker in each state, it is difficult to argue in favor of comparable distributions of income over time and across individuals. That is another reason why it is valuable to explore the effects of shocks and their persistence on incomes for different groups of mobility.

Wages and Productivity: The Role of Labor Mobility in Wage Setting in the Formal Sector

Income risk arises because shocks that may take workers and firms from one state of employment to another can happen at any time, and the uncertainty carried by unexpected transitions translates into unexpected changes in wages. The source of variation can be something as systemic as a global crisis or something more idiosyncratic such as specific firm or worker shocks (bankruptcy, early dismissal, etc.). Regardless of the cause, the response is most likely reflected in incomes. Thus, this section attempts to explain the observed variation in incomes of workers as a function of a measure of productivity.

Empirical studies show that real wages fluctuate less than production, employment, or hours worked, and that they are clearly procyclical.[6] As suggested earlier, risk sharing between employers and workers can account for this rigidity provided that there is an arrangement for salaried workers (either implicit or explicit) for a fixed periodic compensation in exchange for work. According to contract theory, contractual relations deal with two types of problems: the uncertainty of the environment (e.g., random arrival of exogenous productivity shocks) and the private nature of certain information (e.g., personal performance of workers on the job). Both are potential sources of a mismatch between the wage and the work for which this wage is paid, and both usually lead to imperfect, incomplete, and non-self-enforcing labor contracts.

Following this, one can observe several practices that determine remuneration. It can be based on time worked, piece rates (produced units), collective profit sharing, stock ownership, etc. After considering this assortment of possible arrangements, it is not implausible to consider that wage determination is not purely based on competitiveness. That is, under a competitive framework, remuneration of workers should hinge on their productivity. But given that contracts allow for risk sharing and insurance within the firm, adverse random external shocks damaging productivity would not necessarily translate into wage adjustments (e.g., if the arrangement weights more the time worked than the intensity of work or the profit sharing). The argument of risk sharing is compelling for those workers who did not change jobs during the shock, since the insurance under the labor arrangement operated during that period. For those negotiating their wages on spot, the situation is likely different, as firms may offer new contracts, updating the terms after the shocks have passed.[7] The argument is even more contested when on top of mobility we introduce informality into the analysis: although salaried, informal workers lack written contracts and hence the within-firm insurance they get is limited. Moreover, given that tenure does not convey extra benefits for informal workers (e.g., seniority to qualify for pensions), few incentives are left to prevent rotations and hence wage bargaining may take place on a more frequent basis among these workers.

---

[6] See Cahuc and Zylberberg (2004) for a list of references.

[7] Beaudry and DiNardo (1991, 666) relate mobility to wage setting in a distinct but comparable manner. In a contractual economy, they associate wage variations with changes in unemployment and outside options rather than productivity to define the market conditions at the time of setting a labor contract: "With limited mobility, contract wages are negotiated once at the beginning of the contract, and hence labor market conditions at the time of the contract matter. When workers are mobile, wages are negotiated at the beginning of the contract, but when economic conditions improve, they must be revised upward to prevent the worker from being bid away by other firms."

Whereas theoretical contributions addressing these or closely related issues are not new (Rosen 1985; Malcomson 1999; and in general the review in Chapter 6 of Cahuc and Zylberberg 2004), related applied literature exploiting mobility as an argument to distill wage–productivity elasticities is quite recent. Indeed, as Goñi-Pacchioni (2011) points out, significant efforts in the labor market literature have been devoted to finding some mechanism to improve the performance of labor market models with search frictions in order to match the business-cycle information found in the data (Haefke, Sonntag, and Van Rens 2008; Pissarides 2009; Carlsson, Messina, and Nordstrom 2011; Carneiro, Gimaraes, and Portugal 2009; Gertler and Trigari 2009; Costain and Reiter 2008; Menzio 2005; Rudanko 2008; Farmer 2006; Moen and Rosen 2006; Blanchard and Gali 2008; Hall and Milgrom 2008; Shimer 2009). Most of these contributions stress the importance of marginal workers (or equivalently, workers transiting from unemployment into employment in the flow of job creation or simply new hires) in the wage bargaining process. For instance, Pissarides (2009) shows that the job creation condition that drives the volatility of the job finding rate depends on wage bargaining in new jobs. Moreover, he claims that time-series or panel studies of the cyclical volatility of wages show considerable stickiness, but this evidence is dominated by wages in ongoing jobs and is not relevant for job creation in the search and matching model. He also claims that an examination of panel data evidence on the volatility of wages in new jobs shows that volatility is about the same as in the Nash wage equation of the canonical search and matching model. In a related vein, Haefke, Sonntag, and Van Rens (2008) find that US data are consistent with the conventional argument that wages are rigid, but only in ongoing jobs. But they also find that this is no longer the case for wages of newly hired workers or new matches. In fact, such wages, unlike aggregate ones, are volatile and respond one-to-one to changes in labor productivity.

Carlsson, Messina, and Nordstrom (2011) find that in Sweden, wages of both incumbents and new hires also depend on firms' productivity. However, after accounting for worker unobserved heterogeneity they find that the response of the wages of incumbents and new hires to productivity shocks is nonstatistically different. One reason that may drive the different outcome of Haefke, Sonntag, and Van Rens (2008) and Carlsson, Messina, and Nordstrom (2011) is the level of disaggregation of the data they exploit for the productivity variable. While the former exploit aggregate measures of productivity, the latter exploit worker-firm matched data. In that way Carlsson, Messina, and Nordstrom (2011) can control for firm fixed effects as well as workers' unobserved heterogeneity. As the authors note, recent contributions have found mixed results in similar setups: Gertler and Trigari (2009) find that once one looks at equivalent workers

within the same firm, there are no observable differences between incumbents and new hires in the response of wages to the aggregate unemployment rate in US data for 1990–96. Carneiro, Gimaraes, and Portugal (2009) also control for firm and individual fixed effects and find a higher elasticity of wages to the aggregate unemployment rate for new hires than for incumbents in Portugal for 1986–2005. However, they also find no significant differences in the wage productivity elasticities across the two groups. Goñi-Pacchioni (2011) uses productivity measures at the firm level but firm-worker unmatched datasets for Brazil and finds low wage-productivity elasticities for sector stayers but almost unitary elasticities for new hires.

We build upon these contributions and exploit the longitudinal dimension of the datasets described in Box 1.1 in Chapter 1 to compute wage indicators for three countries. The sample of countries is defined by the availability of production data at an industrial subsector level, given that our productivity measure is a simple ratio of production per worker in each industry and period.[8] Neither Bolivia nor Colombia offer such data and hence they are not included in this exercise.

As for the methodology, we exploit the dynamics of labor allocation in order to see how closely related the volatility of wages of new hired workers (or sector movers) is with volatility in productivity. Given that the volatility of wages can be driven by other factors besides factor productivity remuneration (namely, a specific worker's characteristics), our analysis is based on conditional wages. Indeed, heterogeneity among workers can arise at least in two dimensions. In the individual dimension, heterogeneity exists because workers have different characteristics. In the aggregate dimension, heterogeneity exists because wages for different groups are negotiated under different schemes along the business cycle. For instance, newly hired workers signing formal contracts will negotiate differently than those who have not signed a contract or those with already long tenures. At the same time, workers with a formal status might have bargaining powers that informal workers lack (and informal workers might renegotiate their salaries more frequently). In addition, given that our attention is mostly focused on new hires and job movers, another source of heterogeneity bias stems from the fact that newly hired workers may not be representative of the entire labor force (Table 4.2) and the com-

[8] A matched dataset for firms and workers (as in Carlsson, Messina, and Nordstrom 2011), or a dataset of firms that would allow for a finer measurement of labor productivity (as in Goñi-Pacchioni 2011), would have been desirable. However, such information is usually only available through administrative records or specialized manufacturing surveys that were either not accessible or available at the time of this study.

position of newly hired workers varies over the business cycle, as is pointed out by Haefke, Sonntag, and Van Rens (2008) and Goñi-Pacchioni (2011). Such sources of heterogeneity would generate a bias in the estimate of wage cyclicality (Solon, Barsk, and Parker 1994). We follow the approach of Haefke, Sonntag, and Van Rens (2008) to take into account individual heterogeneity and we cope with aggregate heterogeneity partly by distinguishing among mobility groups and labor sectors and partly by analyzing the wages after controlling for characteristics. Thus, the wage of an individual worker *i* of the group *j* at time *t*, depends in part on the individual characteristics of worker *i* and in part on a residual that may or may not depend on aggregate labor market conditions:[9]

$$ln(w_{it}^{j}) = ln(\hat{w}_{st}^{j}) + x'^{j}_{it}\,\beta_{t}^{j} + \psi_{it}^{j},$$

where, x'^{j}_{it} is a vector of individual characteristics (education, working experience, and their squared values), $ln(\hat{w}_{st}^{j})$ is a vector of *s* industries' fixed effects, and ψ_{it}^{j} it is the residual wage that is orthogonal to those characteristics. In other words, to obtain composition-bias corrected wages, we regress log wages on observable worker characteristics and take the average nonstochastic component (fixed effects by industry) nonattributable to workers' characteristics. We estimate this one period at a time. We refer to conditioned and unconditioned composition-bias as corrected and uncorrected specifications, respectively.

In order to relate these wage measures to annual productivity variables in several economic sectors,[10] we harmonize the frequency and sectoral scope of wages to that observed in our productivity measure. Thus, we aggregate quarterly or semiannual data on wages of workers in specific economic sectors into yearly averages for the *j* different subgroups of workers. Then we regress the logarithm of the real wage index on the logarithm of the real labor productivity:

---

[9] The subgroups account for two dimensions: employment state (salaried, formal, informal) and mobility group (sector stayers, sector new hires, job-to-job sector movers).

[10] The economic sectors considered for the computations vary according to each country. In Ecuador, 17 sectors were considered: agriculture, fisheries, mining, manufacturing, utilities (electricity, gas, and water), construction, commerce, hotels and restaurants, transportation and communication, financial sector, real estate, public sector, education, health, other services, domestic servants, and services of extraterritorial organizations. In Peru, eight sectors were considered: agriculture, fisheries, mining, manufacturing, electricity, construction, commerce, and other services. In Venezuela, 13 sectors were considered: petroleum, mining, manufacturing, electricity, construction, commerce, transportation, communication, financial sector, real estate, other services, public sector, and other.

$$ln(\hat{w}^j_{st}) = \alpha_t + \rho^j ln(\hat{w}^j_{s,t-1}) + \zeta^j ln(\tilde{A}_{st}) + \varepsilon^j_{st}, \quad (4.1)$$

where α_t and ε^j_{st} represent time fixed effects and normal i.i.d. residuals, respectively and $\tilde{X}$ denotes instrumented variable X.[11] Equation 4.1 allows for dynamics rendering short-run (ζ^j) and long-run elasticities ($\zeta^j / (1-\rho^j)$), after the degree of inertia or stickiness in wages has been captured by ρ^j.

Table 4.3 reports the estimates of Equation 4.1 for the three countries for which production data for several economic sectors are available. The exercise is carried out for the distinct mobility groups (Columns 1 to 12) and employment states (Panels A to C). Columns 1, 5, and 9 of Panel A report the results for all salaried workers without making a distinction according to their formality status or mobility group. Even after controlling by characteristics, the short-run elasticity is significant but low for Ecuador (0.15), even lower and nonsignificant for Peru (0.05), and surprisingly high but barely significant for Venezuela (0.9). Looking at the memory of the income process we notice that on average persistence is low in Ecuador and Venezuela but very high in Peru. At this very aggregate level it seems that income persistence should have more of an influence on wages of Peruvian workers. Productivity plays the most significant role among Venezuelan workers, while Ecuadoreans incomes are influenced by a mix of these effects. These results can be refined by constraining the sample of workers employed in the estimation of wage aggregates.

A first refinement is done by constraining the sample according to the formality status. Those results are reported under the same columns (1, 5, and 9) but in different panels (B and C). The rationale behind this is that productivity measured the way we do it is most likely picking up the effect of mostly formal production. For instance, it is well known that manufacturing GDP is usually computed by quarterly surveys of the biggest manufacturing firms of several industries. Given that formal firms would mostly hire formal workers, Panel B of our computations should contain the less-biased estimates due to this sort of measurement error. Panel C reports the results after regressing wage measures of exclusively informal workers with the aggregate measures of productivity. This is done because although the productivity measures are most likely to be concentrated in formal firms, the concentration of informal workers at those firms is still far from trivial, and so there is reason to have a rough estimate of the elasticities for these workers based on our inputs. Our prior is that the elasticities measured for the sample of formal workers should

[11] In order to cope with potential endogeneity issues, internal instruments are used in all the cases.

TABLE 4.3 | Wage Productivity Elasticity

	Ecuador				Peru				Venezuela			
	All (1)	New Hires (2)	Movers (3)	Stayers (4)	All (5)	New Hires (6)	Movers (7)	Stayers (8)	All (9)	New Hires (10)	Movers (11)	Stayers (12)
A. Salaried												
Memory	0.268**	0.223**	0.241**	0.570***	0.771***	−0.091	0.757***	0.426***	0.168*	0.320***	0.274**	0.076
	[0.128]	[0.091]	[0.118]	[0.147]	[0.099]	[0.128]	[0.101]	[0.084]	[0.101]	[0.039]	[0.108]	[0.086]
Elasticity	0.153***	0.084*	0.155***	0.131*	0.047	0.245***	0.051	0.175***	0.908*	−0.068	0.707**	1.246*
	[0.040]	[0.047]	[0.041]	[0.070]	[0.032]	[0.083]	[0.033]	[0.033]	[0.487]	[0.406]	[0.350]	[0.744]
LR Elasticity	0.209	0.108	0.204	0.305	0.205	0.225	0.210	0.305	1.091	−0.088	0.974	1.348
Observations	154	122	154	154	63	60	63	63	72	72	72	72
R2	0.83	0.39	0.84	0.50	0.8	0.17	0.79	0.64	0.71	0.62	0.74	0.76
B. Formal												
Memory	0.148	0.043	0.128	0.849	0.698***	−0.088	0.502***	0.144	0.183**	0.365***	0.278***	0.068
	[0.107]	[0.119]	[0.094]	[0.531]	[0.114]	[0.114]	[0.091]	[0.108]	[0.081]	[0.091]	[0.090]	[0.084]
Elasticity	0.243***	0.643	0.237***	0.205	0.057	0.457**	0.112**	0.166***	1.125*	0.105	0.947**	1.291
	[0.054]	[0.438]	[0.048]	[0.133]	[0.050]	[0.217]	[0.048]	[0.063]	[0.665]	[0.617]	[0.467]	[0.940]
LR Elasticity	0.285	0.672	0.272	1.358	0.189	0.423	0.225	0.194	1.377	0.165	1.312	1.385
Observations	154	55	154	149	63	42	63	54	72	72	72	72
R2	0.39	0.9	0.48	0.13	0.51	0.03	0.44	0.19	0.6	0.61	0.81	0.69

(continued on next page)

TABLE 4.3 | Wage Productivity Elasticity (*continued*)

	Ecuador				Peru				Venezuela			
	All (1)	New Hires (2)	Movers (3)	Stayers (4)	All (5)	New Hires (6)	Movers (7)	Stayers (8)	All (9)	New Hires (10)	Movers (11)	Stayers (12)
C. Informal												
Memory	0.303**	−0.012	0.284**	0.096	0.452***	−0.191	0.481***	0.044	0.178	−0.142***	0.073	0.364***
	[0.126]	[0.085]	[0.121]	[0.079]	[0.113]	[0.174]	[0.104]	[0.092]	[0.129]	[0.051]	[0.182]	[0.097]
Elasticity	0.097***	0.02	0.098**	0.121***	0.101**	0.243***	0.009**	0.192***	0.216	−0.404	0.339*	0.276
	[0.033]	[0.037]	[0.037]	[0.034]	[0.044]	[0.078]	[0.039]	[0.056]	[0.155]	[0.435]	[0.192]	[0.180]
LR Elasticity	0.139	0.02	0.137	0.134	0.184	0.204	0.191	0.201	0.263	−0.351	0.366	0.434
Observations	154	115	154	132	63	59	63	60	72	72	72	70
R2	0.92	0.59	0.92	0.42	0.53	0.16	0.55	0.19	0.34	0.36	0.13	0.60

Source: National labor surveys. For details see Box 1.1.
Note: Instrumental Variable estimation (productivity is internally instrumented with its first lag). Robust standard errors are in brackets. LR=long run.* significant at 10%; ** significant at 5%; *** significant at 1%.

be higher than the aggregate and much higher than the elasticities measured with just informal salaried workers. Results of Table 4.3 in general confirm our prior. Short-run elasticities for just formal workers jump from 0.15 to 0.24 and from 0.9 to 1.1 for Ecuador and Venezuela, respectively, preserving their significance. They fall to 0.09 in Ecuador and to 0.2 (but nonsignificant) in Venezuela for the sample of informal workers. In Peru, the elasticity becomes significant but it is still low (0.1).

A second refinement is done by constraining the sample according to the mobility group. Thus, looking at Panel A, we now observe the estimates reported in the remaining columns (all but 1, 5, and 9). Columns 2, 6, and 10 report results after regressing wage measures of exclusively new hires, Columns 3, 7, and 11 do the same for sector movers, and Columns 4, 8, and 12 for sector stayers. Table 4.3 shows that without making distinctions between formal or informal workers, among all salaried workers the groups with the highest short-run elasticities are sector movers, new hires, and sector stayers for Ecuador, Peru, and Venezuela, respectively. Although barely significant, the result for Venezuela seems at odds with our priors. This result is probably driven by the bias induced after collapsing to formal and informal salaried workers into a single sample.

A third refinement is done by constraining the sample according to both formality status and mobility group. Results are reported in Panels B and C and all columns except 1, 5, and 9. The estimates shown for formal workers are the less biased due to measurement error among all the results reported in Table 4.3. Estimates in Panel B show that the highest significant short-run elasticities are those observed for new hires in Peru (0.5) and for sector movers in Ecuador (0.24) and in Venezuela (0.9). Sector stayers, in contrast, display either low or nonsignificant results. Estimates reported in Panel C most likely suffer from measurement errors and that could be one of the reasons why the elasticities are low for any mobility group.[12]

In summary, the exercise reported in this section finds that productivity shocks translate into wage adjustments at different intensities according to the mobility and formality of workers. Among formal workers, those coming

[12] We also attempted to acknowledge that asymmetric responses of wages can occur after positive and negative shocks. That is, downward wage rigidities after productivity shocks are more binding than upward adjustments at distinct phases of the cycle. The dimensionality of our data restricted our analysis once more, as too few periods (not enough to go beyond a whole cycle) are available. Indeed, we only have two years of crisis (2008 and 2009) that do not confer enough degrees of freedom to perform a reliable test. Aware of this caveat (and given that we still have some cross-sectional variation to exploit in those two periods) we did the analysis and found nothing significant.

from unemployment and those moving across sectors are more sensitive to productivity changes than those remaining in the same state of employment. As suggested earlier, the insurance provided through contracts within firms seems to operate well among formal workers who remain formal. Notice again that even under the eventual presence of omission bias (as not all sector stayers are job stayers), it is still possible to argue in favor of our estimates, as they confer upper bounds for the elasticity estimates of stayers.[13]

Income Risk: The Permanency of Income Shocks across Different Groups of Workers

According to the findings reported in the previous section, income shocks do arrive and the degree of exposure to them seems to be directly correlated to mobility, at least on spot. However, income shocks do not fade away after impact, they can persist for several periods. Moreover, the degree of persistence can be stronger for more vulnerable groups of workers: workers endowed with less-favorable characteristics like less education, less experience, informal jobs, etc. may take longer to work through shocks than those with better characteristics. Similarly, workers moving across employment sectors (resetting contracts or work arrangements) are more likely to be affected by unexpected shocks.

From a welfare perspective, permanent shocks are of greater concern, as temporary shocks can be mitigated without affecting the whole stream of future incomes. In other words, while transitory risks are insurable, permanent shocks are not. As Krebs, Krishna, and Maloney (2010, 2) argue, "the distinction between transitory and persistent income shock is important since workers can effectively *self-insure* against transitory shocks through borrowing or own savings, which implies that the effect of these types of shocks on workers' consumption and welfare are quite small (Aiyagari 1994; Heaton and Lucas 1996; Levine and Zame 2002). In contrast, highly persistent or permanent income shocks have a substantial effect on the present value of future earnings, and therefore lead to significant changes in consumption even if workers can borrow or have own

[13] Without loss of generality, let's take the case of sector stayers in a static version of Equation 4.1. Under the assumption that the parametrical elasticity ζ^s for just job stayers (not sector stayers) is lower than the elasticity ζ^m for just job movers (not sector movers), the omission of a dummy interacted term (where the dummy would control for a job mover and would be interacted with the productivity measure) in the regression for sector stayers would render a bias equal to the differential between ζ^m and ζ^s (which is positive) times a semi-definite positive matrix, provided that the productivity term is well behaved and free of any issue leading to inconsistency.

savings (Constantinides and Duffie 1996; Krebs 2003a, 2003b, 2004). Thus, from a welfare point of view, persistent income shocks matter the most."

This section studies the persistence of income shocks, paying special attention to the differences observed across different groups of workers. In doing so, it provides a quantification of the permanent and transitory components of the volatility of income shocks for such groups of workers.

As in the previous section, we posit a Mincerian model for the conditional mean of log earnings:

$$ln(w_{it}^{j}) = ln(\hat{w}_{st}^{j}) + x'^{j}_{it}\beta_{t}^{j} + \psi_{it}^{j}, \tag{4.2}$$

where we use the same notation as before and x'^{j}_{it} contains the same set of characteristics as before. In this case j does not include the group of newly hired workers, as our observed unit is now an individual per month rather than an industry by year and hence we cannot follow the wages of newly hired before hiring workers. We also disregard time or industry fixed effects as we run the model for each available section.

We follow by-now-standard approaches to define an income process with persistence (Meghir and Pistaferri 2004; Storesletten, Telmer, and Yaron 2004; Krebs 2004) and then we compute the values of the variance of the permanent and transitory shocks using the Carroll and Samwick (1997) projection methodology. In particular, we assume that, ψ_{it}^{j} the unpredictable component defining the observed income, can be decomposed into a Martingale permanent component p_{it}^{j} and a transitory innovation with low persistence ξ_{it}^{j}, that is:

$$\begin{aligned} \psi_{it}^{j} &= p_{it}^{j} + \xi_{it}^{j} \quad . \\ p_{it}^{j} &= p_{i,t-1}^{j} + \eta_{it}^{j} \end{aligned}$$

With this in mind, we compute the d period difference of the unpredictable term. A d period difference is feasible since the longitudinal data for all countries is collected at more than a single period. The more waves a panel has for the same individuals, the more d differences we are able to compute. Notice that in order to identify the permanent component (that is, in order to dissect the variance of the unexpected shocks into a part that fades away and a portion that remains) it is necessary to count on at least two periods for which we can compute the d difference. This is because the transitory component will vanish in a single period whereas the persistent term will persist across all available periods. Formally, the decomposition exploits the $I(1)$ process of the permanent component and is conducted as follows:

$$\Delta^d \psi_{it}^j = \psi_{i,t+d}^j - \psi_{i,t}^j = p_{i,t+d}^j + \xi_{i,t+d}^j - p_{it}^j - \xi_{it}^j \quad . \tag{4.3}$$

$$\Delta^d \psi_{it}^j = \left\{ \eta_{i,t+1}^j + \eta_{i,t+2}^j + ... + \eta_{i,t+d}^j \right\} + \xi_{i,t+d}^j - \xi_{it}^j$$

$$Var\left(\Delta^d \psi_{it}^j\right) = d_{it}\sigma_{\eta^j}^2 + 2_{it}\sigma_{\xi^j}^2$$

Tables 4.4 and 4.5 report the estimates for the permanent $\sigma_{\eta^j}^2$ and transitory $\sigma_{\xi^j}^2$ components of the income variance modeled in Equation 4.3.

Table 4.4 reports the estimates for all workers (Panel A) and for workers grouped according to their employment states (Panel B) and their mobility (Panel C). Many common patterns are observed across countries. First, results shown in Panel A reveal that most of the variation of the unexpected income shocks seems attributable to transitory shocks (they are 5 to 10 times stronger than those coming from permanent shocks). This is consistent with findings for other countries in Latin America.[14] Notice, however, that some of the dominant magnitudes of the variances of transitory income are attributable to measurement errors in income. In order to pin down the exact contribution of the transitory component and filter it from the pure measurement error, Meghir and Pistaferri (2004) suggest external estimates of the measurement error,[15] which are not available in our case and hence we just make the disclaimer here and leave further refinements for future research.[16]

Second, after constraining the sample according to formality (Panel B), the dominance of the transitory component is still evident, yet risk mitigation starts to manifest by reducing the distance between permanent and transitory effects among formal workers. Both permanent and transitory components are adjusted: upward for groups exposed to greater income risk, and downward for groups better insured against such risk. For instance, a systematic pattern observed across all countries is that the transitory component is greater for self-employed than for salaried workers. It is also observed that formal employees have a lower transitory component than workers in any other state of employment. In all countries, the self-employed bear income shocks whose transitory component is about four times that observed among formal

[14] For Argentina and Mexico, see Krebs, Krishna, and Maloney (2010); for Brazil, see Goñi-Pacchioni (2011).

[15] For instance, they use a validation of the Current Population Survey earnings data by Bound and Krueger (1994) and a Panel Study of Income Dynamics validation study by Bound, Brown, Duncan, and Rodgers (1994).

[16] Assuming an invertible *MA*(1) process for the transitory shock, Meghir and Pistaferri (2004) also show the use of the eventually biased point estimates for the variances of the transitory income shocks, provided that it is possible to obtain bounds for the unidentified measures.

TABLE 4.4 | Variance Decomposition of Income Shocks according to State of Employment and Mobility

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Permanent (1)	Transitory (2)	Obs./R2 (3)	Permanent (4)	Transitory (5)	Obs./R2 (6)	Permanent (7)	Transitory (8)	Obs./R2 (9)	Permanent (10)	Transitory (11)	Obs./R2 (12)	Permanent (13)	Transitory (14)	Obs./R2 (15)
A. All															
Conditional	0.019***	0.201***	25,258	0.039***	0.194***	7,015	0.019***	0.192***	104,856	0.065***	0.286***	52,783	0.014***	0.104***	1,048,450
	[0.003]	[0.005]	0.241	[0.012]	[0.013]	0.178	[0.002]	[0.003]	0.205	[0.008]	[0.007]	0.192	[0.000]	[0.000]	0.202
B. By Formality															
Informal	0.009*	0.122***	6,379	0.086**	0.091**	490	0.017***	0.128***	25,868	0.041***	0.195***	11,278	0.016***	0.089***	99,900
	[0.004]	[0.006]	0.202	[0.040]	[0.039]	0.142	[0.003]	[0.004]	0.186	[0.013]	[0.011]	0.168	[0.001]	[0.001]	0.22
Formal	0.009*	0.063***	3,430	0.020*	0.086***	2,306	0.009***	0.084***	29,154	0.031***	0.083***	8,410	0.006***	0.045***	348,884
	[0.004]	[0.006]	0.158	[0.012]	[0.012]	0.132	[0.002]	[0.003]	0.137	[0.008]	[0.007]	0.139	[0.000]	[0.000]	0.135
Self-Employed	0.025***	0.287***	10,749	0.047	0.302***	1,394	0.019***	0.318***	28,527	0.084***	0.364***	19,512	0.016***	0.146***	301,255
	[0.006]	[0.009]	0.300	[0.032]	[0.034]	0.257	[0.004]	[0.007]	0.284	[0.015]	[0.013]	0.239	[0.001]	[0.001]	0.256
C. By Mobility															
Stayer	0.014**	0.211***	13,409	0.046***	0.140***	2,919	0.014***	0.188***	63,953	0.063***	0.240***	26,399	0.008***	0.087***	363,743
	[0.005]	[0.007]	0.238	[0.015]	[0.014]	0.196	[0.002]	[0.004]	0.199	[0.011]	[0.009]	0.18	[0.000]	[0.001]	0.175
Mover	0.008	0.230***	3,940	0.015	0.263***	2,816	0.021***	0.286***	14,910	−0.021	0.485***	12,095	0.014***	0.140***	286,291
	[0.009]	[0.013]	0.258	[0.023]	[0.024]	0.183	[0.006]	[0.010]	0.264	[0.021]	[0.019]	0.229	[0.001]	[0.001]	0.236

Source: National labor surveys. For details see Box 1.1.
Note: Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

workers and about twice that observed among informal salaried workers.[17] More importantly, the permanent component of the income shock volatility for formal salaried workers is far lower than that observed among informal salaried or among self-employed workers. Indeed, with the exception of Bolivia, where there is a very close resemblance between the permanent components of the salaried workers (formal and informal), the permanent component of formal salaried income shock volatility is lower than that observed among informal salaried workers across all Andean countries. The permanent component of the variance of self-employed earnings is not necessarily higher than the corresponding figure for informal workers. Only Bolivia and Peru display such a pattern. In the case of Colombia, nothing conclusive can be reported as the estimate appears to be nonsignificant, whereas in Ecuador and Venezuela the permanent component for informal salaried workers is similar to that for the self-employed. This last finding is interesting because the insurance against unexpected income variation that salaried (even informal) workers have is clearly reducing the permanency of shocks among formal workers but not necessarily among informal workers when compared to the self-employed.

Third, when grouping workers according to their mobility (Panel C), we observe patterns consistent with the previous results (less risk exposure among more stable workers). For instance, whenever significant, variance of the permanent component of the income shocks of workers staying in the same employment state is lower than that of those moving across states (by half as much for Ecuador and Venezuela). Variance of the transitory component for sector stayers is also noticeably lower than that of sector movers in all the countries in the sample with the exception of Bolivia, where it is just slightly lower. Thus, as far as our two most important groups are concerned (mobility and formality groups), we find a consistent and systematic pattern across the region suggesting less permanent income risk for formal workers and for workers staying in their employment sector. Notice also that between these two characteristics (formal and stayer), being formal is evidently less risky (as stayers encompass informal and self-employed workers, whereas formal encompasses formal stayers and movers flowing toward formality).

A similar analysis can be done for groups assembled according to other criteria. Table 4.5 reports the results for workers grouped according to their age, education, income, and gender. Panel A shows that younger workers are

[17] In Colombia, three times that observed among informal salaried workers.

more exposed to uninsurable permanent risks, whereas older workers are more exposed to transitory diversifiable risks (except in Peru). As was shown in Chapter 2, along the life cycle it is more likely to observe older workers in self-employment than in any other employment state. Along with the finding shown in Table 4.4 about higher transitory risks for the self-employed, this is consistent with the fact that older workers are exposed to more transitory shocks.

Panel B reports results according to workers' educational attainment. Against a backdrop of findings in the empirical literature for the United States (Meghir and Pistaferi 2004), we observe that less-educated workers are not necessarily more exposed to permanent risks. Peru is the only case where we can clearly observe that workers who are high school graduates (or with higher educational attainment) are exposed to less permanent shocks than those with less education. In Ecuador and Venezuela, results lean slightly toward higher variances of permanent incomes among the educated, while the variance of permanent shocks for less-educated controls in Bolivia and Colombia are nonsignificant. However, regarding transitory shocks, less-educated workers are clearly more exposed to diversifiable short-term risks.

Panel C reports results for workers in different quintiles of the income distribution. It shows that when significant, variance of shocks to permanent income appears to be higher for low-income workers than for middle- or high-income workers. It also shows that richer workers display higher permanent risks than middle-income ones. The variance of the transitory incomes depicts, in general, quite similar patterns. It is worth noting that the quintile of reference for this exercise is the one observed at the arrival state. Income mobility may in part drive some of the results—that is, low-income workers becoming rich or more likely high-income workers becoming middle-income may be in part responsible for the higher volatility in permanent shocks observed for earnings of richer compared to middle-income earners.[18]

Finally, Panel D reports results by gender. In general, both variances of permanent and transitory incomes are higher for females. Two cases are interesting to note: first, only Colombian male workers are subject to higher permanent income risks than female workers. Second, Peruvian female workers are subject to permanent income risk that is about 75% higher than that for male workers, an income risk gap much wider than in any other country in the region.

---

[18] For a recent study about nonanonymous growth incidence curves in Andean countries addressing income mobility see Araar (2011).

TABLE 4.5 | Variance Decomposition of Income Shocks according to Age, Education, Income, and Gender

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Permanent (1)	Transitory (2)	Obs./R^2 (3)	Permanent (4)	Transitory (5)	Obs./R^2 (6)	Permanent (7)	Transitory (8)	Obs./R^2 (9)	Permanent (10)	Transitory (11)	Obs./R^2 (12)	Permanent (13)	Transitory (14)	Obs./R^2 (15)
A. By Age															
<= 25	0.007	0.164***	3,944	−0.008	0.225***	982	0.025***	0.152***	17,028	0.095***	0.322***	7,134	0.024***	0.098***	127,378
	[0.007]	[0.009]	0.242	[0.042]	[0.038]	0.138	[0.004]	[0.006]	0.195	[0.026]	[0.021]	0.217	[0.001]	[0.001]	0.219
26 to 45	0.019***	0.187***	12,669	0.033**	0.170***	3,258	0.020***	0.185***	53,774	0.068***	0.267***	26,807	0.014***	0.098***	543,377
	[0.005]	[0.006]	0.234	[0.016]	[0.016]	0.18	[0.002]	[0.004]	0.207	[0.012]	[0.010]	0.182	[0.000]	[0.001]	0.192
46 to 65	0.009	0.243***	7,622	0.031	0.243***	1,818	0.013***	0.230***	30,087	0.055***	0.307***	14,580	0.013***	0.113***	292,043
	[0.007]	[0.009]	0.26	[0.027]	[0.027]	0.209	[0.004]	[0.006]	0.215	[0.016]	[0.014]	0.199	[0.000]	[0.001]	0.207
B. By Education															
Less than High School Graduate	0.013*	0.230***	12,417	0.03	0.205***	2,175	0.017***	0.200***	68,672	0.066***	0.336***	19,398	0.013***	0.112***	550,366
	[0.005]	[0.007]	0.252	[0.024]	[0.026]	0.154	[0.002]	[0.004]	0.212	[0.014]	[0.012]	0.221	[0.000]	[0.001]	0.216
High School Graduate or higher	0.023***	0.164***	11,295	0.045**	0.166***	3,414	0.019***	0.146***	27,848	0.058***	0.249***	30,304	0.015***	0.084***	415,384
	[0.004]	[0.006]	0.23	[0.018]	[0.017]	0.159	[0.003]	[0.005]	0.165	[0.010]	[0.009]	0.169	[0.000]	[0.001]	0.17

(continued on next page)

TABLE 4.5 | Variance Decomposition of Income Shocks according to Age, Education, Income, and Gender (*continued*)

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Permanent (1)	Transitory (2)	Obs./R^2 (3)	Permanent (4)	Transitory (5)	Obs./R^2 (6)	Permanent (7)	Transitory (8)	Obs./R^2 (9)	Permanent (10)	Transitory (11)	Obs./R^2 (12)	Permanent (13)	Transitory (14)	Obs./R^2 (15)
C. By Quintile															
Bottom	−0.000	0.098***	3,440	0.03	0.185***	470	0.008**	0.131***	7,518	0.017	0.203***	2,011	0.009***	0.078***	110,097
	[0.006]	[0.008]	0.136	[0.046]	[0.046]	0.172	[0.003]	[0.005]	0.315	[0.019]	[0.016]	0.347	[0.000]	[0.001]	0.314
Middle	−0.001*	0.013***	1,678	0.001	0.042**	482	0.001***	0.007***	8,433	0.002**	0.016***	3,794	0.000***	0.005***	65,541
	[0.0004]	[0.001]	0.463	[0.019]	[0.019]	0.047	[0.000]	[0.000]	0.366	[0.001]	[0.001]	0.361	[0.000]	[0.000]	0.383
Top	0.026*	0.227***	2,910	0.088***	0.066**	522	0.004***	0.045***	12,871	0.013***	0.040***	8,058	0.003***	0.030***	107,772
	[0.011]	[0.015]	0.255	[0.028]	[0.026]	0.214	[0.001]	[0.002]	0.295	[0.003]	[0.002]	0.265	[0.000]	[0.000]	0.306
D. By Gender															
Female	0.020***	0.244***	10,217	0.039*	0.202***	2,804	0.021***	0.202***	38,912	0.093***	0.317***	21,443	0.017***	0.100***	406,955
	[0.006]	[0.008]	0.263	[0.021]	[0.020]	0.183	[0.003]	[0.005]	0.21	[0.014]	[0.012]	0.213	[0.000]	[0.001]	0.197
Male	0.018***	0.166***	15,133	0.045***	0.182***	3,830	0.017***	0.186***	65,944	0.047***	0.264***	31,165	0.012***	0.106***	635,730
	[0.004]	[0.005]	0.241	[0.017]	[0.017]	0.169	[0.002]	[0.004]	0.204	[0.010]	[0.009]	0.178	[0.000]	[0.001]	0.205

Source: National labor surveys. For details see Box 1.1.
Note: Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Besides their contribution to identifying and measuring permanent income shocks and their volatility, and the consequent implications for income risk and welfare, all of these findings open an interesting discussion related to precautionary savings. Ultimately, informality is in part the outcome of a voluntary and rational decision by workers (Perry et al. 2007) regarding their savings for nonworking age. Carroll and Samwick (1997) show that wealth holdings should be highly sensitive to the degree of uncertainty of permanent income. They argue that when consumers engage in "buffer-stock" saving over most of their lifetimes, the sensitivity of wealth to uncertainty is low. This is because buffer-stock savers have an effective horizon of only a few years, while consumers actively engaged in retirement saving have an effective horizon that lasts the remainder of their lifetimes. A natural extension of this section would incorporate an analysis relating buffer stock and retirement savings of workers in distinct employment states with the uncertainty measures generated in this chapter.[19]

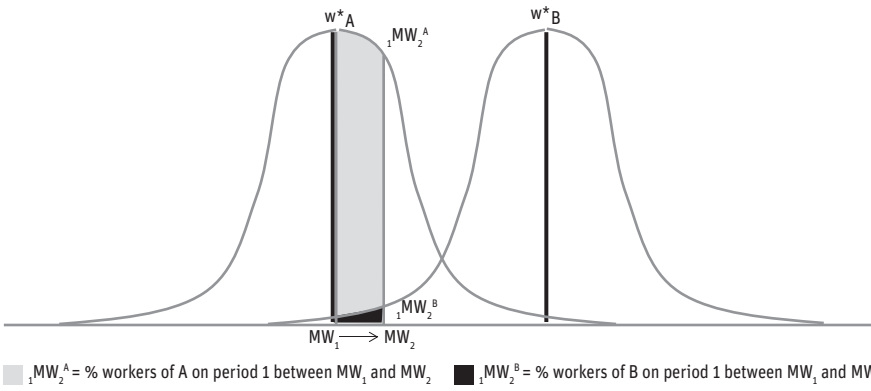
Effects of Minimum Wages on Income Distribution and Mobility Risk

Chapter 3 studied the dynamic of workers flowing across different states of employment. Several impulses may generate these types of responses among both employers and employees. For instance, stringent labor regulations aimed at protecting workers and improving their nonwage benefits could generate strong incentives for firms not to hire formally or to move to informal arrangements with their less productive workers. Higher severance payments may also have pervasive effects both in terms of preventing firms from enhancing formal hiring and, worse, preventing them from destroying unproductive matches. This chapter has been devoted to the study of some of the implications of these dynamics for the income distribution of workers. This section examines the effects of changes in minimum wages on the probability of transitions of workers across employment states based on their position in the income distribution.

The intuition of the approach is sketched in Figure 4.2, which shows the income distribution of two cities in the same country where there is a change in the minimum wage—that is, minimum wage changes from MW_1 in period 1 to MW_2 in period 2. Assuming that the distributions are centered around very distanced means (say, for instance, that city *A* is rural whereas

[19] Krebs and Yaoy (2009), using a similar approach, find that social security systems such as unemployment insurance and pensions could reduce the income risks of individuals in Germany.

FIGURE 4.2 | Exposure to Minimum Wage Changes



Source: Author's own elaboration.

city *B* is urban) and that there are not multiple minimum wages across cities,[20] then an increase in minimum wages would distinctly affect firms and workers operating in these two cities. For a city like *B*, where the minimum wage is not binding, a small fraction of employees would be affected by the increase. The black area ($_1MW_2^B$) in the figure represents the mass of workers whose incomes lie between the old and the new minimum wage. The increase of their incomes (to be legally hired with at least a minimum wage) would be economically justified if, measured in real terms, there were a corresponding increase in those workers' productivity. If not, firms may have reasonable incentives to fire the worker or retain the worker informally. In any case, cities like *B* are not the real problem, as the mass of workers facing the situation is negligible. The flows (separations to unemployment or transitions to informality) will be more intense in cities like *A*, where the gray area ($_1MW_2^A$) is non-negligible.

Thus we exploit the variation across cities in the mass of workers with incomes above the minimum wage during the current period but below the minimum wage during the next period in order to explain the probability of transiting across employment states for all workers in each city. The higher the mass of workers between minimum wages, the more likely we expect to see workers transiting to informality, the less likely we expect to see workers transiting to formality, and the more likely we expect to see workers staying in informality. Equation 4.4 formally states this:

[20] This is the case for all the countries for which we can run the exercise.

$$pr(tr)_i = \alpha + \beta\left({}_1 MW_2^i\right) + \varepsilon_i. \tag{4.4}$$

Table 4.6 shows the results after estimating Equation 4.4 for Ecuador, Peru, and Venezuela. The table reports the estimated values of β. There are virtually no effects of minimum wage adjustments on job finding rates in any sector or country save for Ecuadorean formal posts. In that case, the more exposed a city is to changes in the minimum wage (that is, cities with a larger mass of workers between the old and new minimum wage), the lower the probability of finding a job in the formal sector in that city. Separation rates react in the informal sector (salaried and nonsalaried) in Venezuela: more exposed cities evidence a lower chance to transit from the informal sector to unemployment. More interestingly, the sensitivity of flows from salaried formality and informality after the minimum wage adjustment suggests that firms and workers react by beefing up the informal sector. In Ecuador, the more exposed cities experience informalization of their labor force. In the three countries (notably even in Peru, where in general minimum wages are not binding for the formal sector as is again confirmed in Table 4.6), more exposed cities increase the probability of keeping workers in the informal sector. In Venezuela, flows from the informal to the formal sector in exposed cities decline dramatically.

To the best of our knowledge this is the first attempt to conduct an exercise of this nature in an economy with high informality. Similar exercises have been carried out for the United States (Abowd et al. 1999), France (Kramarz and Philippon 2001), and Portugal (Portugal and Cardoso 2001) to show the effects of minimum wage adjustments on work separations and job permanency.

Conclusions and Policy Recommendations

Dynamic labor informality translates not only into employment mobility risk (as was discussed in Chapter 3) but also into income risk. That is, mobility of workers generates uncertainty about post-retirement protection (pensions) but also uncertainty about pre-retirement incomes. By uncertainty about pre-retirement incomes we are not referring to (static) income insecurity due to low current labor remuneration as was addressed in Chapter 2. Instead we mean exposure to higher unexpected volatility of future incomes for workers who are more transient (especially toward informality). In other words, income risk arises because shocks that relocate workers and firms from one state of employment to another can come at any time, and the uncertainty prompted by those unexpected transitions translates into unexpected changes

TABLE 4.6 | Impact of Minimum Wage Changes on Transition Probabilities

Transition	Ecuador	Peru	Venezuela
U to U	0.226 [0.201]	0.278 [0.242]	0.017 [0.374]
U to SE	–0.597 [0.812]	–0.047 [0.334]	–0.176 [0.307]
U to I	–0.105 [0.268]	–0.218 [0.181]	0.391 [0.377]
U to F	–1.746*** [0.494]	–0.630 [0.667]	–0.712 [0.417]
SE to U	–0.568 [0.401]	0.655** [0.295]	–0.807** [0.304]
SE to SE	0.016 [0.044]	–0.020 [0.025]	0.070 [0.07]
SE to I	–0.106 [0.325]	0.054 [0.118]	0.050 [0.483]
SE to F	0.344 [0.506]	–0.224 [0.461]	–0.811* [0.403]
I to U	0.030 [0.356]	–0.352 [0.265]	–0.756** [0.351]
I to SE	–0.474** [0.19]	–0.236 [0.193]	–0.306 [0.393]
I to I	0.211*** [0.074]	0.090** [0.041]	0.521*** [0.14]
I to F	–0.268 [0.221]	0.171 [0.341]	–0.739*** [0.212]
F to U	–0.121 [0.815]	–0.224 [0.752]	–0.989 [0.618]
F to SE	–0.755* [0.364]	0.150 [0.227]	–0.552 [0.611]
F to I	0.784* [0.403]	–0.292 [0.434]	–0.052 [0.446]
F to F	–0.028 [0.038]	0.025 [0.063]	0.033 [0.067]

Source: National labor surveys. For details see Box 1.1.
Note: Robust standard errors are in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. The minimum wage adjustments considered in the estimations are those taking place from 2004 to 2010 in Ecuador (seven adjustments); in 2000, 2004, 2006, and 2008 in Peru; and from 2006 to 2010 in Venezuela (three annual adjustments between 2006 and 2008 and four biannual adjustments between 2009 and 2010). Years during which the minimum wage remained unchanged are not included in the estimations. U = unemployed; SE = self-employed; I = informal salaried; F = formal salaried.

in wages. In this sense, the relevance of income volatility is apparent because a benchmark regarding how likely (erratic) labor remuneration will be after such displacements is valuable for the wage-setting and bargaining process to show how low or high (on average) such remunerations might be.

After presenting a brief overview of the labor force according to distinct mobility groups,[21] this chapter provided an empirical assessment of the effects of worker flows on worker incomes and the effect of minimum wage adjustments on worker flows.

The chapter first explored the role of labor mobility in wage setting in the formal sector by computing the pass-through of aggregate productivity shocks to wages and earnings for distinct workers grouped according to mobility and formality. While the relation between productivity and wages is weaker for incumbent formal workers who do not transit across employment states (as suggested before, the insurance provided through contracts within firms seems to operate well among formal workers who remain formal), we find that the competitive model prescriptions correlating wages to productivity hold for entrant workers into the formal sector (either entering from unemployment or moving from the informal sector). Hence, evidence confirms that income shocks do arrive and that the degree of exposure to them seems to be directly correlated to mobility, at least on spot.

However, income shocks do not fade away after impact, they can persist for several periods. The second exercise accounted for this by showing that the degree of persistence can be stronger for more vulnerable groups of workers, including those with less education, less experience, informal jobs, etc. It may take longer for these vulnerable groups to work through such shocks. Similarly, workers moving across employment sectors and renegotiating work arrangements may also be strongly affected by unexpected shocks. We find that (1) most of the variation in unexpected income shocks seems attributable to transitory shocks (they are five to 10 times stronger than those coming from permanent shocks); (2) formal employees have a lower transitory component than workers in any other state of employment (the self-employed bear income shocks whose

[21] Mobility status is defined after comparing the state of employment of a worker in two consecutive periods of time. For instance, new hires (or entrants from unemployment) are those workers who became employed (either formal, informal, or independent) exclusively from the unemployment state. Movers are those workers who are employed in the observed period and were also employed in the preceding period, but at distinct employment states (for instance, workers moving from informal salaried to formal salaried jobs or from formal salaried to independent jobs would be classified as movers). Stayers are those employed workers who are observed in the same employment sector during the two periods under comparison.

transitory component is about four times that observed among formal workers and about twice that of informal salaried workers); and (3) the permanent component of the income shock volatility for formal salaried workers is far lower than that observed among informal salaried or self-employed workers. We also find that the variance of the permanent component of the income shocks of workers staying in the same employment state is lower than that of those moving across states. Hence, evidence suggests that the more transient or informal workers are, the higher the permanent income risk they will face.

But the reverse transmission mechanism is also relevant: changes in salary policies can influence worker flows. Our third exercise studied the impact of minimum wage adjustments on worker displacements. We found that cities concentrating more workers with earnings close to the minimum wage tend to displace formal workers to the informal sector after increases in the minimum wage. Given that in some cases the institutional arrangements to adjust the minimum wage do not exclusively follow indexation to the evolution of fundamental factors (such as productivity gains), one prescription of this chapter is to acknowledge the pervasive effects that discretionary minimum wage increases would have on labor outcomes. This chapter contributes with some actual estimates of these effects.

In terms of income risk, conventional insurance mechanisms against pre-retirement income risk for formal salaried workers take the form of precautionary savings, within-the-firm risk pooling, outside-the-firm conventional insurance, and strengthening of social networks. Availability and access to these instruments and exposure to financial literacy are important conditions to facilitate the use of such instruments. However, informal salaried and self-employed workers usually cannot afford (or get access to) these conventional mechanisms (aside from strengthening social networks). Worse, as in the case for post-retirement risk, these workers usually fail to properly assess pre-retirement risks and thus fail to foresee the magnitude of their exposure to them. Hence they end up coping with risks after the fact (liquidating assets, seeking emergency liquidity and loans, removing children from school, sending other household members to employment, migrating, etc.).

As is prescribed in Bendokat and Tovo (1999) and Hetizmann, Sudharshan, and Siegel (2002), besides the aforementioned informal/private risk management arrangements, there are public mechanisms such as regional social funds, food and emergency aid funds, etc. that can help people cope with these risks and protect human and economic capital in the face of shocks. However, as these studies note, the priority should be on prevention (investment in education, infrastructure, and institutions oriented to the lower-income population) and

mitigation (through contributory and noncontributory social insurance). This chapter has contributed to the discussion with quantitative measures that enable us to recognize and distinguish among the permanent and transitory income risks that affect more vulnerable workers. These findings could help identify and better target the specific groups of workers more exposed to such risks, and discern which risk management arrangements might be more suitable to the specific context of each country.

References

Abowd, J., Kramarz, F., Lemieux, T. and Margolis, D. 1999. "Minimum Wages and Youth Employment in France and the United States." In: D. Blanchflower, and R. Freeman, editors. *Youth Employment and the Labor Market*. Illinois, United States: Chicago University Press.

Aiyagari, R. 1994. "Uninsured Idiosyncratic Risk and Aggregate Saving." *Quarterly Journal of Economics.* 109: 659–84.

Alaimo, V. and Franco, C. 2012. "Understanding labor markets risks in Latin America and the Caribbean. The role of unemployment, informality and high job rotation." Inter-American Development Bank. Washington, DC, United States. Mimeographed document.

Araar, A. 2011. "Pro-poor Growth in Andean Countries." Inter-American Development Bank. Washington, DC, United States. Mimeographed document.

Beaudry, P. and Di Nardo, J. 1991. "The Effect of Implicit Contracts on the Movement of Wages Over the Business Cycle: Evidence from Micro Data." *Journal of Political Economy.* 99(4): 665–88.

Bendokat, R., and Tovo, M. 1999. "A Social Protection Strategy for Togo." Social Protection Discussion Paper No. 9920. Washington, DC, United States: World Bank.

Blanchard, O. and Gali, J. 2008. "Labor Markets and Monetary Policy: A New-Keynesian Model with Unemployment." CREI Working Paper. Barcelona: Center for International Economic Research, Universitat Pompeu Fabra.

Bosch, M. and Maloney, W. 2008. "Cyclical Movements in Unemployment and Informality in Developing Countries." Working Paper No. 3514. Bonn, Germany: Institute for the Study of Labor (IZA).

Bound, J. and Krueger, A. 1994. "The Extent of Measurement Error in Longitudinal Earnings Data: Do Two Wrongs Make a Right?" *Journal of Labor Economics.* 9(1): 1–24.

Bound, J., Brown, C., Duncan, G. and Rodgers, W. 1994. "Evidence on the Validity of Cross-sectional and Longitudinal labor Market Data." *Journal of Labor Economics.* 12(3): 345–68.

Cahuc, P. and Zylberberg, A. 2004. *Labor Economics.* London, United Kingdom: The MIT Press.

Carlsson, M., Messina, J. and Nordstrom, O. 2011. "Wage Adjustment and Productivity Shocks." Working Paper No. 2011:9. Uppsala, Sweden: The Institute for Labour Market Policy Evaluation.

Carneiro, A., Gimaraes, P. and Portugal, P. 2009. "Real Wages and the Business Cycle: Accounting for Worker and Firm Heterogeneity." Mimeographed document.

Carroll, C. and Samwick, A. 1997. "The Nature of Precautionary Wealth." *Journal of Monetary Economics.* 40(1): 41–71.

Constantinides, G., and Duffie, D. 1996. "Asset Pricing with Heterogeneous Consumers." *Journal of Political Economy.* 104(2): 219–40.

Costain, J., and Reiter, M. 2008. "Business Cycles, Unemployment Insurance, and the Calibration of Matching Models." *Journal of Economic Dynamics and Control.* 32(4): 1120–155.

Farmer, R. 2006. "Shooting the Auctioneer." University of California at Los Angeles. Mimeographed document.

Gertler, M. and Trigari, A. 2009. "Unemployment Fluctuations with Staggered Nash Wage Bargaining." *Journal of Political Economy.* 1(117): 38–86.

Goñi-Pacchioni, E. 2011. "Formality, Labor Productivity, Wage Setting and Income Risk." European University Institute. Mimeographed document.

Haefke, C., Sonntag, M. and Van Rens, T. 2008. "Wage Rigidity and Job Creation." Working Paper No. 3714. Bonn, Germany: Institute for the Study of Labor (IZA).

Hall, R. and Milgrom, P. 2008. "The Limited Influence of Unemployment on the Wage Bargain." *American Economic Review.* 98(4): 1653–1674.

Heaton, J. and Lucas, D. 1996. "Evaluating the Effects of Incomplete Markets on Risk Sharing and Asset Pricing." *Journal of Political Economics.* 104(3): 443–87.

Heitzmann, K., Sudharshan, R. and Siegel, P. 2002. "Guidelines for Assessing the Sources of Risk and Vulnerability." Social Protection Discussion Paper No. 0218. Washington, DC, United States: World Bank.

Kramarz, F. and Philippon, T. 2001. "The Impact of Differential Payroll Tax Subsidies on Minimum Wage Unemployment." *Journal of Public Economics.* 82(1): 115–46.

Krebs, T. 2003a. "Growth and Welfare Effects of Business Cycles in Economies with Idiosyncratic Human Capital Risk." *Review of Economic Dynamics.* 6(4): 846–68.

Krebs, T. 2003b. "Human Capital Risk and Economic Growth." *Quarterly Journal of Economics.* 118(2): 709–44.

Krebs, T. 2004. "Job Displacement Risk and the Cost of Business Cycles." Brown University. Mimeographed document.

Krebs, T. and Yaoy, Y. 2009. "Measuring Income Risk in German Labor Market." University of Mannheim. Mimeographed document.

Krebs, T, Krishna, P. and Maloney, W. 2010. "Trade Policy, Income Risk, and Welfare." *Review of Economics and Statistics.* 92(3): 467–81.

Levine, D. and Zame, W. 2002. "Does Market Incompleteness Matter?" *Econometrica.* 71(5): 1695–725.

Malcomson, J. 1999. "Individual Employment Contracts." In: O. Ashenfelterand D. Card, editors. *Handbook of Labor Economics*, Vol. 3. Amsterdam, Netherland: Elsevier Science/North Holland.

Meghir, C. and Pistaferri, L. 2004. "Income Variance Dynamics and Heterogenity." *Econometrica.* 1(71): 1–32.

Menzio, G. 2005. "High Frequency Wage Rigidity." University of Pennsylvania. Mimeographed document.

Moen, E. and Rosen, A. 2006. "Incentives in Competitive Search Equilibrium and Wage Rigidity." Working Paper No. 5554. London, United Kingdom: Centre for Economic Policy Research (CEPR).

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

Pissarides, C. 2009. "The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?" *Econometrica.* 5(77): 1339–369.

Portugal, P., and Cardoso, A. 2001. "Disentangling the Minimum Wage Puzzle: An Analysis of Job Accessions and Separations from a Longitudinal Matched Employer Employee Dataset." Working Paper No. 2844. London, United Kingdom: Centre for Economic Policy Research (CEPR).

Rosen, S. 1985. "Implicit Contracts: A Survey." *Journal of Economic Literature.* 23(3): 1144–175.

Rudanko, L. 2008. "Labor Market Dynamics under Long Term Wage Contracting." Boston University. Mimeographed document.

Shimer, R. 2009. Labor Markets and Business Cycles. New Jersey, United States: Princeton University Press.

Solon, G., Barsk, R. and Parker, L. 1994. "Measuring the Cyclicality of Real Wages: How Important is Composition Bias?" *Quarterly Journal of Economics.* 1(109): 1–25.

Storesletten, K., Telmer, C. and Yaron, A. 2004. "Cyclical Dynamics in Idiosyncratic Labor Market Risk." *Journal of Political Economy.* 112(3): 695–717.

PART III

Do Labor Policies Effectively Promote Formality? Impact Evaluation of Recent Policies

Parts I and II examined informality in Andean labor markets from a static and a dynamic perspective. Special attention was given to equilibrium outcomes (allocations and retributions) and the trajectories followed by workers along the business cycle to achieve such outcomes. Most of the analysis exploited the longitudinal dimension of the data inputs in order to suggest explanations based on the direction and intensities of the transitions among labor categories. The main lessons learned from Parts I and II are that labor informality is widespread and volatile, and that it affects both the pre- and post-retirement security of workers. The insecurity faced by informal workers is seen in lower remuneration for their work (related to the low productivity of these workers), intermittent contributions to the social security system (and hence intermittent protection before retirement and unlikely accumulation of contributions to be pensionable after retirement), and high volatility of pre-retirement incomes translated into higher exposure to both permanent and transitory shocks.

While many of the techniques applied in Parts I and II are novel for the empirical assessment of labor informality in the Andean region, the emerging messages are not as surprising. Many of them are a documented confirmation of priors that some local policymakers have had for some years now. These priors have induced policymakers to take action and implement regulations to address informality. Part III of this book aims to complement the analysis in the previous parts with an evaluation of some quasi-experiments. Although the identification strategies for the exercises reported in the next chapter are not as clean as to claim a strictly unbiased causal impact of the reforms under study, they exploit to the extent possible the data sets at hand. Thus, the idea

of the next chapter is to open up the discussion on the relevance of specific reforms undertaken in recent years in some of the countries under analysis by approximating their causal impact. The impact of the reforms is measured on a number of labor-related outcomes (with special emphasis on informal job finding, formal job separations, and unemployment duration). The effectiveness of the policies in procuring formality is assessed through the significance and magnitude of the variations in such outcomes that are attributable to the interventions.

Two cases are presented. The case study for Colombia examines how changes in legislation governing health and pension benefits enacted between 2003 and 2008 affected the size of the formal sector. Two major changes in the legislation are studied: first, the requirement (for independent workers) to use the same base income in order to contribute toward both the health insurance and pension systems; and second, the requirement that employers make contributions to the system through a unified payment plan, which made it more difficult to contribute differently to the pension plan versus the health plan. The case study for Ecuador estimates the impact of a conditional transfer program, the *Bono de Desarrollo Humano*, on the aforementioned labor transitions.

5

Impact of Labor Reforms and Social Programs on Labor Formality: Two Case Studies in the Andean Region

Colombia: The Impact of a Unified Pension and Health Insurance System on Informality[1]

For the purposes of this book, labor informality has been defined based on the lack of social benefits that workers are entitled to by virtue of their work. Among all these social benefits, the main one used to estimate an internationally comparable measure of informality is pensions. Thus, whenever we have talked about informal workers in this book, we have been referring to persons who are working but not contributing to their local pension systems. This section looks to evaluate the impact on informality of a national reform redefining the ways to contribute to the pension system.

Between 2003 and 2009, Colombia undertook changes in legislation governing health and pension benefits (Box 5.1). The reform unified the health and pension systems, compelling employers to make contributions to these two plans in a unified way (before the reform, some worker-firm pairs may have chosen to contribute only to the health insurance scheme or only to pensions). The

[1] This section draws on the background paper prepared by Calderón and Marinescu (2012).

unification also required the contributions to health and pensions to be made together on the basis of a single wage.[2]

Calderón and Marinescu (2012) examine how this reform affected the informal and formal labor markets. Considering informal to be those workers who are not covered by either the contributive health insurance system or the pension system,[3] the authors address the efficacy of policies aimed at increasing levels of compliance of contributions to health insurance and pension plans for all workers, but in particular for independent workers. Their prior is that since the unified health and pension contribution system makes it more difficult to contribute only to health and not to pensions or vice-versa, some workers may drop all coverage and become fully informal. At the same time, the authors also acknowledge that although workers could value pensions at less than their cost, some of them could value health insurance enough to also contribute to pensions in order to keep their health insurance. The aim of their paper is to empirically test the dominant effect of the unification across different groups of workers.

Camacho, Conover, and Hoyos (2009) argue that informality may be preferred if taxes or social security contributions exceed a worker's valuation of the services they provide.[4] The traditional argument to explain why workers may prefer to contribute differently toward the acquisition of these benefits is that if workers heavily discount the future, they will value less any benefits they'll receive further down the line, and thus may prefer a form of compensation readily available, like having a higher wage. Calderón and Marinescu (2012) suggest two additional reasons. First, some workers take advantage of a system in which pension and health benefits are separate by reporting distinct wages as the contributory base to each system: they

---

[2] Before the reform, even when contributing to both schemes, there was an incentive to contribute minimally to the health system (i.e., declare a low wage for the purpose of these contributions), since the benefits do not depend on the amount of the contribution, and to contribute larger amounts (i.e., declare a larger wage) to the pension system, as those benefits do depend on the amount of the contribution.

[3] They also consider as "partial" informal workers those that have one benefit or the other but not both. They exclude from the analysis all individuals who do not work for pay (family workers with no remuneration).

[4] By the time this study was produced, the costs to access these benefits were as follows: (1) For pensions, the payments were equivalent to 16 percent of the wage, of which 12 percentage points were paid by the employer and 4 percentage points were paid by the employee; (2) For health benefits, the contributions were equivalent to 12.5 percent of the wage, with the employer paying 8.5 percentage points and the employee paying 4 percentage points; and (3) For salaried workers, both the deduction and payment of benefits were made by the firm. See also Table 1.3 in Chapter 1.

BOX 5.1. COLOMBIA: PENSION AND HEALTH BENEFIT REFORMS

The government of Colombia has introduced a series of reforms aimed at increasing the number of individual contributions toward pensions and health benefits and at eliminating incentives to evade contributions fully or partially. These legislative changes have affected independent and salaried workers differently.

Independent Workers

March 1, 2003: The reforms established that the same base income has to be used to contribute to both health and pensions. Before the reform, independent workers were likely declaring a lower base income for health contributions than for pension contributions, since health insurance benefits are not tied to the amount of the contribution, while pension benefits are directly linked to the amount of the contribution. The reform aimed to reduce the double accounting in contributions by linking benefits to the same income. This policy is expected to increase the amounts contributed to health insurance and decrease the amounts contributed to pensions for those independent workers who contributed to both systems. The reform may, however, have little impact on informality for independent workers. Indeed, for those who were contributing only to health or only to pensions, the new requirement that the same base income be used for both systems probably does not provide a strong enough incentive to contribute to both systems.

April 1, 2007: The unified health and pension payment system established at this time should in principle make it impossible to contribute only to one of the systems. This reform should incentivize some independent workers who previously contributed only to health to contribute to both systems, while others will drop their health insurance to avoid contributing to pensions. Dropping contributive health insurance may seem particularly appealing for workers who can qualify for the free public health insurance scheme by meeting Colombia's SISBEN proxy means test. De jure, there are some exceptions: for example, low-wage independent workers are allowed to keep contributing to health benefits but not to pensions. De facto, it is observed that some of the high-skilled independent workers also contribute only to health benefits even after the unification. This is of concern for the empirical strategy because for low-income independent workers the law does not incentivize formalization.

Salaried Workers

For salaried workers, the key change is the unified system of payment for health and pensions and the ability for workers to verify employers' contributions. The law should reduce the proportion of workers whose employer contributes either only to health or only to pensions, and may increase the proportion of workers who are informal, contributing to neither health nor pensions. The list below summarizes the timing of the introduction of the reform (its application was rolled out by firm size):

Firms	Date
1,500 or more employees	August 1, 2006
500 to 1500	October 1, 2006
100 to 500	December 1, 2006
30 to 100	February 1, 2007
Less than 30	April 1, 2007

report their full incomes to qualify for higher pension benefits, but because everyone is mandated to pay proportionately to their income for a minimum level of health coverage, an incentive is created to report less income in order to pay less for the same minimum package. Second, the existence of universal health care programs can drastically undermine individual willingness to pay for these benefits (Camacho, Conover, and Hoyos 2009). In the same sense, Carrasquilla and Mejia (2010), find that the unification of benefits covered by the mandatory health care plan (*Plan Obligatorio de Salud* – POS) generates a moral hazard problem that directly undermines formal employment.

Econometric Specification

Calderón and Marinescu (2012) estimate the impact of the two different reforms on labor market outcomes. The first reform—the obligation for independent workers to use the same base income to contribute to both health and pensions (they call this reform "Unification: base income for independents" or *R*1)—is coded by a dummy that equals one for independent workers from March 2003 onward and 0 otherwise. For *R*1, the treated group is all independent workers, while the control group is all salaried workers. The second reform is the unified system of payment for health and pensions (which they call "Unification" or *R*2). As explained before, this was rolled out by firm size. To have a sufficiently long period prior to the reform, Calderón and Marinescu use the firm size categories that are available in the 2001–2005 surveys. As a result, unification is a dummy that is equal to one if the firm has 11 or more workers and the date is February 2007 or later,[5] and it is also equal to one if the firm has 10 workers or less and the date is April 2007 or later. Otherwise, the unification dummy is equal to zero.[6] Firms with less than 11 workers serve as a control for firms with 11 workers or more when these larger firms are bound by the unification reform, while firms with 11 workers or more serve as a control group when smaller firms

[5] Firms with 30 workers or more are bound by the unification reform of February 2007, while firms with less than 30 workers and independents are affected by the April 2007 reform. Since there is no breakdown of firm size above 11 workers in the data prior to 2006, Calderón and Marinescu choose to consider as treated in February 2007 all firms with more than 11 workers, and treated in April 2007 all firms with 10 workers or fewer. This obviously introduces some noise in the definition of treated and control groups, but Calderón and Marinescu also use more detailed firm-size categories when they restrict the sample to 2006 and later.

[6] Note that independent workers are included in the firms with fewer than 10 workers.

are affected by the unification reform. The specification to be estimated is the following:

$$y_{it} = \alpha_1 R1 + \alpha_2 R2 + \beta X_{it} + \varepsilon_{it}, \quad (5.1)$$

where y_{it} is the labor market outcome of interest for individual i in calendar month t. $R1$ is the dummy for unification of the base income for independents, $R2$ is the dummy for unification. X_{it} is a set of controls.[7]

Equation 5.1 specifies a difference-in-differences strategy to identify the effect of $R1$ and $R2$. For the unification of the base income for independents ($R1$), Calderón and Marinescu use all other salaried workers as a control group. To identify the impact of the unification ($R2$), they use two firm size categories (above or below 10 workers) that serve as a control for each other, since the reform was introduced in a staggered fashion.

Further, in order to see whether the impact of the unification reform differs by firm size, Calderón and Marinescu adopt two additional specifications. First, they allow the reform to differentially impact each of the four firm-size categories present in the data since 2001: one worker, two to five workers, six to 10 workers, and more than 10 workers. Second, they use the more detailed firm-size categories available from the second half of 2006 onward: one worker, two to three workers, four to five workers, six to 10 workers, 11 to 19 workers, 20 to 30 workers, 31 to 50 workers, 51 to 100 workers, and more than 100 workers. This allows them to track more precisely the timing of the introduction of the unification reform for firms above 100 workers, between 30 and 100 workers, and below 30 workers.[8]

---

[7] The set of controls is compounded by dummies for firm size category, independent workers, month, and municipality fixed effects. In specifications with additional controls, the following variables are included: years of schooling, age, age squared, number of children, dummy for females, and a dummy for those who are married or cohabiting.

[8] Calderón and Marinescu focus more narrowly on firms close to the 100-worker threshold or to the 30-worker threshold. This is important because control and treatment groups should be as similar as possible, and, in particular, they should react similarly to macro trends. Another issue here is that workers may move between firms of different sizes, and between salaried and independent status. Thus, the treatment and control groups can change composition over time. Because available data are not longitudinal, Calderón and Marinescu cannot track workers across firms. However, they control for observed worker characteristics, which partially alleviates some of the concerns regarding changes in composition. Additionally, in as much as firms of different sizes are seen as the treatment and control groups and not individual workers, the movement of workers between different firm sizes becomes less problematic. Indeed, the question then becomes whether firms of different sizes became more or less formal after the reform.

Results[9]

Calderón and Marinescu (2012) first show that between 2001 and 2009, 36% of the workforce was fully formal in that those workers contributed to both health insurance and pensions, while 40% was fully informal, contributing to neither of those plans. Fifty-nine percent of workers contribute to health insurance, and only 36% to pensions. This indicates that there are essentially no workers who contribute only to pensions (less than 1%), while about a fourth of the workforce contributes only to the health insurance scheme. In general, these figures suggest that workers value health insurance benefits at their cost or more, while they value pensions at less than their cost. This pattern also implies that the unified system of payment for health insurance and pensions has the potential to significantly affect behavior. Hence, this rationalizes the government's initiative toward unification that seeks increased coverage of the pension system. That said, Table 5.1, reports the impact of the two reforms on full formality (Columns 1 to 3), full informality (Columns 4 to 6), health insurance (Columns 7 to 9), and pension coverage (Columns 10 to 12). Columns 1, 4, 7, and 10 do not control for characteristics besides firm size. Columns 3, 6, 9, and 12 add an interaction between the unification reform and the independent dummy in order to test whether there is evidence that firms that were required to comply with the unified payment system shifted some salaried workers to an independent status. Column 2 suggests that the impact

[9] To estimate Equation 5.1 and get these results, two separate sources of data are exploited. The first is the Ongoing Household Survey 2001–2005 (*Encuesta Continua de Hogares* - ECH). The ECH is a repeated cross-section of household survey data collected by the National Statistics Department (DANE). The weighted sample is representative of the urban population of the 13 largest metropolitan areas in the country. The data include individuals between 12 and 65 years old. Information in the ECH consists of four basic components: (1) identification variables; (2) household characteristics; (3) education; and (4) labor force information. In addition, a special module on informality takes place in the second quarter of every year for the period 2001–2005. In this module individuals are asked to report their sector of employment, type of contract, firm size, whether or not they have a written work contract, and if they make contributions to employment-based health insurance and pensions. The second source is the Comprehensive Integrated Household Survey 2006–2009 (*Gran Encuesta Integrada de Hogares* - GEIH). The GEIH is repeated cross-sectional data representative of the 24 largest metropolitan areas (however, analysis is restricted to the 13 largest areas to keep consistency across surveys). In the GEIH, the information on informality is available on a monthly basis rather than for a single quarter of the year. The analysis is based on the information contained in the "informality" module of both the ECH and GEIH. It includes data on firm size, job tenure, written contracts, job location, and access (and contributions) to social security (pensions and health care). Unpaid family workers are dropped from the sample, since unpaid workers are not required to contribute to the social security system. Calderón and Marinescu classify workers in three separate categories according to their type of employment: salaried, independent self-employed, and independent employers.

of the unified payment for health insurance and pensions on formalization is positive and significant (0.97). As explained earlier, in Column 3, Calderón and Marinescu add the interacted term to test whether some salaried workers were shifted to independent status. If that's the case, the impact of the reform on salaried workers should be bigger than 0.97, and the impact on independent workers should be smaller, implying that the interaction between unification and independent should be negative. This is indeed what happens in Column 3: the unification reform significantly increased full formality for salaried workers by 3.09 percentage points, and significantly decreased full formality for independent workers by 1.6 percentage points. Once this interaction is added, the impact of the unification of the base income for independent workers is halved, suggesting that some of the decline in full formality for independent workers is due to the unification reform.

Regarding the effects on informality, Calderón and Marinescu find that the unification reform slightly increased full informality by 0.8 percentage points (Column 5), with no significant effect of the unification of the base income for independent workers. The addition of an interaction between the unification and independent dummies in Column 6 shows that full informality for salaried workers was unaffected by unification, while unification significantly increased full informality for independent workers by 1.7 percentage points. Health insurance declines by 1 percentage point with the unification reform (Column 8). When adding an interaction between unification and independent workers in Column 9, the unification reform does not affect health insurance coverage for salaried workers, but it decreases the coverage for independent workers by 1.5 percentage points (consistent with the increase in full informality due to independent workers reported in Column 6).

With respect to pension coverage, results are also consistent with those seen for the impact on formality: there are essentially no workers who only contribute to the pension system, and hence any worker who contributes to pensions is fully formal. The unification reform significantly increased pension coverage by 1.18 percentage points (Column 11), which is consistent with its positive effect on full formality documented in Column 2. By contrast, the unification of the base income for independent workers seems to have significantly decreased pension coverage by 6.35 percentage points, which corresponds to its negative effect on full formality documented in Column 2. Column 12 shows that pension coverage significantly increased by 3.36 percentage points for salaried workers, while it significantly decreased by 1.5 percentage points for independent workers. Similar to what happened in Column 3, once we add the interaction, the impact of the unification of the base income for independent workers is halved.

TABLE 5.1 | Impact of Unification on Formality, Informality, Health Insurance, and Pension Coverage

	Fully Formal			Fully Informal			Health Insurance			Pensions		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Unification	0.006 [0.005]	0.00978** [0.004]	0.03089*** [0.005]	0.01593*** [0.005]	0.00795* [0.004]	0.000 [0.005]	-0.01804*** [0.005]	-0.01007** [0.005]	-0.00326 [0.005]	0.00760* [0.005]	0.01181*** [0.004]	0.03363*** [0.005]
Unification^{x} Independent			-0.04714*** [0.002]			0.01714*** [0.002]			-0.01522*** [0.002]			-0.04870*** [0.002]
Unification: base income for independents	-0.06601*** [0.002]	-0.06154*** [0.002]	-0.03085*** [0.003]	0.00736** [0.003]	0.001 [0.003]	-0.01016*** [0.003]	-0.00557* [0.003]	0.00088 [0.003]	0.01079*** [0.003]	-0.06797*** [0.002]	-0.06355*** [0.002]	-0.03184*** [0.003]
2 to 5 workers	0.03341*** [0.001]	0.00906*** [0.001]	0.00942*** [0.001]	-0.10597*** [0.002]	-0.07675*** [0.002]	-0.07689*** [0.002]	0.010649*** [0.002]	0.07702*** [0.002]	0.07713*** [0.002]	0.03305*** [0.001]	0.00892*** [0.001]	0.00929 [0.001]
6 to 10 workers	0.21190*** [0.002]	0.16539*** [0.002]	0.16642*** [0.002]	-0.26725*** [0.003]	-0.20580*** [0.003]	-0.20618*** [0.003]	0.26663*** [0.003]	0.20455*** [0.003]	0.20488*** [0.003]	0.21266*** [0.002]	0.16676*** [0.002]	0.16781*** [0.002]
11 or more workers	0.63795*** [0.001]	0.53895*** [0.002]	0.53853*** [0.002]	-0.56250*** [0.002]	-0.41170*** [0.002]	-0.41154*** [0.002]	0.56286*** [0.002]	0.41108 [0.002]	0.41094*** [0.002]	0.63774*** [0.001]	0.53968*** [0.002]	0.53924*** [0.002]
Independent	-0.06275*** [0.002]	-0.11028*** [0.002]	-0.11016*** [0.002]	-0.05190*** [0.003]	0.02710*** [0.003]	0.02705*** [0.003]	0.04911*** [0.003]	-0.02906*** [0.003]	-0.02902*** [0.003]	-0.05989*** [0.002]	-0.10828*** [0.002]	-0.10816*** [0.002]
Schooling		0.01876*** [0.000]	0.01875*** [0.000]		-0.03434*** [0.000]	-0.03434*** [0.000]		0.03463*** [0.000]	0.03463*** [0.000]		0.01847*** [0.000]	0.01846*** [0.000]
Age		0.01868*** [0.000]	0.01867*** [0.000]		-0.01169*** [0.000]	-0.01169*** [0.000]		0.01137*** [0.000]	0.01137*** [0.000]		0.01900*** [0.000]	0.01899*** [0.000]
Age squared		-0.00019*** [0.000]	-0.00019*** [0.000]		0.00005*** [0.000]	0.00005*** [0.000]		-0.00005*** [0.000]	-0.00005*** [0.000]		-0.00019*** [0.000]	-0.00019*** [0.000]
Number of children		-0.00932*** [0.000]	-0.00928*** [0.000]		0.01398*** [0.000]	0.01396*** [0.000]		-0.01411*** [0.000]	-0.01409*** [0.000]		-0.00921*** [0.000]	-0.00916*** [0.000]

(continued on next page)

TABLE 5.1 | Impact of Unification on Formality, Informality, Health Insurance, and Pension Coverage (*continued*)

	Fully Formal			Fully Informal			Health Insurance			Pensions		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Female		-0.01843***	-0.01847***		-0.03876***	-0.03875***		0.04004***	0.04003***		-0.01970***	-0.01974***
		[0.001]	[0.001]		[0.001]	[0.001]		[0.001]	[0.001]		[0.001]	[0.001]
Married or cohabitating		0.00372***	0.00224***		-0.03308***	-0.03254***		0.03336***	0.03288***		0.00343***	0.00191**
		[0.001]	[0.001]		[0.001]	[0.001]		[0.001]	[0.001]		[0.001]	[0.001]
Observations	687,364	686,219	686,219	687,364	686,219	686,219	687,271	686,126	686,126	687,271	686,126	686,126
R-squared	0.515	0.549	0.549	0.266	0.36	0.36	0.264	0.359	0.359	0.512	0.545	0.545

Sources: Ongoing Household Survey (ECH), 2001–2005; Comprehensive Integrated Household Survey (GEIH), 2006–2009.
Note: Fully formal means contributing to both health insurance and pensions, while fully informal means contributing to neither. The effect of the reform on pensions remains positive and statistically significant if clustering at the firm size. All columns control for month and municipality fixed effects. Robust standard errors are in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5.2 shows the results by firm size,[10] after constraining the sample to 2006–2009.[11] Panel A shows the estimates for regressions differentiating between firms with 50–100 workers and firms with more than 100 workers. For these firms the effect of the unification reform appears to be limited to independent workers. Some independent workers operating in these firms became formal after the unification of payments was introduced, with an effect of 4.74 percentage points (Columns 1 and 2). Before the reform, some firms operated in a gray zone, and after the reform decided to comply more, in particular by contributing largely with pensions, with a positive effect of 4.9 percentage points (Columns 7 and 8).

Panel B shows the results for small-to-medium-sized firms (6–50 workers). The results reported in Column 2 suggest that the unification reform increased full formality by 4.5 percentage points for workers in firms with 6 to 10 workers, 4.2 percentage points for firms with 11 to 19 workers, and 3.8 percentage points for firms with 20 to 30 workers. No statistically significant effect is found for firms with 31 to 50 workers. Likewise, the unification reform does not appear to have a statistically significant effect on full informality for these medium-sized firms, or on the increase of health insurance. Indeed the positive effect on formality appears to be a result of a larger likelihood of complying with pension contributions. Interestingly, the magnitude of the positive effect appears to decline as firm size increases. This is plausible because larger firms were expected to be more compliant with these contributions even before the unification system was implemented. Overall, these results suggest that the unified system of payment for health and pensions mostly affected smaller firms with less than 30 workers. The reform's basic aim was accomplished for firms with 6 to 30 employees, since these firms increased the proportion of formal workers. On the other hand, the perverse effect of the reform in increasing

[10] In panel B, the unification dummy is interacted with each of the firm-size categories, and the main term for unification is omitted.

[11] This constraint pertains to the fact that the GEIH allows for a finer classification of firm size. It also allows discriminating between independent self-employed workers and independent employers. Calderón and Marinescu (2012) report more general results for estimations done over the entire 2001–2009 sample using data from both the ECH and the GEIH. The results of such estimations are consistent with those reported in Table 5.2. The authors also do robustness checks by dividing the independent category into two groups (self-employed and employers) in order to provide a better control group for these workers. Their results show that, when independent workers are compared to employees of small firms, there is no significant change in the estimates. Further comparing self-employed workers and employers, they find that the estimates are consistent with those presented in this section.

TABLE 5.2 | Impact of the Reforms by Firm Size

Panel A. Medium-sized (50 to 100 Workers) and Large (100 and More Workers) Firms

	Fully Formal		Fully Informal		Health Insurance		Pensions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification	−0.00031 [0.013]	0.00481 [0.013]	−0.00777 [0.009]	−0.00966 [0.009]	0.00619 [0.010]	0.00826 [0.009]	0.00127 [0.013]	0.00621 [0.012]
Unification*Independent	0.04735** [0.021]	0.04745** [0.020]	−0.02349 [0.015]	−0.02427 [0.015]	0.02182 [0.016]	0.02268 [0.015]	0.04902** [0.021]	0.04904** [0.020]
Independent	−0.33845*** [0.020]	−0.33473*** [0.019]	0.12731*** [0.015]	0.13125*** [0.015]	−0.12814*** [0.015]	−0.13262*** [0.015]	−0.33762*** [0.020]	−0.33337*** [0.019]
50-100 workers	−0.07034*** [0.003]	−0.05621*** [0.003]	0.03931*** [0.002]	0.03038*** [0.002]	−0.04039*** [0.002]	−0.03049*** [0.002]	−0.06926*** [0.003]	−0.05611*** [0.003]
Schooling		0.01288*** [0.000]		0.00883*** [0.000]		0.00980*** [0.000]		0.01191*** [0.000]
Age		0.03678*** [0.001]		−0.00882*** [0.000]		0.00957*** [0.000]		0.03603*** [0.001]
Age squared		−0.00046*** [0.000]		0.00009*** [0.000]		−0.00010*** [0.000]		−0.00045*** [0.000]
Number of children		−0.00916*** [0.001]		0.00476*** [0.001]		−0.00593*** [0.001]		−0.00800*** [0.001]
Female		−0.00967*** [0.002]		0.00280*** [0.001]		−0.00239** [0.001]		−0.01008*** [0.001]

(continued on next page)

TABLE 5.2 | Impact of the Reforms by Firm Size (*continued*)

Panel A. Medium-sized (50 to 100 Workers) and Large (100 and More Workers) Firms (*continued*)

	Fully Formal		Fully Informal		Health Insurance		Pensions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Married or cohabitating		0.003 [0.002]		−0.00206** [0.001]		0.00327** [0.001]		0.00238 [0.002]
Observations	124,589	124,577	124,589	124,577	124,589	124,577	124,589	124,577
R- squared	0.072	0.134	0.031	0.067	0.029	0.068	0.073	0.134

Panel B. Small and Medium-sized Firms (Between 6 and 50 Workers)

	Fully Formal		Fully Informal		Health Insurance		Pensions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification 6 to 10 workers	0.05323*** [0.017]	0.04540*** [0.016]	−0.019 [0.013]	−0.0981 [0.013]	0.016 [0.014]	0.006 [0.013]	0.05665*** [0.017]	0.04893*** [0.016]
Unification 11 to 19 workers	0.05466*** [0.018]	0.04239** [0.017]	−0.01725 [0.014]	−0.004 [0.013]	0.020 [0.014]	0.007 [0.014]	0.05144*** [0.018]	0.03928** [0.017]
Unification 20-30 workers	0.04683*** [0.018]	0.03864** [0.017]	−0.01606 [0.013]	−0.007 [0.013]	0.019 [0.014]	0.010 [0.013]	0.04354** [0.017]	0.03538** [0.016]
Unification 31-50 workers	0.03255* [0.018]	0.028 [0.017]	−0.00480 [0.014]	0.001 [0.013]	0.007 [0.015]	0.001 [0.014]	0.03032* [0.018]	0.025 [0.017]

(continued on next page)

TABLE 5.2 | Impact of the Reforms by Firm Size (*continued*)

Panel B. Small and Medium-sized Firms (Between 6 and 50 Workers) (*continued*)

	Fully Formal		Fully Informal		Health Insurance		Pensions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent	−0.28742***	−0.32174***	0.09504***	0.14948***	−0.09221***	−0.14688***	−0.29025***	−0.32434***
	[0.005]	[0.004]	[0.005]	[0.004]	[0.005]	[0.004]	[0.005]	[0.004]
6 to 10 workers	−0.13847***	−0.29154***	0.10518***	0.19253***	−0.10086***	−0.18620***	−0.14278***	−0.29787***
	[0.010]	[0.010]	[0.009]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
20-30 workers	0.09924***	−0.09215***	−0.07125***	0.05419***	−0.06821***	−0.05581***	0.10227***	−0.09053***
	[0.010]	[0.011]	[0.009]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
31 to 50 workers	0.21177***	0.17265***	−0.14663***	−0.10661	0.14542***	0.10492***	0.21298***	0.17435***
	[0.012]	[0.011]	[0.009]	[0.009]	[0.010]	[0.009]	[0.011]	[0.011]
Schooling		0.03425***		−0.03676***		0.03730***		0.03371***
		[0.000]		[0.000]		[0.000]		[0.000]
Age		0.03963***		−0.02201***		0.02198***		0.03966***
		[0.001]		[0.001]		[0.001]		[0.001]
Age squared		−0.00044***		0.00018***		−0.00018***		−0.00044***
		[0.000]		[0.000]		[0.000]		[0.000]
Number of children		−0.01072***		0.01553***		−0.01642***		−0.00983***
		[0.001]		[0.001]		[0.001]		[0.001]

(continued on next page)

TABLE 5.2 | Impact of the Reforms by Firm Size (*continued*)

Panel B. Small and Medium-sized Firms (Between 6 and 50 Workers) (*continued*)

	Fully Formal		Fully Informal		Health Insurance		Pensions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female		−0.03191*** [0.003]		0.00650** [0.003]		−0.00667** [0.003]		−0.03174** [0.003]
Married or cohabitating		0.000 [0.003]		−0.01350*** [0.003]		0.01395*** [0.003]		−0.00038 [0.003]
Observations	80,874	80,851	80,874	80,851	80,874	80,851	80,874	80,851
R- squared	0.161	0.254	0.101	0.225	0.097	0.222	0.164	0.256

Source: Comprehensive Integrated Household Survey (GEIH) 2006–2009.
Note: All columns control for month and municipality fixed effects. Robust standard errors are in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

informality was observed in micro firms with less than five employees, and among self-employed workers. In summary, these results suggest that larger firms were presumably not on the margin of choosing between full formality and full informality, so this likely explains the absence of a significant effect for firms with more than 50 employees. At the other extreme, for very small firms and self-employed workers, the unified payment system increased the cost of contributions so much that many decided to operate fully informally. In the middle, some medium-sized firms were able to absorb some extra costs and become fully formal. The overall impact of the unified payment system reform was to increase full formality and pension coverage, while also slightly increasing full informality.

Concluding Remarks: The Unified Pension and Health Insurance System Reform in Colombia

The results shown in this section suggest that the unified payment for health and pension plans had a substantial impact on formality, informality, and the coverage of pensions. While many of the provisions of the Colombian system, such as the subsidized health care regime, appear to have largely contributed to the expansion of the informal labor market, the regulations that unified the system of payment for health insurance and pensions significantly increased full formality. Calderón and Marinescu (2012) indeed suggest that the unified system of payment for health and pension plans significantly increased full formality and overall coverage of the pension system by about 0.97 and 1.18 percentage points, respectively, while at the same time reducing coverage of the health insurance system by about 1 percentage point. This decline in health insurance coverage is fully concentrated among independent workers. Full informality also increased, and again this increase was fully concentrated among independent workers, in particular those self-employed. Finally, the introduction of the unified payment system had different effects by firm-size category, with the largest firms being unaffected. Small-to-medium-sized firms (those with 6 to 50 workers) increased full formality and micro firms (those with 5 workers or less) increased full informality. These results suggest that the reforms were successful in increasing coverage of the pension system among the overall population. The increase in the share of individuals who contribute to both health and pension benefits constitutes a positive change. However, policymakers should be mindful of the negative impact of the unification of payments on the coverage of the contributive health insurance system among independent workers and of the increase in full informality observed among micro firms after the reform.

Ecuador: The Effects of a Conditional Transfer Program on the Labor Market[12]

By reforming the national contributory pension system, policies examined in the previous section were expected to exert a direct influence on labor outcomes by design. Besides these types of policies, however, there are others that are not designed to have a direct impact on labor outcomes, but that may indirectly influence workers' labor decisions. An example of those policies is conditional cash transfers (CCT). In Ecuador, the most important CCT program is the Human Development Bonus (*Bono de Desarrollo Humano* – BDH). The program attempts to reduce demand-side income inequality through cash transfers while establishing co-responsibilities with the beneficiaries (poor people), who must keep their children in school and regularly visit health services.[13]

The direct effects of the BDH on school attendance, cognitive achievement, education levels, and poverty have been studied. Llerena Pinto (2009), Ponce and Bedi (2010), and Turner (2006) find positive effects on attendance but no effects on cognitive achievement. The indirect effects of the program on labor outcomes, however, had not been explored until Gonzalez-Rozada and Llerena Pinto (2011) addressed this issue. The prior is that as beneficiary households are getting a lump sum transfer, there is a positive income effect that can induce people to consume more physical goods but also more leisure. As happens with unemployment insurance—which can induce moral hazard to become or stay unemployed—unemployed workers living in households receiving the CCT have fewer incentives to intensify efforts to find a job in either the formal or even the informal sector of the economy. Likewise, the program can also affect employment because a generous CCT could increase separations. Thus, exploiting a regression discontinuity design, Gonzalez-Rozada and Llerena Pinto (2011) estimate the effects of the program on the duration of unemployment, the transiting probability from unemployment to informality, and the separation probability from a formal job.

---

[12] This section summarizes the background paper by Gonzalez-Rozada and Llerena Pinto (2011).

[13] The BDH basically consists of a monetary compensation to vulnerable groups such as the elderly, the disabled, and mothers whose families fall below the poverty line. The program has a budget of US$624 million and pays a monthly benefit of US$35. As of December 2010, 1.76 million persons were receiving the subsidy, with mothers constituting 67% of the beneficiaries. The total population of Ecuador was 14.48 million in 2010, so the impact of the policy cannot be negligible.

Impact Evaluation Methodology

Identification Strategy[14]

Participation in the program is based on the Selben index, a system of selection for beneficiaries of social programs. Families with a Selben score corresponding to the two lowest quintiles are eligible to participate.[15] Considering this, Gonzalez-Rozada and Llerena Pinto (2011) follow two strategies for identification. First, they exploit the discontinuity of treatment at the Selben cutoff point. In fact, they compose a quasi-Selben index using the Employment-Unemployment-Underemployment Survey[16] (*Encuesta de Empleo, Desempleo y Subempleo* – ENEMDU) rather than the Living Standards Measurement Survey (LMS).[17] This is because participation of individuals observed in the ENMEDU cannot be determined directly by just observing the LMS, and so the analysis must be done using the ENEMDU in order to exploit its longitudinal information (which is necessary to study the effects on labor transitions). Thus, the first strategy consists of defining an instrument, $z_{i,t}$ for the BDH participation as an indicator variable adopting the value of one for those households, *i*, in the ENEMDU survey period *t*, scoring less than or equal to 71.24 on the quasi-Selben index (corresponding to the first two quintiles of the distribution).[18] The second strategy is to exploit the discontinuity of treatment at certain thresholds of age. Before 2007, due to administrative constraints, the authorities did not monitor the educational requirements of the BDH program (Schady and Araujo 2006) and hence some families with no children or with children outside the age range allowed under the educational requirement of the program managed to get BDH benefits.[19] Hence,

---

[14] To analyze the effects of the program on the labor market, only families will be considered, as the other types of beneficiaries (the elderly and disabled) do not participate in the labor force.

[15] For example, until January 2007, families with a Selben score of less than 50.65 (i.e., families in quintiles 1 and 2) were eligible to participate in the BDH program.

[16] See Box 1.1 in Chapter 1.

[17] The Selben index is constructed using nonlinear principal components analysis of a combination of 27 variables that can be classified into the following groups: infrastructure (6), demographic characteristics of household members (9), educational characteristics of household members (4), and household assets (8). The variables come from the 1999 LSM until January 2007. After that date the index is computed using the new LSM survey of 2006, and in 2009 the LSM survey is replaced by the Social Registry survey.

[18] They report that there is a jump of about 12% in the probability of selection at the cutoff point of 71.24. Given that there is no discontinuity of the observed characteristics that compound the Selben index and that there is no reason for those surveyed by ENEMDU to lie in order to manipulate the Selben index, regression discontinuity design can be used.

[19] Participation requires school enrollment of children between 5 and 18 years old, and class attendance must exceed 75%. The lack of control of this requirement before 2007 generates a regression discontinuity strategy to isolate the effects of the program.

Gonzalez-Rozada and Llerena Pinto (2011) also define treatment and controls groups using the age and educational requirements of the program. They define another instrumental variable for the BDH participation as an indicator variable adopting the value of one (treatment) for those households in the ENEMDU survey scoring less than or equal to 71.24 on the quasi-Selben index and having children between 5 and 18 years old.[20]

Effects on Unemployed Workers[21]

The first outcome is the impact of this active labor policy on the duration of unemployment.[22] As was explained earlier, a CCT may induce moral hazard and reduce job search efforts. A Cox proportional hazard model is estimated for the duration of unemployment, including policy variables and covariates. Covariates, *X*, are a polynomial on age, gender, formal education, and time dummies. The policy variable is an indicator variable, *I(BDH =1)* adopting the value of one for those workers belonging to a household receiving BDH benefits and zero otherwise. Then, the model is:

$$\theta(t_u \mid x) = \lambda(t_u)\exp[x\beta + \gamma I(BDH = 1)] \tag{5.2}$$

where $\theta(t_u \mid x)$ is the hazard of leaving unemployment, and $\lambda(t_u)$ is the baseline hazard, the exit probability from unemployment that is unspecified and can

[20] The control group is compounded by families scoring less than 71.24 and without children or with children less than 5 years old or with children between 19 and 25 years old. As before, they report jumps in the probability of treatment at the age thresholds and provide evidence of nondiscontinuity at the threshold for all the observable characteristics.

[21] Two panel data samples are built. The first panel includes households interviewed in the third quarter of 2005 (2005:Q3) and followed through 2005:Q4, 2006:Q3, and 2006:Q4; and households interviewed in 2005:Q4 and followed through 2006:Q1, 2006:Q4, and 2007:Q1. The second panel includes households interviewed in 2007:Q3 and followed through 2007:Q4, 2008:Q3, and 2008:Q4; households interviewed in 2007:Q4 and followed through 2008:Q1, 2008:Q4, and 2009:Q1; and households interviewed in 2009:Q3 and followed through 2009:Q4, 2010:Q3, and 2010:Q4. Gonzalez-Rozada and Llerena Pinto call the first sample the "2005–2006 panel sample" and the second sample the "2007–2010 panel sample." They cannot merge these samples because in June 2007 there was a methodology change in the ENEMDU surveys.

[22] Duration is computed in weeks. First, the authors compute the incomplete duration of unemployment the first time the individual appears as unemployed in the survey, using the question of "how long have you been unemployed?" Then they follow the individual in the rest of the surveys of the corresponding panel sample and compute the time the person remains unemployed. The complete duration of unemployment is computed adding to the incomplete duration of unemployment the time the individual remains unemployed. The median unemployment duration in the 2005–2006 panel sample is around 20 weeks, while in the 2007–2010 panel sample it is about 30 weeks. Part of this increment in median duration between both panel samples could be due to the methodological change of June 2007.

take any form. If, as explained earlier, the BDH's targeting mechanism produces a jump in the probability of receiving benefits at the Selben cutoff point and the observed and unobserved individuals' characteristics vary continuously around it, γ will measure the causal effect of the BDH program on the duration of unemployment. Since the identification strategy suggests a fuzzy regression discontinuity approach, the variable in the Cox proportional hazard model is instrumented with $z_{i,t}$ defined above. Following Urquiola and Verhoogen (2009) in addition to the IV variable, Gonzalez-Rozada and Llerena Pinto control for a piecewise linear spline in the Selben index with a kink at the cutoff point of 71.24. Then, the instrumental variable Cox model to be estimated is:

$$\theta(t_u \mid x) = \lambda(t_u)\exp[x\beta + \gamma_1 z_{i,t} + \gamma_2 Selben + \gamma_3 Selben \times z_{i,t}] \tag{5.3}$$

where γ_1 will measure the causal effect of the BDH program on the duration of unemployment.

The second outcome is the probability of transiting from unemployment to informality. In this case, it is important to analyze if the BDH is a distortive policy, in the sense of increasing the finding probability of informal jobs, or if it has an income-improving effect (BDH could finance the job search process so that workers can wait to find a suitable formal job opening). In this case, both effects go in inverse directions: the income improving effect implies a higher probability of finding a formal job, while the "substitution effect" reduces this probability. Gonzalez-Rozada and Llerena Pinto implement a multinomial logit model estimation, addressing the probability of transition from unemployment to different types of jobs (states): formal employment, informal employment, and out of the labor force. The dependent categorical variable, *y*, adopts the value zero for those workers remaining in unemployment after the four waves of the panel sample; $y = 1$ if the worker gets formal employment at some point in the sample; $y = 2$ if the worker goes from unemployment to informal employment; and $y = 3$ if the worker goes out of the labor force. The explanatory policy variable, $I(BDH = 1)$, is instrumented by z_{it} as before and the same covariates are used as controls in this estimation. That is, the probability that worker *i* goes from unemployment to state *j* is:

$$\Pr[y_i = j] = \frac{e^{x\beta_j + \gamma_{1,j} z_{i,t} + \gamma_{2,j} Selben + \gamma_{3,j} Selben \times z_{i,t}}}{1 + \sum_{l=1}^{3} e^{x\beta_l + \gamma_{1,l} z_{i,t} + \gamma_{2,l} Selben + \gamma_{3,l} Selben \times z_{i,t}}}, j = 1,2,3 \tag{5.4}$$

where $y = 0$ is the base category. For example, $Pr[y_i = 2]$ is the probability of transition to an informal job. In this case, the relative risk ratio, $e^{\gamma_{1,2}}$, measures

how much more likely it is to go from unemployment to informality than to remain unemployed when comparing workers having benefits and workers not having them.

Effects on Employed Workers[23]

An additional impact of the BDH is on the separation probability from formal employment. In particular, a generous BDH transfer could increase separations: the job search effort could be reduced given that the conditional transfer is available. While this is perhaps of second order in the analysis of the BDH program, it could be important to identify its effect. In this case, Gonzalez-Rozada and Llerena Pinto estimate the separation probability using a logit model. The dependent variable, as described earlier, is a binary indicator adopting the value of one if a formal worker changes his/her labor condition during the period analyzed. The policy variable is an indicator variable, $I(BDH = 1)$, adopting the value of one if the worker has BDH benefits. The authors define an interval around the BDH cutoff point and, using a regression discontinuity approach, estimate the impact of the program on the separation probability using a logit estimation. Letting $Pr[Separation_{i,t} = 1]$ denote the probability that worker i separates from formal employment in period t, the model is:

$$\Pr[Separation_{i,t} = 1] = \frac{1}{1 + e^{-x\beta - \gamma_1 z_{i,t} - \gamma_2 Selben - \gamma_3 Selben \times z_{i,t}}} \tag{5.5}$$

where γ_1 measures the causal effect of the BDH program on the separation from formal employment.

---

[23] Two pooled cross-section samples are built. First, Gonzalez-Rozada and Llerena Pinto identify those formal workers in 2005:Q3 (2006:Q3) and follow them through 2005:Q4 (2006:Q4). Then, they take all formal workers in 2005:Q4 (2006:Q4) and follow them through 2006:Q1 (2007:Q1) and pool these two cross-section samples over time creating the 2005–2006 pooled cross-section sample. A binary variable called separation adopts the value of one if the individual goes from formal employment in 2005:Q3 (2006:Q3) to be unemployed, inactive, or an informal worker during the 2005:Q4 (2006:Q4) (the same happens for the waves starting in 2005:Q4 and 2006:Q4). The variable adopts the value of zero when the worker remains in the same formal job. The procedure is repeated for the waves starting in 2007:Q3 (2008:Q3), 2007:Q4 (2008:Q4), and 2009:Q3 (2010:Q3). In both pooled cross-section samples there are around 17% formal workers belonging to families receiving BDH benefits. In the first (second) sample, 3% (4.5%) of the mothers receive the BDH. Eleven percent (13%) of the workers in the pooled cross-section sample of 2005–2006 (2007–2010) changed their labor condition from formal employment to unemployment or informal job or left the labor force.

Results

Results showing the impact of BDH on several labor outcomes are reported for two groups of workers: mothers receiving the BDH and non-mothers (i.e., individuals living in households that receive the BDH).[24] Given the consistency of the results of the 2005–2006 panel with those of the 2007–2010 panel and also with those using the second identification strategy described earlier, here we only report the results corresponding to the implementation of the first identification strategy for the most recent panel (2007–2010).

Impact on Unemployment Duration

Table 5.3 shows the estimated impact of the BDH program on the duration of unemployment for mothers.[25] Columns 3 and 6 report the estimation of the preferred specification, which is Equation 5.3 using a sample of households scoring between 66.24 and 76.24 on the quasi-Selben index and including a piecewise linear spline in the Selben index with a kink at the cutoff point as controls. Columns 1, 2, 4, and 5 focus more narrowly on discontinuity (as in van der Klaauw, 2002, and Urquiola and Verhoogen, 2009), using a sample of households scoring within an interval of ± 3 points around the cutoff point of the Selben index. Columns 1 and 4 show estimates for Equation 5.2, while Columns 2 and 5 show the estimation of Equation 5.3. (Columns 1, 2, 4, and 5 omit the piecewise spline in the Selben index). All the specifications estimated using the IV procedure show a negative effect of the BDH program on the hazard of leaving unemployment. For example, Column 3 (6) shows that the BDH program has a significant effect reducing the log hazard of leaving unemployment of around 1.17 (1.01) in the mother (non-mother) 2007–2010 panel sample. In other words, the BDH program decreases the hazard of leaving unemployment by 69% (77%). This evidence suggests that treated mothers (non-mothers) experience a longer duration of unemployment than mothers (non-mothers) with similar characteristics but who do not receive BDH benefits.[26]

---

[24] In the 2005–2006 panel sample, 22% of the unemployed workers belong to families receiving BDH benefits. This figure is about 20% in the panel sample constructed after the methodological change. Mothers receiving BDH benefits account for 6.7% of unemployed workers in the 2005–2006 panel sample and 4.8% in the 2007–2010 panel sample.

[25] Mothers are defined as any female head or spouse of a male head in a household with children and any female daughter of the head or spouse older than 15 years of age in a household with grandchildren.

[26] The median unemployment survival time for mothers with no BDH benefits is around 12 weeks, while for those mothers who receive the cash transfer this median time is around 24 weeks.

TABLE 5.3 | **Effect of the Human Development Bonus Program on the Duration of Unemployment, 2007–2010**

Dependent variable: Duration in weeks	Mothers			Non-mothers		
	(1)	(2)	(3)	(4)	(5)	(6)
I(*BDH* = 1)	−0.58	−0.696*	−1.172*	0.006	−0.634*	−1.011*
	(.425)	(.336)	(.572)	(.272)	(.291)	(.466)
Age	−0.125	−0.132	−0.188**	−0.079	−0.092	−0.058
	(.088)	(.081)	(.071)	(.051)	(.05)	(.043)
Age squared	0.002	0.002	0.002**	0.001	0.001	0.001
	(.001)	(.001)	(.001)	(.001)	(.001)	(0)
Gender (male = 1)				−0.385	−0.268	−0.384
				(.343)	(.342)	(.282)
Selben Index			−0.069			−0.155
			(.109)			(.119)
Selben Index x $z_{i,t}$			−0.265			0.141
			(.19)			(.187)
Complete Primary (or less)	0.362	0.473	0.275	0.491	0.674	0.884*
	(.453)	(.494)	(.335)	(.444)	(.452)	(.394)
Incomplete or Complete Secondary	0.186	0.095	0.025	0.395	0.463	0.524
	(.373)	(.359)	(.277)	(.376)	(.376)	(.308)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	100	100	157	152	152	223

Source: Authors' calculations using the 2005–2006 and 2007–2010 panel samples.
Note: Columns (1) and (2) show estimation of a Cox and IV Cox proportional hazard model using a sample composed of households scoring in an interval of ± 3 points around the Selben cutoff point. Columns (3) and (6) show the estimation of an IV Cox proportional hazard model using an interval of ± 5 points around the Selben cutoff point. In Columns (2), (3), (5), and (6), *I*(*BDH* = 1) was instrumented using an indicator variable adopting the value of one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. Figures in parentheses are robust standard errors. Estimations use the ENEMDU probability weights. * significant at 10%; ** significant at 5%; *** significant at 1%.

Impact on the Transition from Unemployment to Informality

Gonzalez-Rozada and Llerena Pinto (2011) implement a multinomial logit estimation distinguishing four different destination states: remaining in unemployment (baseline category), formal employment in the first post-displacement job, informal employment in the first post-displacement job, and out of the labor force. Table 5.4 reports the results. Multinomial logit specifications 1 and 2 use a sample composed of households scoring within an interval of ± 3 points around

the Selben cutoff point, while multinomial logit specification 3 uses a sample composed of households scoring within an interval of ± 5 points around the Selben cutoff point. This last one is our preferred specification as it controls for a piecewise linear spline in the Selben index with a kink at the cutoff point. The first column in each specification (i.e., 1, 4, 7, 10, 13, and 16) shows the estimation of the probability of leaving unemployment toward formal employment; the second column shows the estimation of the probability of leaving unemployment toward informal employment; and the third column in each specification shows the estimation of the probability of leaving unemployment toward inactivity. Evidence suggests that for mothers and non-mothers, the BDH program is not a distortive policy that increases the finding probability of informal jobs.

Impact on the Probability of Separation from Formality

Gonzalez-Rozada and Llerena Pinto (2011) build pooled cross-section samples[27] and define in each one a binary variable called "separation" adopting the value of one if a formal worker changes his/her labor condition (that is, if the worker goes from formal employment to unemployment, informal employment, or out of the labor force). Table 5.5 shows the logit estimation for the 2007–2010 sample. Explanatory variables include a policy variable, either a binary indicator that the mother receives the cash transfer or a binary variable adopting the value of one if the worker lives in a household enrolled in the BDH program and zero otherwise, and exogenous control variables such as age and its square, educational attainment variables, and gender. Columns 1 to 3 show the estimation for mothers with formal employment, while Columns 4 to 6 show the estimation for formal workers in general. As before, estimations in Columns 1, 2, 4, and 5 use a sample composed of households scoring within an interval of ± 3 points around the Selben cutoff point, while estimations in Columns 3 and 6 use a sample composed of households scoring within an interval of ± 5 points around the Selben cutoff point (preferred estimations). In Columns 2, 3, 5, and 6 the *I(BDH=1)* variable was instrumented using an indicator variable adopting the value of one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the quasi-Selben index. As was the case for job finding in the informal sector, the effect of BDH on formal separation is negligible.[28]

---

[27] See footnote 23.

[28] Gonzalez-Rozada and Llerena Pinto (2011) found some significant results in the effects of BDH on formal separation for 2005–2006: mothers receiving BDH benefits have a three times greater chance of leaving a formal job than the comparable group of mothers with no benefits. For the non-mother group, the authors find no significant impact in both pooled cross-section samples.

TABLE 5.4 | Effect of the BDH Program on the Transition Probabilities from Unemployment, 2007–2010

Dependent variable:	Mothers									Non-mothers								
	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3			Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
I(*BDH* = 1)	−0.146	−0.276	−0.058	0.231	0.805	0.199	1.606	1.831	0.874	−0.87	−1.246	−1.033	1.117	0.863	0.341	1.57	1.113	0.664
	(.797)	(.839)	(.755)	(.769)	(.796)	(.685)	(1.21)	(1.252)	(1.153)	(.695)	(.654)	(.774)	(.598)	(.569)	(.647)	(.816)	(.81)	(.958)
Age	−0.078	0.027	−0.164	−0.063	0.051	−0.153	0.017	0.19	−0.102	0.102	−0.006	−0.441***	0.144	0.037	−0.421***	0.02	−0.039	−0.460***
	(.184)	(.22)	(.18)	(.19)	(.219)	(.184)	(.16)	(.199)	(.142)	(.116)	(.091)	(.119)	(.116)	(.096)	(.124)	(.099)	(.084)	(.113)
Age squared	0.001	0	0.003	0.001	−0.001	0.003	0.000	−0.002	0.002	−0.002	0	0.005***	−0.002	−0.001	0.005***	−0.001	0.000	0.005***
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)	(.002)	(.003)	(.002)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Gender (male = 1)										−0.569	1.14	−0.243	−0.642	1.084	−0.166	−0.323	0.956	−0.339
										(.727)	(.884)	(.768)	(.745)	(.88)	(.796)	(.591)	(.69)	(.648)
Selben Index							0.076	0.14	−0.016							0.378	0.395*	0.254
							(.342)	(.315)	(.295)							(.198)	(.201)	(.269)
Selben Index x $z_{i,t}$							0.737	0.578	0.379							−0.445	−0.700*	−0.259
							(.439)	(.435)	(.415)							(.321)	(.308)	(.368)
Complete Primary (or less)	0.453	0.441	−0.076	0.412	0.203	−0.111	0.791	0.825	0.409	0.625	0.646	0.288	0.064	0.029	−0.247	−0.251	−0.279	−0.157
	(.818)	(.815)	(.794)	(.844)	(.909)	(.76)	(.743)	(.772)	(.666)	(.651)	(.719)	(.803)	(.68)	(.748)	(.79)	(.574)	(.623)	(.682)

(continued on next page)

TABLE 5.4 | Effect of the BDH Program on the Transition Probabilities from Unemployment, 2007–2010 (*continued*)

Dependent variable:	Mothers									Non-mothers								
	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3			Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**
Intercept	0.28	−1.415	2.14	−0.122	−2.294	1838	−7.05	−15.284	2	−1.908	−0.584	7.544***	−3.254	−1.933	6.773**	−29.04	−30.166*	−11.541
	(3.106)	(3.676)	(3.075)	(3.306)	(3.732)	(3.199)	(25.301)	(23.938)	(21.688)	(2.264)	(1.842)	(2.16)	(2.254)	(2.017)	(2.188)	(14.971)	(15.231)	(20.577)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	100	100	100	100	100	100	157	157	157	152	152	152	152	152	152	223	223	223

Source: Authors' calculations using the 2007–2010 panel sample.
Note: Multinomial logit specifications 1 and 2 use a sample composed of households scoring in an interval of ± 3 points around the Selben cutoff point. Multinomial logit specification 3 uses a sample composed of households scoring in an interval of ± 5 points around the Selben cutoff point. In Columns (4) to (9), the *I*(*BDH* = 1) variable was instrumented using an indicator variable adopting the value of one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. In all estimations, remaining in unemployment is the base category. In the three specifications, the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%.

TABLE 5.5 | **Impact of the BDH Program on the Separation Probability from Formality, 2007–2010**

Dependent variable:	Mothers			Non Mothers		
Separation Probability	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
I(BDH=1)	0.241	0.226	0.416	−0.095	0.108	0.076
	(.242)	(.225)	(.353)	(.191)	(.155)	(.236)
Age	0.180***	0.178***	0.147***	0.053*	0.054*	0.051**
	(.044)	(.044)	(.032)	(.021)	(.021)	(.017)
Age squared	−0.002***	−0.002***	−0.002***	−0.001**	−0.001**	−0.001**
	(.001)	(.001)	(0.000)	(0.000)	(0.000	(0.000)
Gender (male=1)				0.592*	0.595*	0.221
				(.261)	(.26)	(.186)
Selben Index			0.078			−0.035
			(.096)			(.062)
Selben Index x $z_{i,t}$			−0.004			0.048
			(.13)			(.087)
Education						
Incomplete or Complete	0.245	0.251	0.146	−0.066	−0.035	−0.048
Secondary	(.255)	(.256)	(.214)	(.179)	(.18)	(.145)
More than Complete	−0.528	−0.553	−0.795*	−0.506	−0.46	−0.439*
Secondary	(.439)	(.44)	(.359)	(.27)	(.268)	(.205)
Intercept	−4.228***	−4.213***	−9.351	−2.919***	−3.042***	0.163
	(.971)	(.966)	(7.09)	(.569)	(.572)	(4.562)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,667	1,667	2,589	2,378	2,378	3,753

Source: Authors' calculations using the 2007–2010 pooled cross-section sample.
Note: Columns (1) to (3) show the estimation of a logit model for mothers who had formal employment during the fourth quarters of 2007 and 2008 and the first quarters of 2008 and 2009. Columns (4) to (6) show the same estimation but for workers who had formal employment during the fourth quarters of 2007 and 2008 and the first quarters of 2008 and 2009. Estimations in Columns (1), (2), (4) and (5) use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Estimations in Columns (3) and (6) use a sample composed of households scoring in an interval of ± 5 points around the Selben cutoff point. In Columns (2), (3), (5) and (6) the *I*(*BDH*=1) variable was instrumented using an indicator variable adopting the value of one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%.

Concluding Remarks: The Human Development Bonus Program in Ecuador

This case study has looked at the impact of the BDH program on the duration of unemployment, the probability of going from unemployment to informal employment, and the probability of separation from formal employment. Exploiting the program's targeting mechanism and a regression discontinuity design, Gonzalez-Rozada and Llerena Pinto (2011) isolate the causal effects of the program on these labor market outcomes for two groups of workers: mothers who receive the cash transfer and workers living in households receiving the BDH. The main findings are: (1) Mothers with BDH benefits and workers living in households receiving the BDH have a longer duration of unemployment than the comparable group of workers that do not receive those benefits; (2) The BDH program does not have distortive effects on the probability of finding an informal job for mothers and workers living in households receiving BDH benefits; and (3) The BDH program seems to increase the probability of separation from formal employment for mothers receiving the cash transfer between 2005 and 2006. No impact is found for either mothers receiving BDH benefits or workers living in households receiving BDH benefits when using data for 2007–2009. While the sample size of the group analyzed in the ENEMDU panel constrains the empirical strategy, these findings are still important, as they open the discussion about the eventual nondesirable effects of CCTs on some labor market outcomes, leaving room for further refinements (using administrative records) and for government debate and eventual intervention.

References

Calderón, V. and Marinescu, I. 2012. "The Impact of Colombia's Pension and Health Insurance Systems on Informality." IDB Publication No. 6439. Washington, DC, United States, United States: Inter-American Development Bank.

Camacho, A., Conover, E., and Hoyos, A. 2009. "Effects of Colombia's Social Protection System on Workers' Choice between Formal and Informal Employment." Working Paper No. 006003. Bogotá, DC, Colombia: Centro de Estudios sobre Desarrollo Económico (CEDE), Universidad de los Andes.

Carrasquilla, A. and Mejía, P. 2010. "Aseguramiento en salud e informalidad: reflexiones sobre una inconsistencia." Revista de Asuntos Públicos 5. Bogotá, DC, Colombia: Escuela de Gobierno, Universidad de los Andes.

Gonzalez-Rozada, M., and Llerena Pinto, F. 2011. "The Effects of a Conditional Transfer Program on the Labor Market: The Human Development Bonus in Ecuador". Washington, DC, United States: Inter-American Development Bank. Mimeographed document.

Llerena Pinto, F. 2009. "Pobreza y educación en Ecuador: evaluación de impacto de la transferencia monetaria condicionada." Mimeographed document.

Ponce, J. and Bedi, A. 2010. "The Impact of a Cash Transfer Program on Cognitive Achievement: The Bono de Desarrollo Humano of Ecuador." *Economics of Education Review.* 29(1): 116–25.

Schady, N. and Araujo, M. 2006. "Cash Transfers, Conditions, School Enrollment, and Child Work: Evidence from a Randomized Experiment in Ecuador." Policy Research Working Paper No. 3930. Washington, DC, United States: World Bank.

Turner, B. 2006. "Policy Analysis of Ecuador's Bono de Desarrollo Humano Program." World Bank, "Bono de Desarrollo Humano" Project Appraisal Document. Mimeographed document.

Urquiola, M. and Verhoogen, E. 2009. "Class Size and Sorting in Market Equilibrium: Theory and Evidence." *American Economic Review.* 99(1): 179–215.

Van der Klaauw, W. 2002. "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach." *International Economic Review.* 43(4): 1249–287.

Latin America employs two thirds of its labor force under informal arrangements, more than other emerging regions such as the Middle East, North Africa, or Central Asia. Within Latin America, the Andean group leads the ranking of economies with the most informal labor markets: pooling informal salaried and informal independent workers, informal labor constitutes about 70% of the labor market in Colombia and Venezuela and between 80% and 90% in Ecuador, Bolivia, and Peru. In other words, for every 10 jobs in the Andean countries, only two involve social security. This evidence is symptomatic of a regional atrophy: endemic informality in the Andes—or what we call *Andemic Informality*.

Since high informality can drag economic growth, perpetuate inefficiencies, and exacerbate vulnerabilities, and since informality is rampant in the region, a comprehensive understanding of the dynamics of informality is necessary to prescribe sustainable policies to address the problem in a way that incorporates the assessment of risks and vulnerabilities of different groups of workers.

In this context, recent studies of Latin American labor markets have focused on analysis of the determinants, evolution, and implications of increasing informal arrangements between workers and employers. This book adds to that tradition with a refreshed dynamic and causal perspective that exploits novel panel data sets, recent methodological advances, and identification strategies after recent policy reforms in Andean countries.

IDB

INTER-AMERICAN DEVELOPMENT BANK