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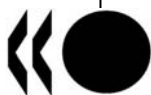
**THE ECONOMY OF THE POSSIBLE: PENSIONS AND INFORMALITY IN LATIN AMERICA**

**By Rita Da Costa, Juan Ramón de Laiglesia, Emmanuelle Martínez and Ángel Melguizo**

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## PREFACE

Social protection coverage is insufficient in most countries in Latin America. Even short-term shocks, such as a temporary job loss or a period of illness, can permanently move many citizens into poverty in the absence of public support. From a longer-term perspective, irregular contributions to old-age pension systems, whether publicly or privately managed, foretell insufficient pensions for the majority of the retired population in the decades to come.

These worrying prospects are not restricted to the poorest segments of society. A majority of middle-sector workers – workers who are in the middle of the income distribution – are employed in the informal labour market. Indeed, in contrast to most OECD economies, informality is prevalent in Latin America: it accounts for more than 50% of total non-agricultural employment in the region, with the proportion ranging from around three-quarters in Ecuador and Peru, to a little over one-third in Colombia and Chile. Pervasive informality, in turn, interacts with contributory social protection systems to create a vicious cycle: the majority of informal workers contribute irregularly, if at all, and fail to secure support for their own time of need. This scenario will put significant pressure on policy makers, who in many cases have focused on poverty alleviation programmes but overlooked the insufficient coverage of the less poor – but still vulnerable – middle sectors.

This paper by Rita Da Costa, Juan Ramón de Laiglesia, Emmanuelle Martínez and Ángel Melguizo, from the OECD Development Centre, contributes to this relevant debate. The authors examine in detail the interactions of the pension system with income levels and labour informality in Bolivia, Brazil, Chile and Mexico. These four countries effectively illustrate the varied realities of informality levels, pension schemes, and coverage outcomes in the region. The authors demonstrate that being a middle-sector worker and having an informal job are not mutually exclusive. Based on this original research, they discuss the main policy responses, both in the short and the long run. In particular, given Latin America's particularly constrained fiscal space, encouraging the informal middle sectors to join contributory social protection schemes will be a vital part of mobilising their savings for social insurance, and building fairer and more efficient social risk-management systems.

Mario Pezzini

Director

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January 2011

## RÉSUMÉ

La couverture des pensions de retraite est relativement faible en Amérique latine. Indépendamment des types de systèmes de retraite, cette situation représente un défi pour les politiques publiques : aussi bien les faibles niveaux d'affiliation que les historiques de contribution irréguliers indiquent que les retraites des décennies à venir seront insuffisantes. Cet article décrit la relation existant entre les systèmes de couverture retraite et le phénomène d'informalité du marché du travail en Bolivie, au Brésil, au Chili et au Mexique, par niveau de revenu, et à partir des données d'enquêtes de ménage. L'analyse souligne le fait que le nombre de travailleurs formels est limité, et ce même parmi les groupes de revenus moyens et élevés. De même, les taux de couverture (mesurés par la proportion de contribuables ou d'affiliés par rapport au nombre total de travailleurs) varient de 10 % pour la force de travail en Bolivie, à 62 % au Chili. 76 % des travailleurs formels sont couverts en moyenne, tandis que parmi les travailleurs indépendants agricoles ce chiffre ne dépasse pas 7 %. En se basant sur ce pronostique, différentes alternatives de réformes de retraites sont examinées.

**Classification JEL:** H55, J32, O17.

**Mots clé:** pensions de retraite, informalité, travailleurs indépendants, Amérique latine.

## ABSTRACT

Social protection coverage is quite low in Latin America. This situation, irrespective of the type of pension scheme, represents a challenge for public policy since these low levels of affiliation and irregular contribution histories indicate that pensions will be insufficient in the coming decades. This paper describes the relationship between pension protection and labour informality in Bolivia, Brazil, Chile and Mexico by income level, using several rounds of national household surveys. Our analysis highlights that labour formality is limited, even among the middle and the high income groups. Correspondingly, coverage rates (measured by contributors or affiliates over workers) range between 10% of the labour force in Bolivia to up to 62% in Chile. 76% of formal workers are covered on average, while coverage among the self-employed in agriculture is below 7%. Based on this prognosis, we discuss some alternative pension reforms.

**JEL-Classification:** H55, J32, O17.

**Keywords:** old-age pension, informality, self-employment, Latin America.

## I. INTRODUCTION

According to recent figures, only a third of the population aged over 65 years in Latin America is entitled to a pension. The lacklustre outcome in pension coverage may not be surprising if one knows that only about a third of the active population is covered by social security – contributing to a pension and/or entitled to health insurance (Mesa-Lago, 2009). Moreover, labour informality remains high in Latin America and the Caribbean. Informal employment accounts for more than 50% of total non-agricultural employment in Latin America, with the proportion ranging from around three-quarters in Ecuador and Peru, to a little over one-third in Colombia and Chile (precise estimates depend on measurement methods; see OECD, 2008 and Jütting and de Laiglesia, 2009).

Given the prevalence of informal work in the region, policy makers could be tempted to address the coverage issue by focusing solely on lower income groups and those working informally, assuming that middle classes are largely covered by existing systems. This paper argues that such an approach would be misled for two reasons: first, because many workers around the middle of the income distribution are informal and they exhibit radically different coverage patterns from formal workers at similar levels of income; second, because policy reform in social protection systems on its own is unlikely to make a dramatic dent in the level of informality.<sup>1</sup>

A relatively secure steady job is almost a defining characteristic of the middle class in the developing world, in contrast to the lower income groups in the same countries (Banerjee and Duflo, 2008). Regular pay has benefits that go beyond the monthly cheque. People with regular pay are more likely to have better access to credit. Secure, stable incomes therefore have profound implications for wellbeing. Moreover most social protection systems, be they for unemployment, health care or pension benefits are contributory. Middle class workers in steady employment are the group most likely to pay into these schemes – and most likely to be able to draw on them when needed.

Pervasive informality interacts with contributory social protection systems to create a vicious cycle, in which the mass of informal workers weaken those systems by contributing irregularly if at all and yet fail to secure support for when they need it. Even short-term shocks, such as a temporary lay-off, or a period of illness, can permanently move them back into poverty

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1 This is not to say that policy in social protection or other areas is powerless. The extent of informality in a country is inversely linked with per capita income, but per capita income does not explain everything. Informality in Argentina and Ecuador, for instance, is nearly 20 percentage points higher than in other countries with similar levels of per capita income (OECD, 2009).

in the absence of public support. But not all informal workers are poor (many earn around the median income) or unproductive. Nor should they all be seen as victims of exclusion from the formal sector since some of the informality observed reflects to a voluntary exit rather than exclusion.

In a nutshell, these two worlds – workers in the “middle sectors”<sup>2</sup> of the income distribution and informal employment – are not mutually exclusive. In this paper we look at how social protection works in practice for Latin American workers with different income levels, and examine some of the policy responses this relationship calls for. So far, responses have focused on *ex post* interventions: transfers that are not linked to contribution histories, often referred to as “social pensions”; and transfers which guarantee a minimum pension within mandatory-contributory pension schemes (conditional on a given contribution history). Unfortunately, the large fiscal commitment that such policy responses would imply is for many countries in the region a big challenge; public resources are scarce in Latin America. As discussed extensively in OECD (2008), this shortage can principally be laid at the door of low tax-collection rates, particularly in the case of personal income taxes – rates are low by international standards even controlling for differences in per capita income. The resulting lack of resources restricts the public sector’s ability to take effective (and in many cases efficient) measures such as extending universal health care, or, in this particular case, permitting wider access to minimum pensions.

Besides, a non-contributory basic pension can in fact be a disincentive to formalisation: if workers are covered independently of their contributions – frequently tied to formal employment – they may well seek informal jobs instead. As such, social protection policies need to be designed in conjunction with a framework of appropriate social, labour and macroeconomic institutions. Pension systems – and social protection in general, including their interaction with unemployment benefits, health insurance – should adopt a pragmatic “political economy of the possible” approach (Santiso, 2006). Pragmatism in social protection reform means responding to three key social and institutional features in Latin American: high labour informality, a relatively young (although rapidly ageing) population, and limited fiscal resources.

To analyse in detail how the pension system interacts with income levels and labour informality, we draw on household-level data from Bolivia, Brazil, Chile and Mexico from the mid-1990s to the mid-2000s. This sample represents a good mix of country-specific and regional considerations. It covers the range of informality levels in the region (from the relatively low level in Chile, to the high in Bolivia) and the main forms of pension scheme (from the public pay-as-you-go system in Brazil to private ones based on individual capital accounts).

The paper is organised as follows: Section II sets the backdrop of the pension coverage challenge in Latin America. We describe the data sources and present the main coverage statistics and the key results from the literature. In Section III we focus on the labour status of workers in our set of Latin American countries, grouped under three income ranks, disadvantaged, middle sectors and affluent. Section IV combines these job and income categories with actual pension coverage, based both on descriptive statistics and on an econometric analysis

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2 In line with the measurement and terminology of Castellani and Parent (2010), the middle sector refers to those workers in households with income between 50% and 150% of the national median.



of the determinants of contribution. Against this background, Section V discusses alternative pension reforms to address the coverage gap, subject to the prevalence of labour informality. Section VI concludes.

## II. SETTING THE CHALLENGE: PENSION COVERAGE IN LATIN AMERICA

### II.1. The challenge of pension coverage in Latin America

In Latin America, only a third of active workers contribute to a pension system. The shortfall in coverage will generate a shortfall in benefit coverage in coming decades. Indeed, today only a third of the over-65 population is entitled to pensions from the contributory system (Mesa-Lago, 2009). In only a few countries – Argentina, Bolivia, Brazil, Chile, Costa Rica and Uruguay – are rates above 60% (Rofman *et al.*, 2008). Allowing for changes over time, and worker mobility in and out of the pension system, the two could be only loosely related, but the high cross-country correlation between the two measures of performance is certainly suggestive of the need to address coverage head on.

The shortfall in coverage in the region hides significant diversity due to both levels of average income, differences in their demographic history as well as differences in the pension system. Chile and Uruguay have coverage rates for the economically active population above 60% compared to Bolivia and Paraguay's 13%. Similarly, Uruguay and Brazil cover 85% of their elders, while the corresponding figure in Honduras or Nicaragua is in single digits (Mesa-Lago, 2009).

Not only is pension coverage in Latin America low on average, it is correlated with individual income levels (see for instance Rofman *et al.*, 2008). Based on an ample sample of countries from the region, at least four sub-groups can be distinguished. I) Paraguay, Nicaragua, Honduras, Dominican Republic and Bolivia where the coverage ranges from a maximum of 40% for the highest income quintiles to values close to zero for the lowest ones. In Bolivia from the 1990s to 2000s the gap actually widened, coverage increasing for the highest quintile, while falling for the fourth quintile; II) Peru, Ecuador, Guatemala and El Salvador, where coverage peaks at around 60% for the highest quintiles while lower quintiles have values ranging from below 5% to 20%. Except in Ecuador with 20% coverage), this group sees significant variation in coverage between quintiles. This is particularly notable in Guatemala, where the difference in coverage of the first and the fifth quintiles is around 60%; III) Colombia, Venezuela, Mexico, Argentina and Panama have similar overall coverage rates (from 5% to 60%), but lower dispersion between income levels; and IV) Brazil, Uruguay, Costa Rica, and Chile show the highest coverage rates for all income levels, with the highest quintiles reaching 80% (Uruguay), and even the lowest above 20% (Brazil).

Compared to possibly optimistic priors, coverage is particularly low in the middle three quintiles even though these are not amongst the poorest. Rates for these workers in the first group of countries are around 15% in the 2000s (ranging from 10% in Bolivia to 20% in

Dominican Republic), and only slightly over 20% in the second group (with the exception of Peru where it is only around 10%). In the third group, coverage is around 40% (ranging from 41% in Argentina and Panama to around 35% in Colombia). Coverage is higher in the fourth group at above 50% on average for all countries included. Extending the analysis back in time finds no clear or reassuring pattern: between the 1990s and 2000s, coverage of these middle quintiles increased in about half of the countries of the region, but decreased in the other half.

What structural factors drive these modest improvements and how can policy improve pension coverage? In the remainder of the paper, we exploit household data to deepen this analysis by introducing a key element, labour informality. We will do so for our sample of four Latin American countries, Bolivia, Chile, Mexico and Peru. Not only does this sample span the region's set of labour informality outcomes and pension schemes, it also represents the diversity in pension coverage outcomes.

## II.2. Main data sources

The data are drawn from nationally representative household surveys from Bolivia, Brazil, Chile and Mexico, from the mid-1990s to 2006. Due to data availability, the same years and periods are not covered for all countries within this time range. To be precise; the datasets used are the *Encuesta Continua de Hogares de Condiciones de Vida* (ECH), years 2001 and 2002 for Bolivia; the *Pesquisa Nacional por Amostra de Domicilios* (PNAD), years 1996, 1998, 1999 and 2001 to 2006 for Brazil; the *Encuesta de Caracterización Socioeconómica Nacional* (CASEN) years 1994, 1996, 1998, 2000, 2003 and 2006 for Chile, and the *Encuesta Nacional de Ingresos y Gastos de los Hogares* (ENIGH) years 1998, 2000, 2002, 2004 2005 and 2006 for Mexico.<sup>3</sup> Total population figures from household surveys and the underlying sample multipliers have been adjusted with data from Social Panorama of Latin America (ECLAC, 2008) data on population for the four countries.

Throughout the paper and for ease of exposition, households are categorised in three income groups: disadvantaged, middle sector and affluent. This classification is based on per capita household income (including both labour and non-labour income) in adult-equivalent terms. Household size is measured in adult-equivalent terms to allow comparison of households of different sizes and structures; the equivalence scale is the following: a weight of 1 is assigned to the household head, a weight of 0.5 to each additional adult, and a weight of 0.3 for each child aged 14 or younger.<sup>4</sup> Households are classified as middle sectors – population in the middle of the income distribution – if they have income between 50% and 150% of the household-adjusted median income per head for the country. The other two classes, disadvantaged and affluent, are those below 50% and above 150% of the median respectively (in line with Castellani and Parent,

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3 Table A1 in the annex provides more information on the coverage, period of survey, accessibility and questions of these dataset. These are (some of) the same datasets used by Rofman *et al.* (2008). Different methodological choices lead to slight differences in average outcomes between their results and ours for aggregate outcomes, which are nonetheless largely comparable.

4 This is the “OECD-modified scale”, which has been adopted by the European Commission, among others. Other scales used in international comparisons include the square root of household size (used in many OECD studies since the 1990s). In practice, the difference implied by the choice of one or another of these weighting schemes is small.

2010). Indeed, 50% of the median adult-equivalent per capita income is used to define the poverty line in a number of countries, especially within the OECD (OECD, 2008b). Relative poverty so defined is also increasingly relevant for a number of emerging countries (OECD, 2010). The disadvantaged group is therefore the group that is considered poor by this particular measure.<sup>5</sup> Individuals are then categorised as per the household they are in (regardless of their share of income earnings within the household). Among the countries examined in this paper, the middle sectors account for nearly 50% of the workforce, the disadvantaged account for about 20% and the affluent 30%. A notable exception to this pattern is Bolivia where the proportion is closer to one-third for each segment.

### II.3. Defining and measuring pension coverage

To analyse pension coverage, it is necessary to establish two different definitions for coverage of the working-age population – reflecting their status as contributors to the pension system, and coverage rates for the elderly – reflecting their status as benefit recipients.

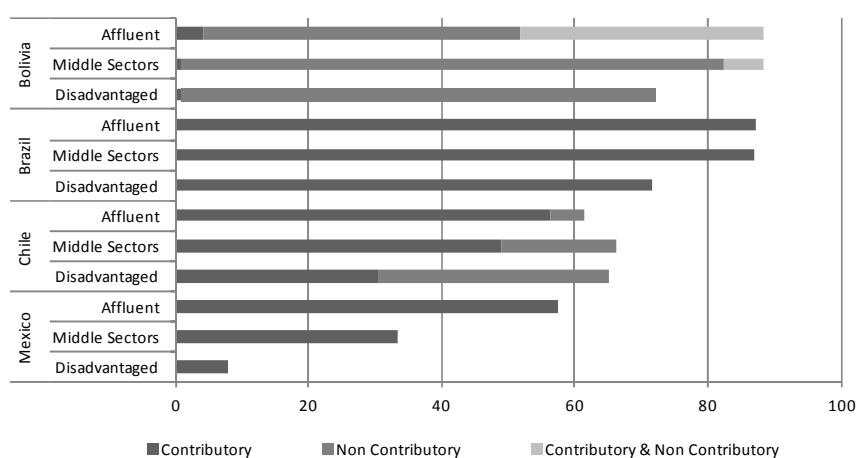
Calculating coverage rates for the elderly (over 65 years old) is straightforward, since this is the group currently receiving benefits. Focusing on our sample of countries, Figure 1 presents coverage rates after retirement across income groups, based on the population over 65 who declare receiving old-age benefits in the respective household survey.<sup>6</sup> Similarly to the findings of Rofman *et al.* (2008) for the working-age population, coverage rates are also positively correlated with income. Differentiating by types of pension, coverage rates for contributory pensions are low – the exception is Brazil, where they are above 85% on average, and 87% among the middle sectors. For this reason, as previously mentioned, many countries have pursued non-contributory pension schemes.

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5 National poverty lines or the international USD 1.25 a day would typically identify respectively a larger and a smaller group of poor individuals. However, as they are set by different methods and standards, they do not offer similar comparability (Garroway and de Laiglesia, 2010).

6 Table A2 in the annex details the specific survey questions used to identify benefit recipients, as well as the nature of the benefit.

Figure 1. Pension coverage rates of the elderly by income level  
(percentage, pension beneficiaries over population over 65 years)



Note: Data for 2006 except Bolivia 2004. No data are available for non-contributory pensions in Brazil and Mexico.

Source: Authors' calculations based on National Household Surveys.

By contrast, defining pension coverage during working life, which is key to explaining the outcomes in coverage of the elderly, is significantly more difficult, both conceptually and due to data limitations. The most direct measures are affiliation rates, *i.e.* the number of members registered in the pension system divided by a measure of the potential universe of members, be it working-age population, economically-active population or employed workers. However, this measure does nothing to capture the main outcomes of the system, such as the savings a member can expect to have accumulated at retirement or expected total years of contributions. A better definition would be the ratio of the total months of contribution over the total months affiliated to the pension system. Unfortunately, the use of such a measure requires rich data on contribution histories, typically not available alongside a large set of other socio-economic outcomes (with the notable exception of the *Encuesta de Protección Social* in Chile). An intermediate option, used in this paper, is the ratio of contributors to workers. While active contributors may not ultimately be entitled to a pension at retirement, this measure has the advantage of capturing contribution behaviour at a given point in time, which can then be explored in relation to other contemporaneous circumstances, including job status.

Indeed, it is important that any measure of coverage have a dynamic component. Workers tend to shuttle frequently in and out of the labour force, between work and unemployment, and between formal and informal jobs and between different types of job (salaried and self-employed) within each category. Using data from the first two waves of the Mexican Family Life Survey, changes in status between 2002 and 2005, de Laiglesia *et al.* (2008) examine mobility for different categories of workers, measuring formality by the coverage by social security. Overall mobility for both men and women is high and the probability of remaining in any particular employment sector is relatively low – the highest value is 63% for self-employed males, with the probabilities of remaining in formal sector salaried jobs being 62% for men and 55% for women. Moreover, although inter-temporal and cross-national comparisons of mobility are complicated by differences in methods and data, there is evidence of mobility

being higher when large economic shifts are underway, such as in the transition countries during the late 1990s (Pages and Stampini, 2007). Finally, the rate of movement from formal to informal work is comparable to movement in the opposite direction. This impression derived from these simple transition matrices is confirmed when controlling for the effects of different rates of job separation and job creation across sectors (Bosch and Maloney, 2010).

The evidence on labour dynamics in Latin America has two key implications for labour-market and social protection policy. First, at least part of the informal workforce – especially among the self-employed – is not rationed out of formal salaried jobs. Instruments to integrate them into pension systems will therefore need to consider their incentives and the ability of the state to harness their saving capacity and demand for social insurance. Second, a number of individuals transit from informality to formality and back. This may be evidence of effective allocation of labour if demands are similar, but creates a challenge in ensuring coverage particularly in pensions which typically have lengthy eligibility periods. As a consequence, cross-sectional analysis of the data may be misleading. Proper analysis should instead seek to evaluate coverage from a life-cycle perspective, taking into account the effect of demographic change. It should also take into account the different contribution patterns revealed in the micro data, since there is significant variation across income levels, work status and gender.

Due to data availability, we examine “coverage” by contemporaneous self-declared contribution behaviour. An individual is considered “covered” if he responds positively to questions regarding contributions to or enrolment in a public or private pension scheme depending on the survey. In Chile data cover contributors to both the private pension funds (*Administradoras de Fondos de Pensiones*, AFP), and to the previous public pay-as-you-go system (*Instituto de Normalización Previsional*, INP). In Mexico, questions refer to enrolment in the private pension system (*Sistema de Ahorro para el Retiro*, SAR) managed by private pension funds (*Administradoras de Fondos para el Retiro*, AFORE), to the public institutions (*Instituto Mexicano de Seguridad Social*, IMSS; *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*, ISSTE), to the state company Pemex scheme, and to university insurance programmes. In Bolivia, coverage is proxied by enrolment in the private pension system (AFP). Finally, in Brazil, data cover contributors to the *Instituto de Previdência* at all its levels: national (*Instituto Nacional Seguro Social*, INSS), federal and local.

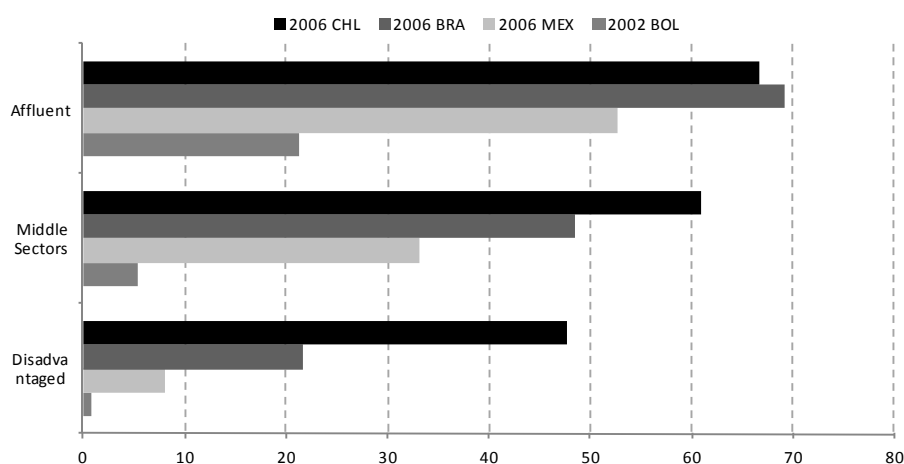
The universe is the working population, taken here as those individuals employed in the labour market aged 14 to 64 years; this age span captures adequately a typical labour career in Latin America where the average compulsory age is 14. Covering the whole of the working age population or the economically active population would be desirable if data on contribution density were available. Typically however, survey questions regarding pension contributions are placed in the labour and work module and are therefore only available for individuals in employment.

Finally, broadly speaking, in this paper we will consider that an individual needs to be contributing for around 60% of their working life to get an adequate pension. Over a stylised 40-year labour career this corresponds to 24 years of contributions, although in practice the timing of pension gaps and the worker’s wage profile matter as well. As a first approximation then, where a country’s overall coverage rates are below 60% it is likely that many if not most current workers are failing to accumulate enough to cover their retirement.

## II.4. Pension coverage among workers

Coverage rates for this working population – all classes included – vary markedly between countries and have increased slightly during the time span studied in each of them. Chile has the highest coverage rates (62% in 2006), a slight decrease from 63.6% in 1996; followed by Brazil (51.6% in 2006) whose coverage rates have also maintained stable during the time span studied (48.0% in 1996) and Mexico, where coverage rates increased from 33.2% in 1996 to 36.2% in 2006. Bolivia has the lowest coverage rates, around 9.7% in 2002. Additionally, in line with Rofman *et al.* (2008), coverage rates increase with income, though the extent to which this extends up the income distribution is noticeable (Figure 2).

Figure 2. Pension coverage rates by income level  
(percentage of workers covered)



Note: For Mexico and Bolivia the data is on enrolment, whereas for Chile and Brazil they capture contributors.

Source: Authors' calculations based on National Household Surveys.

Although lack of coverage for the disadvantaged is the usual focus of analysis and debate, it is apparent that this is also an issue for workers in the middle sector – either side of the median of the income distribution. The difference in coverage between the middle sectors and the affluent is never lower than around six percentage points (in Chile) and rises to around 20 points in Brazil and Mexico. The consequence is that many people currently in those middle sectors are likely to fall into poverty in old age. There were no significant changes in the coverage of this group of workers of those four countries during the period studied (1996-2006; see Tables A3 to A10 in the annex).

## II.5 Lessons from pension reform and contribution behaviour in Latin America

These modest results in terms of coverage in Latin America contrast with the predictions made almost two decades ago. According to the World Bank's 1994 report *Averting the Old Age Crisis: Policies to Protect the Old and to Promote Growth*, "structural pension reformers" (*i.e.* those countries who introduced of mandatory individual capital accounts, managed by the private sector), would benefit from improvements to their fiscal position (despite up-front fiscal costs

due to transition and maintained solidarity pillars, higher productivity, higher domestic savings and investment, and a boost to the development of their domestic capital and financial markets.<sup>7</sup> They were also expected to enjoy positive labour-market effects. Individual pension systems – because of the clearer link in members’ minds between the contributions they make and the benefits secured – should provide better incentives than traditional defined-benefit pay-as-you-go schemes (such as operate in most OECD countries). In turn this should lead to a higher structural employment rate, higher labour supply, and lower levels of informality (OECD, 2007).

Latin America became – by far – the most ambitious adopter of this reform agenda: Chile had already led the way in 1981 and was followed by Peru in 1993, Colombia in 1994, Argentina in 1994 (though reformed again in 2008), Uruguay in 1996, Mexico and Bolivia in 1997, El Salvador in 1998, Costa Rica and Nicaragua in 2000 and Dominican Republic in 2003.<sup>8</sup>

In practice evidence on these labour impacts remains controversial. The taxes needed to support the unreformed pension schemes may not have had as great an impact on employment as was supposed.<sup>9</sup> Even allowing for the relatively short period of time since the reforms were adopted (around 15 years on average, with lengthy transitional rules), the incentives to join the formal sector and pay contributions to the new system have proved weaker than expected. In fact, only Chile among the reformers and to a lesser extent Brazil, a non-reformer, seems to be bucking the regional trend.<sup>10</sup> Short-sightedness or lack of information on the part of workers, rational decisions based on volatile returns or high start-up fees, social preferences for anti-poverty (rather than savings) programmes, and the interaction with labour and social legislation all contribute to explain low overall coverage rates in the region (see the discussion in Gill *et al.*, 2005). This issue was already highlighted in Queisser (1998), who analysed the early stages of

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7 See Lindbeck and Persson (2003), or Barr and Diamond (2006) for a more sceptical view. The evidence for these benefits has been mixed (Gill *et al.*, 2005).

8 Among these reformers (and note that Brazil and Venezuela did not join the trend), three models emerged: substitutive, parallel and mixed (Mesa-Lago, 2008). In substitutive systems (adopted in Chile, Bolivia, Mexico, El Salvador, and Dominican Republic), the previous defined-benefit pay-as-you-go system is closed and replaced by individual capital accounts. Parallel systems (adopted in Peru and Colombia) are characterised by a deep reform of the public scheme, which then competes with new private ones. In the mixed systems (Argentina until the 2008 reform, Costa Rica, and Uruguay) provision is an aggregate of public (generally minimum) and private benefits. OECD (2009) presents a comprehensive database of pension regulation for OECD countries.

9 In the case of Chile, there is evidence that social-security taxes were already borne by employees, and therefore did not affect labour costs (Gruber, 1997; Cox-Edwards, 2002). On the other hand, studies covering Mexico and Colombia have found a smaller share being borne by workers, discouraging firms from hiring more workers (for Mexico see Cazorla and Madero, 2007; for Colombia Kugler and Kugler, 2003). Finally, Cruces *et al.* (2010) find partial shifting to wages, but no labour-market effects in Argentina.

10 Some studies have been able to conclude that in Chile the pension reform has led to a significant increase in formal employment, and reduction in unemployment (Corbo and Schmidt-Hebbel, 2003). In Brazil, informal employment remains above 40% but has decreased steadily since 2003 with accelerating net annual generation of formal employment (see Menezes Filho for informal employment and Scorzafave, 2009, and Côrtes Neri, 2010 for an analysis of the formal tier).



reformed pension systems in Latin America, specifically in Argentina, Bolivia, Chile, Colombia, El Salvador, Mexico, Peru and Uruguay, including the coverage challenge. Then, unlike the systemic reasoning behind the optimistic predicted effects of pension reform, many of the explanations for the relatively disappointing outcomes rely on individual workers' contribution behaviour.

To go from the examination of average coverage rates to the design of policy, it is necessary to understand the many interactions behind contribution decisions at the individual level. Previous studies have already tried to explain these preferences and interactions through analysing the characteristics at the individual and household level that lead a worker to decide to contribute or not in the region. Most empirical studies carried out for the region (Packard *et al.*, 2002; ECLAC, 2006; Auerbach *et al.*, 2007) rely on regressions that explain contribution behaviour by a number of correlates for a set of countries. Key explanatory factors include education, job type and household income. In their study of social security systems in 13 Latin American countries Packard *et al.* (2002) find that the household's income is a significant determinant of whether a worker is covered by social security; the same is true for household size, the smaller the household the higher likelihood that workers contribute to social security; as per the educational attainment, the higher education level, the higher the probability to contribute, since there is not only an increase of the information of the worker but also a higher wage. The same correlation between education and contribution is found by Pages *et al.* (2007), who in addition demonstrate that part time workers and workers in low-paid job (especially the ones who earn wages below the minimum wage), are less likely to be covered. ECLAC (2006) analyse the impact of job status and find that being self-employed decreases the probability to contribute while being a salaried worker increases it. As expected, the higher the education the higher the probability to contribute. The authors point out that job status (domestic services, professional or technical, microenterprises, salaried workers, self-employed, public sector) subsumes the effect of education through the selection process of educated individuals into better jobs in larger firms, themselves contributing factors.

These results stress the importance of income in determining workers preferences for being covered, directly and indirectly through the education level. In this paper we introduce not only income (the aforementioned three different income groups) but also an additional dimension, labour informality, in order to analyse further the coverage preferences of the group of independents.

### III. INFORMALITY AND WORK STATUS

Given the extent and persistence of informality in the region, no analysis of coverage rates in social protection would be complete without an examination of this dimension. Attempts to explain the limited coverage of Latin America's social-protection schemes often blame the duality of its labour markets. Indeed, some authors equate formal employment with job-linked pension entitlements (see Gasparini and Tornarolli, 2007 for an example.) More broadly, informality is often used to refer somewhat loosely to activities that are carried out outside of the legal or regulatory framework. Additionally, it is necessary to account simultaneously for the impact of income on contribution behaviour, which while related is not explained solely by job informality.

Such a generic term in fact spans a number of very different realities, from the outright illegal such as drug trafficking or smuggling, to very common exchanges which nonetheless take place outside formal and contractual environments, such as mutual help among neighbours. A job is informal when "the employment relationship ... is not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits" (ILO, 2003); in other words, when a labour relationship is neither observed nor protected by the government. It follows that informal employment includes not only many forms of self-employment, but also employment in informal enterprises (themselves usually excluded from labour inspection and social protection requirements), together with unregistered employment in formal enterprises or households.<sup>11</sup> Informal employment is therefore very heterogeneous and cannot be considered merely a form of underemployment.<sup>12</sup>

A substantial and growing body of evidence calls into question the view that informal workers are shut out of the formal sector as the sole result of a segmented labour market (the "exclusion" view). In particular, the finding that mobility between formal and informal employment is relatively large in both directions suggests that at least part of the population in informal work chooses to be outside the regulated economy (the "exit" view). This evidence is

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11 Domestic workers account for a sizeable share of informal employment in Latin America (15% according to ILO, 2009) and such employment explains much of the difference in informality rates between men and women in the region.

12 Informal employment has often been viewed as a residual sector. In classic development models of surplus labour (such as those of Lewis, 1954; Ranis and Fei, 1961; and Harris and Todaro, 1970) workers move from traditional agriculture to modern manufacturing, but may fail to find a formal job in the urban labour market. In that case, informal work is a form of underemployment that substitutes for outright unemployment.

summarised for emerging countries in Jütting and de Laiglesia (2009), and for Latin America in Perry *et al.* (2007).

The evidence on mobility and on relative incomes of formal and informal workers suggests that it is better to think of informal employment as two-tiered (Fields, 1990 and 2005). The lower tier includes occupations traditionally associated with informality: the majority of own-account workers whose firms do not offer growth prospects, and informal employees who are queuing for formal jobs. The upper tier comprises workers that are relatively better off, including informal sector employers and entrepreneurs with accumulated productive capital<sup>13</sup> and certain forms of false self-employment.<sup>14</sup> There are transition costs in moving from one tier to the other.

Acknowledging these tiers – and distinguishing between exit and exclusion – should be part of the design of policies that aim to increase the coverage of social protection. The distribution of earnings between formal and informal workers is similar and therefore there are workers in the upper tier who choose to opt out of the formal economy and its social-protection networks, but who could nonetheless afford the necessary contributions. On the other hand, most workers in the lower tier cannot afford to opt into social protection as independent workers and are not offered the possibility of providing payroll-linked contributions. There is unlikely to be a “one-size-fits-all” policy that will cover both of these situations, and the same conclusion can be expected to apply to pension policies for these two (admittedly stylised) groups.

### III.1. Measuring informality

For the purposes of analysis, we define formal employment as that which is subject to a written contract or a document that certifies social protection entitlement through employee status (such as the Brazilian *carteira de trabalho*). Using the existence of a labour contract to determine formality facilitates comparability since it echoes a form of regulation that is common to the countries of Latin America – the obligation to formalise and register an employment relationship (Kanbur, 2008).

An alternative, often applied in the literature, is to count workers covered by social-protection schemes. This is less comparable between countries, and also suffers from potential indeterminacies as a result of the unbundling of social benefits. Cover against health problems, occupational hazards, old age, maternity or unemployment may be provided separately, and coverage for different workers may differ across these dimensions, making them formal on one but informal on others. This is particularly true of pension coverage –the main outcome we seek to analyse.

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- 13 Self-employed workers in a professional capacity (craftsmen, and members of the liberal professions, among others) can also be thought of as pertaining to the upper tier of informal employment when their activities are undeclared and carried out personally, rather than as part of an incorporated enterprise.
  - 14 False self-employment is the practice of registering as a self-employed worker with the labour or tax authorities while working in a formal firm in a role whose characteristics would normally be associated with a labour contract. An example would be a “sub-contractor” who is exclusively hired by a single firm while technically remaining self-employed.

Formality defined, the task is then to sub-divide informal employment in a way which reveals different labour-market and social-insurance behaviours within it. In many countries in the region, self-employed workers are not obliged to register or contribute to social-security or pension systems. The first group is therefore self-employed workers all of whom we consider as informal, or at least not formal.<sup>15</sup> This group is subdivided according to the sector in which they work (agricultural or non-agricultural) and their level of education (in order to identify self-employed professionals). Informal employees make up the balance, and this group is similarly split into its agricultural and non-agricultural components. All in all, this leads us to define six categories: formal salaried workers, self-employed with completed tertiary education, non-agricultural informal employees, non-agricultural self-employed, agricultural informal employees, and agricultural self-employed. Motivations, incomes and applicable labour legislation differ across all these categories. Armed with this more nuanced – but still practical – framework, the problems posed by informality for social protection can be better analysed.

The categorisation of workers is based on survey responses to job characteristics. Workers are classified as formal employees if they were employed either in the public or private sector, and were holding a written work contract at the time of the survey.<sup>16</sup> All independent workers are classified as self-employed and are divided between the agricultural and the non-agricultural. The self-employed with tertiary education are the workers who belong to every independent categories of workers and completed a tertiary level of education. Informal employees are those employed either in the private or the public sector without a written work contract at the time of the survey.

### III.2. Formality and informality in Latin America

The composition of the workforce across income groups reflects partially the degree of inequality within countries. In most countries in our sample, about 20% of households fall into the disadvantage group, about 30% in the higher-income affluent group with about half in the middle sectors. In Bolivia, a larger share of the workforce is classified as disadvantaged, reflecting the higher proportion of the population with lower relative incomes. Figure 3 shows the composition of the workforce in terms of six categories across income groups, that is for each of the disadvantaged, middle sectors and affluent income groups. The six categories are ordered according to priors on the quality of jobs, with formal employees as the most stable and better paid jobs, followed by professionals as characterised by self-employed with tertiary education, other non-agricultural informal employees and finally informal agricultural workers, which includes households in subsistence agriculture and other groups which are potentially isolated in the economy.

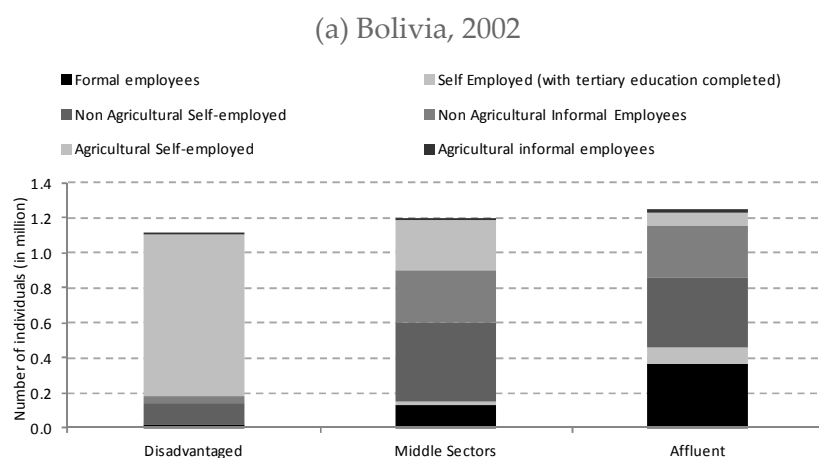
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15 Following the definition of the 17th International Conference of Labour Statisticians, the self-employed should be classified as formal when their enterprise is formal. Given heterogeneity in the relevant survey questions across countries, a definition based on (homogeneous) questions on employment status has been preferred.

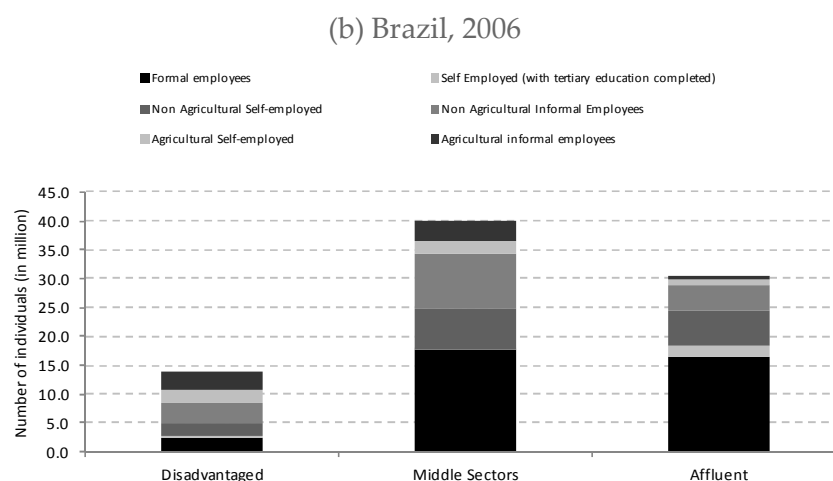
16 As already mentioned, in the case of Brazil, holders of a signed job card are used instead. Table A2 in the annex provides details on the specific question used, the variables codes and the answers chosen, which exhibit slight differences the four countries.

The results clearly show that informal work is an issue not only for deprived income groups but also to those in middle sectors. All in all, in the four Latin American countries considered 43.8 million of the total 72.0 million middle-sector workers are informal. Labour informality is therefore very much a middle-sector issue. It remains a prime factor behind their relatively low pension coverage – and a leading indicator of potential poverty for many of today's middle-sector households.

Figure 3. Workers by employment category and income group

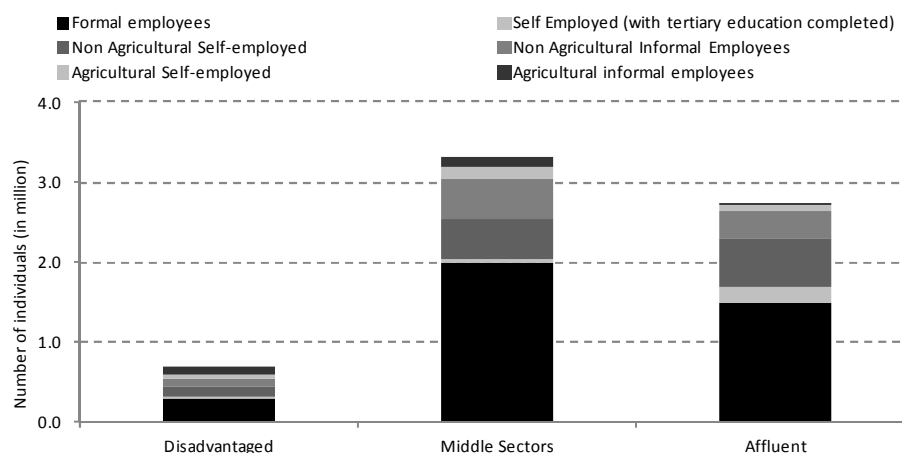


Source: Authors' calculations based on *Encuesta Continua de Hogares- Condiciones de Vida* 2002.



Source: Authors' calculations based on *Pesquisa Nacional por Amostra de Domicilios* 2006.

(c) Chile, 2006



Source: Authors' calculations based on *Encuesta de Caracterización Socioeconómica Nacional 2006*.

(d) Mexico, 2006



Source: Authors' calculations based on *Encuesta Nacional de Ingresos y Gastos de los Hogares 2006*.

In general – and unsurprisingly – the size of the formal workforce rises with income. Nevertheless, two important facets of informality in the middle sectors are revealed. First, the absolute number of middle-sector informal workers is high. In fact, other than in Bolivia, it is in middle sectors where the greatest numbers of informal workers belong. Second, their proportion is high too: there are more informal than formal workers among the middle sectors in all countries but Chile.

The composition of the informal workforce across income groups varies, reflecting the heterogeneity of informal work. The starkest example is Bolivia, where the majority of the disadvantaged are in self-employed agricultural occupations, possibly in subsistence occupations. The self-employed show up in all income groups across countries, reflecting a diversity not captured by our six occupational categories. Educated self-employed individuals

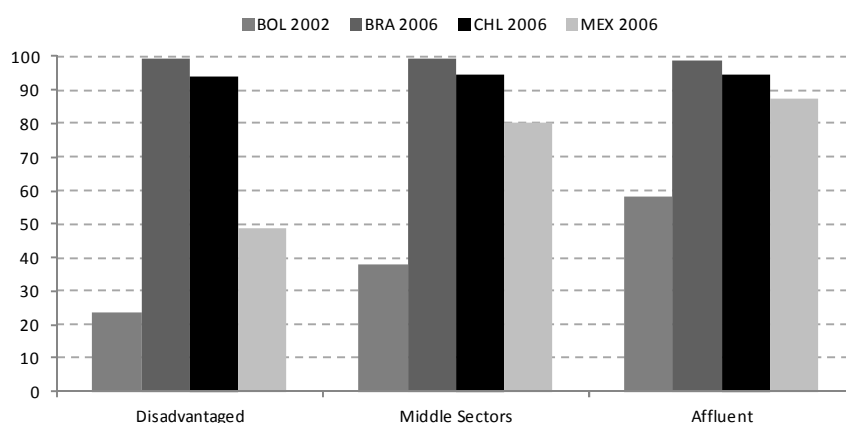
are mostly found among the affluent, indicating their higher earning potential. Those informal workers who are in an employment relationship are usually thought of as a particularly disadvantaged group, seen as excluded from social protection not by their own choice but by their employer (even if in practice it can be thought as resulting from a joint decision or the result of optimal behaviour in the part of each workers and employees; see Auerbach *et al.* (2007). The fact that there are informal employees even in the affluent group suggests that social security provisions in labour law may in practice have only limited enforceability.

## IV. PENSIONS AND INFORMALITY

### IV.1. (In)formality and pension coverage

We now analyse the interaction of the three dimensions, informality, income level, and pension coverage. Coverage rates among formal employees are high (Figure 4), above 80%, except in Bolivia and among the disadvantaged in Mexico (where coverage drops dramatically at low incomes, although these cases are not numerous). Despite differences across income groups and certain heterogeneity across countries, pension coverage among formal employees, at all income levels, is broadly adequate in three of the four countries analysed when measured against the 60% coverage threshold.

Figure 4. Pension coverage rates of formal workers by income level  
(percentage of workers covered)



Notes: For Mexico and Bolivia the data is on enrolment, whereas for Chile and Brazil they capture contributors.

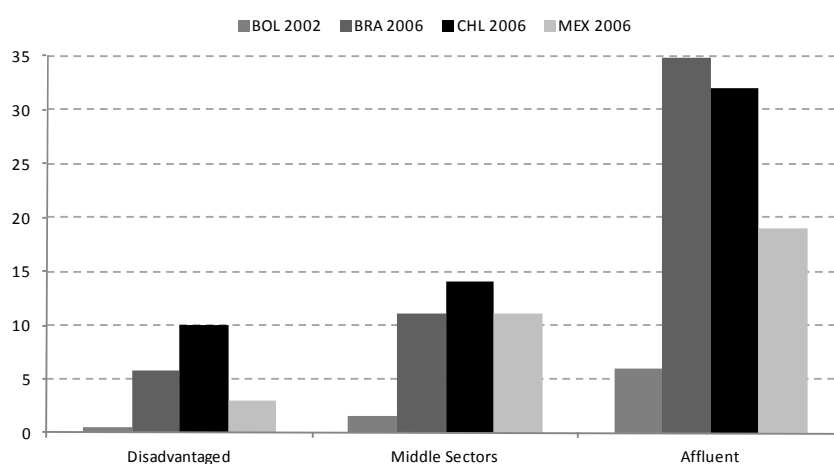
Source: Authors' calculations based on National Household Surveys.

All three income groups (disadvantaged, middle sectors and affluent) have similar coverage levels in Brazil and Chile; in Mexico, middle-sector coverage is similar to the coverage of the affluent, although coverage for the disadvantaged is lower. The picture is more worrying in Bolivia. Coverage there rises with income level – itself evidence of inequality among formal workers – but absolute levels remain low. Even formal employees in the affluent income group barely reach the 60% standard.



By contrast, coverage rates of informal workers are very low, and strongly linked to income level in all four countries, even around median incomes (Figure 5). The generally adequate coverage of formal workers means that the persistent shortfall in coverage in the region is concentrated among the self-employed and informal employees. The informal middle sectors in Chile secure the highest level of coverage (14%), followed by Brazil and Mexico (11%), and Bolivia (2%). These coverage levels put the informal middle sectors closer to the disadvantaged than the affluent

Figure 5. Pension coverage rates of informal workers by income level  
(percentage of workers covered)



Notes: For Mexico and Bolivia the data is on enrolment, whereas for Chile and Brazil they capture contributors.

Source: Authors' calculations based on National Household Surveys.

The analysis of coverage rates among middle-sector workers also exhibits some "unexpected" combinations: formal workers who are not covered, and informal workers who are (Table 1). Focusing on middle sector workers, Bolivia has the highest percentage of informal middle-sector individuals among the covered (27.2%), and Chile the lowest (10.1%).

Table 1. Covered workers and formality, by level of income

	Disadvantaged		Middle Sectors		Affluent	
	Formal	Informal	Formal	Informal	Formal	Informal
<b>Bolivia</b>	40.7	59.3	72.8	27.2	80.4	19.6
<b>Brazil</b>	83.2	16.8	88.8	11.2	78.0	22.0
<b>Chile</b>	87.9	12.0	89.8	10.1	79.7	20.2
<b>Mexico</b>	68.3	31.7	78.2	21.1	84.2	15.8

Source: Authors' calculations based on National Household Surveys.

The issues associated with and arising from informality therefore extend even to individuals who in principle would be considered "protected" and whom, not being among the most deprived, may not be the priority of social policy. This highlights the importance of considering mobility between formality and informality during an individual's working life.

Workers who make such transitions risk falling into poverty in old age, since they will not have contributed sufficiently.

Among informal workers, pension coverage is highest for professionals (self-employed with tertiary education) in all countries other than Mexico (Figure 6). There – surprisingly – coverage of professionals is lower than that of non-agricultural informal employees.<sup>17</sup> Coverage rates for most informal categories rises markedly with incomes. Coverage rates for professionals are an exception, as they are U-shaped (with the exception again of Mexico), being lower for the middle sectors than the income groups either side.

Brazil is noteworthy because compulsory affiliation there extends to self-employed workers – it is voluntary in Bolivia and Mexico, and will be in Chile until 2012. Coverage as a result is indeed relatively high. However compulsion does not seem to have succeeded in breaking the link with income: the level of coverage of the less-educated self-employed is low, and coverage rises markedly from one income group to the next (from 12% for the middle sectors to 38% for the affluent). This points both to the limited effect of compulsion on the one hand and, probably, to low and irregular savings among middle-sector independent workers on the other. It certainly suggests that legal compulsion by itself is not enough to secure extended coverage. We will analyse empirically this issue on some detail in the next subsection.

Finally, coverage among informal employees is higher than coverage among the self-employed (with professionals not included) at all income levels in Chile, and more so in Mexico – the highest for any informal group. Any explanation based solely on this descriptive analysis must remain somewhat speculative; however it is possible that capitalisation provides incentives to remain in the system even after a transition to an informal job.

Recasting this data by occupational class, Brazil has the highest coverage rate for professionals (around 40%), followed by Chile (around 20%). Non-agricultural informal employees are best covered in Mexico (around 17%), as noted above. Chile has the highest coverage rates for the non-professional self-employed, in both agricultural (around 14%) and non-agricultural (around 10%) occupations.

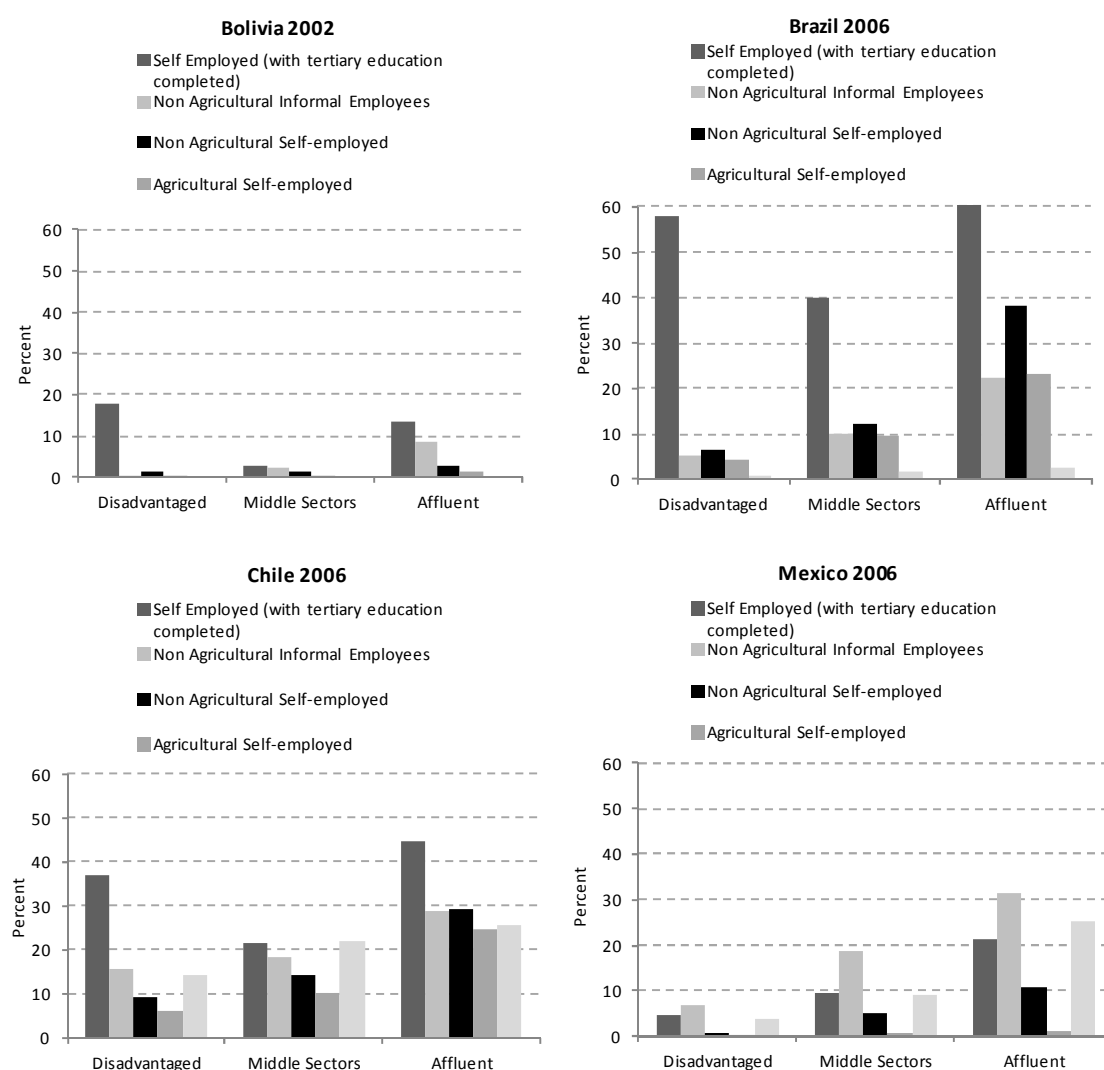
Summing up, the data presented confirm that informality reduces pension coverage for all income groups. Moreover, the link between coverage and income levels is much clearer among informal workers than formal, meaning that poverty in old age is likely to reproduce, or even exacerbate the high inequality in the region.<sup>18</sup>

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17 Tables A3 to A10 in the annex show the evolution of coverage for this group from 1994 to 2006. It has increased only for the affluent.

18 Recent analysis edited by López-Calva and Lustig (2010) points to a significant and widespread advance in the reduction of income inequality in Latin America between 2000 and 2006. In particular, they study in depth the cases of Argentina, Brazil, Mexico and Peru, where inequality has been reduced due to the fall in the earnings gap between skilled and low-skilled workers and the impact of conditional cash transfer programmes such as Jefas y Jefes del Hogar in Argentina, Bolsa Escola/Bolsa Familia in Brazil, Progresa/Oportunidades in Mexico, an in-kind transfers in Peru. However, these authors stress that the reduction in skill premiums is probably temporary, and that a large share of government expenditure remains neutral or even regressive.

Figure 6. Pension coverage of workers by employment category and income group



Notes: For Mexico and Bolivia the data is on enrolment, whereas for Chile and Brazil they capture contributors.

Source: Authors' calculations based on National Household Surveys.

## IV.2. An empirical analysis of contribution determinants in Brazil and Chile

The analysis of average coverage rates has shown that informal workers are less likely to be covered by pension systems. It has also shown that there exist important differences between groups among informal workers. In particular, while coverage rates increase mildly with income for formal wage workers, the relationship between income and coverage is much stronger among informal workers, with variations across countries and the status of workers.

The contribution response to income changes can be interpreted as the existence of demand for coverage that is constrained by the available modalities of coverage. Indeed, informal workers often have little choice as to how and how much they can contribute to the pension system. Rigidities in the forms of contribution may therefore be limiting the effective

contributions by these workers. Such an interpretation would support the design of policies that can incentivise contribution by those workers specifically, based on the premise of their future need for pension coverage and their current willingness and ability to pay.

The correlation between work status, income and pension coverage cannot be taken at face value. A number of confounding factors could generate these results. First and foremost, potential productivity or skills will be correlated with sector choices as well as income, and deviations from permanent income can explain current contributions. Second, the sector composition of each type of workforce differs and can hide a number of other differences in the quality of jobs, whether pecuniary or non-pecuniary, which could be correlated with participation in the pension system. Finally, a number of other determinants of participation in the pension system identified in the literature, in particular the stage of the life cycle that the household of the respondent is in, may also be correlated with work status. In all these cases, the attribution of different contribution patterns to work status could be spurious.

In order to shed light on this issue, we estimate a model explaining the probability to contribute to the pension system for workers in Brazil and Chile. For these two countries, coverage is measured by actual contributions, as opposed to affiliation available in Bolivia and Mexico. Using affiliation might induce errors, as it is likely to be better explained by past behaviour and circumstances rather than current ones alone. Therefore, the two are not strictly comparable.

The outcome of interest is a binary variable, which takes the value 1 if a worker is contributing to the pension system and 0 otherwise. Explanatory variables include household per capita income in adult equivalent terms (in logarithms), a set of individual socioeconomic variables and a set of indicators for job status. In line with the literature, individual socioeconomic variables include age, gender, marital status and educational attainment, measured by a set of dummy variables (completed primary, incomplete secondary, completed secondary, incomplete tertiary and completed tertiary education). The composition of the household is also controlled for by including the number of individuals in the household according to age groups (under 3, 3 to 6 years old, 6 to 14 years old and over 65) as well as total household size.

The indicators of job status are dummy variables identifying each of the groups considered in the preceding sections, except the fact that we do not differentiate between agricultural and non agricultural workers; *i.e.* formal worker, independent worker and independent worker with completed tertiary education. Informal wage workers are the omitted category. Rather than multiplying groups, the sector is controlled for by a set of sector dummy variables (the omitted sector is manufacturing).<sup>19</sup>

The objective of this exercise is to test formally the descriptive analysis made in previous sections on the basis of average contribution rates. We therefore expect contribution probabilities to be higher on average for formal workers and for independent workers with higher education. We also expect to find a positive relationship between the probability to contribute and income. Finally, we expect the relationship between income and contribution to be steeper for

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19 Summary statistics for key variables of this econometric analysis are shown in Table A11 in the annex.

independent workers. To test for this difference, interaction terms between income and the various job status variables are included in the estimation equation so as to allow for group-specific slope parameters. The interplay between average contribution rates and the slope of income in the contribution equation is particularly interesting in the comparison between Brazil and Chile. At the time of data collection, contribution was compulsory for independent workers in Brazil, but voluntary in Chile.

The results for Brazil and Chile are reported, respectively, in Tables 2 and 3. Equations (I) through (IV) present the basic specification to which control variables for educational attainment (II), job category (III), sector of work (IV), are added in turn.<sup>20</sup> Equation (V) allows testing the different effect of household income by type of workers. Specification (V) therefore includes all controls as in (IV) but replaces the income variable by group-specific interactions. This specification allows the coefficient on the income variable to vary across groups.<sup>21</sup> Household income is found to be an important and significant determinant of contributing to the pension system in both countries. This result confirms earlier findings by Packard *et al.* (2002) and Auerbach *et al.* (2007). The coefficient on income is smaller once key confounding factors education and sector of work are controlled for, but it remains sizeable and significant. As the sign and size of coefficients change significantly once job type is controlled for, we refer to specifications (IV) and (V) to draw conclusions.

As seen in the descriptive analysis, formal work is a very important determinant of contribution probabilities. Formal workers are the omitted category for occupational dummies. The implied level coefficients are large and significant for both countries and the implied marginal effects (at the average of independent variables) are close to 1. To determine the effect of income, the direct coefficient on the income variable and the corresponding interactions need to be added. For formal workers, income plays a smaller role in determining contribution probabilities than for other groups.

In both Chile and Brazil, income is a strong determinant of contributions to the pension system for informal workers, as represented by the coefficient on the income term in both cases. However, the slope of income is greater for independent workers. At the average of other independent variables,<sup>22</sup> a 10% increase in household per capita income increases the probability of contribution for independent workers by 1.4% in Chile and 2.0% in Brazil.<sup>23</sup> These are sizeable changes, because average contribution rates for the self-employed around median income are of the order of 10%.

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20 Tables 2 and 3 only report the key coefficients of interest, in particular the levels for each category and the effect of income, as well as interactions. Full regression results are available from the authors upon request.

21 All workers belong to one of the four groups, there is therefore no omitted group and the average effect on income is omitted.

22 As the specification used is a Probit, it represents the probability of contributing as a nonlinear function of the linear combination of covariates; marginal effects therefore depend on assumed values for other covariates rather than on the sole model.

23 In both cases, the implied coefficients are strongly significant (at better than the 0.1% level).

Table 2. Determinants of contributing to the pension system: Brazil 2006

	I	II	III	IV	V
logy	[0.231***] 0.579*** (0.004)	[0.195***] 0.510*** (0.006)	[0.152***] 0.397*** (0.007)	[0.141***] 0.368*** (0.007)	
Income (log)*formal					[-0.146***] -0.385*** (0.02)
Income(log)* independents					[0.194***] 0.514*** (0.01)
Income(log)* Educated independents					[0.073***] 0.193*** (0.024)
Income(log)* Informal workers					[0.120***] 0.316*** (0.013)
Age	[-0.005***] -0.012*** (0.000)	[0.002***] 0.006*** (0.000)	[0.004***] 0.010*** (0.000)	[0.004***] 0.011*** (0.000)	[0.004***] 0.011*** (0.000)
Female	[-0.043***] -0.107*** (0.007)	[-0.026***] -0.067*** (0.011)	[-0.041***] -0.106*** (0.011)	[-0.057***] -0.149*** (0.012)	[-0.051***] -0.135*** (0.012)
Independents		[-0.889***] -3.424*** (0.017)	[-0.886***] -3.376*** (0.017)	[-0.881***] -3.325*** (0.018)	[-0.999***] -9.093*** (0.145)
Independents with Tertiary education		[-0.634***] -2.964*** (0.028)	[-0.641***] -3.252*** (0.037)	[-0.638***] -3.102*** (0.039)	[-0.688***] -6.820*** (0.24)
Informal workers		[-0.881***] -3.558*** (0.017)	[-0.880***] -3.537*** (0.018)	[-0.877***] -3.504*** (0.018)	[-0.993***] -8.026*** (0.145)
Controls for					
Educational attainment	No	No	Yes	Yes	Yes
Sector	No	No	No	Yes	Yes
Household composition	Yes	Yes	Yes	Yes	Yes
Pseudo R <sup>2</sup>	0.117	0.673	0.679	0.687	0.694
Log likelihood	-100098.78	-37039.73	-36401.08	-35475.02	-34652.8
N	163660	163660	163652	163652	163652

Notes: PROBIT coefficients, marginal effects (at the mean of the dependent variables) between brackets, standard errors in parenthesis.

Asterisks indicate significant coefficients (resp.) at the 5% (\*), 1% (\*\*) and 0.1% (\*\*\*) level.

Table 3. Determinants of contributing to the pension system: Chile 2006

	I	II	III	IV	V
logy	[.083***] 0.216*** (0.005)	[0.098***] 0.284*** (0.007)	[0.083***] 0.242*** (0.008)	[0.081***] 0.235*** (0.008)	
Income (log)*formal					[-0.010*] -0.030* (0.015)
Income(log)* independents					[0.138***] 0.396*** (0.012)
Income(log)* Educated independents					[0.108***] 0.311*** (0.029)
Income(log)* Informal workers					[0.062***] 0.179*** (0.016)
Age	[-0.004***] -0.012*** (0.000)	[0.001***] 0.004*** (0.000)	[0.002***] 0.007*** (0.000)	[0.003***] 0.008*** (0.000)	[0.003***] 0.007*** (0.000)
Female	[-0.050***] -0.130*** (0.009)	[-0.057***] -0.162*** (0.012)	[-0.065***] -0.185*** (0.012)	[-0.049***] -0.141*** (0.014)	[-0.047***] -0.135*** (0.014)
Independents		[-0.834***] -2.786*** (0.015)	[-0.832***] -2.770*** (0.015)	[-0.835***] -2.792*** (0.015)	[-0.996***] -7.945*** (0.23)
Independents with Tertiary education		[-0.680***] -2.309*** (0.032)	[-0.680***] -2.315*** (0.038)	[-0.685***] -2.358*** (0.039)	[-0.749***] -6.724*** (0.437)
Informal workers		[-0.773***] -2.514*** (0.015)	[-0.770***] -2.493*** (0.015)	[-0.770***] -2.491*** (0.015)	[-0.917***] -4.999*** (0.245)
Controls for					
Educational attainment	No	No	Yes	Yes	Yes
Sector	No	No	No	Yes	Yes
Household composition	Yes	Yes	Yes	Yes	Yes
Pseudo R <sup>2</sup>	0.029	0.543	0.546	0.548	0.552
Log likelihood	-62904.2	-29600.6	-29352.5	-29216.7	-28955.8
N	96748	96748	96520	96520	96520

Notes: PROBIT coefficients, marginal effects (at the mean of the dependent variables) between brackets, standard errors in parenthesis.

Asterisks indicate significant coefficients (resp.) at the 5% (\*), 1% (\*\*) and 0.1% (\*\*\*) level.

The comparison between the Brazilian and Chilean cases can also shed some light on the process of participation given different regulations. While in Brazil participation by self-employed workers is compulsory, in Chile – at the time the data was gathered – it was not. Working independently has similar marginal effects in Chile and in Brazil, conditional on personal and other job characteristics (equation IV in each of Tables 2 and 3), although coefficients are of larger magnitude for Brazil, indicating that less of that effect is mediated through education or occupational choice. The differences between the two country settings in terms of the income effect are not large. Income matters more for independents in Brazil than in Chile, while the effect is smaller for wage workers in Brazil than in Chile. Reforms that make contribution compulsory are likely to increase average coverage rates but even with such provisions in place, there is scope to increase the attractiveness of pension systems for the self-employed and possibly also informal wage workers with some disposable income.

The findings of the descriptive exercise are therefore supported – if nuanced—by the econometric analysis. As expected, job status both in terms of formality but also in terms of dependent or independent work, is an important determinant of contribution behaviour. More importantly, we find that not only is income an important determinant, but that the association of larger incomes with higher probabilities to contribute is significantly stronger for self-employed workers, especially those without higher education.



## V. COVERING THE UNCOVERED: ON POLICY OPTIONS

The main goal of pension reform is to achieve "adequate, affordable, sustainable and robust pensions, while at the same time contributing to economic development" (Holzmann and Hinz, 2005). Many of the countries in Latin America that were at the forefront of structural pension reform, such as Bolivia, Mexico or notably Chile, seem to have achieved affordability and sustainability, but run the risk of failing in adequacy and robustness. These challenges are shared by countries, such as Brazil, that did not participate in this type of reforms. In addition, informality severely limits the coverage of pension systems – even those based on individual capitalisation accounts, where the incentives to contribute are in principle greater.

Pension reform in Latin America will therefore need to be underpinned by appropriate social, labour and macroeconomic mechanisms. It cannot be seen as the silver bullet to reduce informality, as was hoped by the pension reformers of the 1990s. Instead, reform needs to take into account this reality. While reducing informality can be retained as a goal – and incentives aligned with this end – changes should focus on assuring adequate and sustainable pensions across the population (in a similar vein, see Escrivá *et al.*, 2010 for Chile, Colombia, Mexico and Peru, and Ribe *et al.*, 2010 for the region as a whole).

Mechanisms to guarantee pension coverage are of two types: those that act at the moment of retirement, called *ex post* interventions; or those that act *ex ante* during the working career (see Holzman *et al.*, 2009, and Hu and Steward, 2009). *Ex post* interventions are themselves of two main types: transfers that are not linked to contribution histories, often referred to as "social pensions"; and transfers which guarantee a minimum pension within mandatory-contributory pension schemes (conditional on a given contribution history). Social pensions can be universal, paid to all individuals who reach eligibility age, sometimes with residency restrictions; this is the case in Bolivia and Chile. Or they can be means-tested as is the case in Argentina, Brazil, Chile, Costa Rica and Uruguay.

Given that informality is pervasive in Latin America, reliance on this solidarity pillar seems almost inevitable. Indeed calls to strengthen it have been made by the Inter-American Development Bank (to be financed by consumption taxes; Levy, 2008, and Pages, 2010), and by the Economic Commission for Latin America and the Caribbean (ECLAC, 2006). One way of doing so would be to reduce the years of contributions required for a minimum contributory pension, currently over 20 years in many countries (compared with 15 in Spain for instance). Another option is to introduce social pensions. This would be more expensive, but could have a significant impact on poverty reduction. Dethier *et al.* (2010) estimated that expenditure on universal and means-tested pensions may represent up to 2% of GDP each year.

Unfortunately, as pointed out, a large fiscal commitment to a non-contributory basic pension can act as a strong disincentive to formalisation. The design of such a scheme must therefore be particularly careful. A minimum pension which rises with contributions up to a certain level may address this risk at least in part – as has been done recently in Chile. However, such reform will never be cheap, and estimates put the cost at the order of 1% of GDP (Arenas *et al.*, 2008; Melguizo *et al.*, 2009). These costs will not be immediate however, since all pension reforms include a transition period during which those who enter the new system accumulate resources or entitlement well before they begin to retire. Only after this, given that there are generally generous transition rules, is a social-pillar protection mechanism necessary.

In contrast to the *ex post* situation, there is little doubt that governments need to act now for workers in the active phase. It is also with these *ex ante* policies there seems to be the greater scope for pension reforms benefitting the middle sectors. The most direct policy option is to make affiliation compulsory for the self-employed. This is not currently the case in many countries (among our sample, Bolivia, Mexico, and Chile at least until 2012). However the patchy coverage figures and the empirical analysis for Brazil, which does have compulsion, demonstrate that the effective implementation of such policy is not simply a matter of passing the necessary legislation. By definition, it is not evident how to enforce compulsory contributions for those in the informal sector. Furthermore, some informal workers can afford only to save to cover basic needs so compulsory saving may not be optimal for low- or even middle-income households – unfortunately, household survey data is not adequate to answer this question, and estimates from alternative databases are not accurate either.

Several countries have been considering alternative hybrid approaches, such as “semi-compulsion”. Under these programmes, workers are automatically enrolled, but are able to opt out. Modifications that would particularly respond to the needs of informal workers could accompany this. Greater flexibility on both the amount and timing of contributions is one example; permitting withdrawals in limited circumstances such as long-term unemployment or health problems, is another (Hu and Steward, 2009).

Finally, in recent years the debate has started to focus on “matching contributions” – transfers made by the state into an individual’s defined-contribution pension plan conditional on their own voluntary contributions. In contrast to minimum and social pensions, matching contributions provide incentives for long-term saving by the worker themselves. This may be particularly relevant for informal individuals with some savings capacity – a group that covers much of our middle sectors. Matching contributions are still in the experimental design stage, and few countries have implemented them. In Latin America, the Colombian Solidarity Pension Fund subsidises the contribution of low-income self-employed workers, and the Mexican government partially matches the contributions of workers affiliated to the private defined-contribution system. Brazil does some matching within its rural pension scheme. Finally, Peru has recently introduced a matching-contribution scheme for informal workers of small firms, by which the government matches 100% of the worker’s contribution. Though they have the support of the World Bank (Ribe *et al.*, 2010), it is still early days for these schemes and research assessing them is awaited.

## VI. CONCLUSIONS

Policy for social protection in Latin America constantly runs up against the prevalence, flexibility and persistence of informal work throughout the region. These constrain the funding of social-security systems financed through payroll taxes, and make it hard to create eligibility criteria that are inclusive yet limit incentives toward informality. For these reasons, coverage is low, and not only among the poor. In most countries contributory systems fail to reach even half of middle-sector workers.

Difficulties do not mean, however, that it is impossible to design systems which provide adequate protection. Recent decades have witnessed substantial efforts in Latin America to reform social-protection systems with the twin objectives of financial sustainability and increased coverage. Reforms typically recognise that pensions, health care and unemployment insurance have different characteristics and different priorities. They have therefore tended to separate previously bundled items. Health-care systems have been reformed in the direction of universal insurance against a set of predetermined eligibility criteria. Pensions systems have been reformed with financial sustainability and incentives in mind, in some cases complemented by social pensions to alleviate poverty in old age.

This paper's detailed analysis of four diverse countries has shown that the middle sectors are largely informal in Bolivia, Brazil, Chile and Mexico. Social insurance, and pensions in particular, for a significant proportion of the middle sectors will therefore have to be achieved in ways other than through links to formal employment. Some reforms have already allowed for social protection among informal workers. Nevertheless, informal workers' participation in social insurance systems remains strongly dependent on their income. Correspondingly, coverage rates (measured by contributors or affiliates over all workers) range between 10% of the labour force in Bolivia to up to 62% in Chile. These rates of coverage vary widely across sectors of the economy: 76% of formal workers are covered on average, while coverage among the self-employed in agriculture is below 7%.

Social assistance policy is typically seen as a means of poverty alleviation. Nevertheless, insufficient coverage of the middle sectors poses a serious challenge to traditional social protection systems. Left to (often incomplete) markets, individuals are likely to under-insure or insure inefficiently, if they insure at all. Yet middle-sector workers combine a capacity to save with a potential demand for social protection – and many of them would need only a relatively small adverse shock to return to the ranks of the poor. Given Latin America's particularly constrained fiscal space, encouraging the informal middle sectors to join contributory social protection schemes will be a vital part of mobilising their savings for social insurance, and building fairer and more efficient social risk-management systems. The main alternatives have been discussed, from compulsory or semi-compulsory affiliation, to the establishment of

matching defined contributions schemes. These social protection policy reforms need to be designed in conjunction with a framework of appropriate social, labour and macroeconomic institutions. Pension systems – and social protection in general – should adopt a pragmatic approach. This means responding to three key social and institutional features in Latin American: high labour informality, a relatively young (although rapidly ageing) population, and limited fiscal resources.

## ANNEX

Table A1. Household surveys data and definitions

Country	Name	Years	Geographical Coverage	Time of the Survey	Institution
Bolivia	Encuesta Continua de Hogares- (ECH)	2001, 2002	National	2001 : November 2002 : December	Instituto Nacional de Estadística (INE)
Brazil	Pesquisa Nacional por Amostra de Domicílios (PNAD)	1996, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006	National	September	Instituto Brasileiro de Geografia e Estatística (IBGE)
Chile	Encuesta de Caracterización Socioeconómica Nacional (CASEN)	1996, 1998, 2000, 2003, 2006	National	September	Instituto Nacional de Estadísticas (INE)
Mexico	Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH)	1998, 2000, 2002, 2004, 2005, 2006	National	Third quarter	Instituto Nacional de Estadística y Geografía (INEGI)

Table A2. Household surveys, questions used by country

**Bolivia**

<b>Variables</b>	<b>Sub-variables</b>	<b>Variables Code</b>	<b>Question</b>	<b>Answer</b>
<b>Employees</b>	Employees	s517	Usted trabaja como	Obrero (01) Empleado (02)
<b>Independent</b>	Independent	s517	Usted trabaja como	Trabajador (a) por cuenta propio (03) Patrón, socio o empleador que si recibe (04) Patrón, socio o empleador que si recibe (05) Cooperativista de producción (06) Trabajador (a) familiar o aprendiz sin remuneración (07)
<b>Formal</b>	Formal	s518	Usted firmo contrato	Si, firmo con fecha de vencimiento (01) Es personal de planta (03)
<b>Informal</b>	Informal	s518	Usted firmo contrato	No firmo pero tiene compromiso por obra (02) No firmo (04)
<b>Education</b>	Primary and secondary education	s402a	¿Cuál fue el nivel de instrucción?	Ninguno (11) Curso de alfabetización (12) Educación pre-escolar (13) Básico (1 a 5 años) (14) Intermedio (1a 3 años) (15) Medio (1 a 4 años) (16) Primaria (1 a 8 años) (17) Secundaria (1 a 4 años) (18) Educación básica de adultos (19) Centro de educación media de adultos (20) Normal (21) Técnico de instituto (26) Instituto de formación militar y político (27) Otros cursos (28)

Variables	Sub-variables	Variables Code	Question	Answer
<b>Education</b>	Tertiary education	s402a	¿Cuál fue el nivel de instrucción?	Universidad pública (licenciatura) (22) Universidad privada (licenciatura) (23) Posgrado, maestría (24) Técnico de universidad (25)
<b>Pension</b>	Pension	s550b	¿Está afiliado a A.F.P?	Si (01)
<b>Sector</b>	Secondary and tertiary economic sector	cob_p	Grupo ocupacional Ocupación principal	Fuerzas armadas (0) Dirección en la administración pública (01) Profesionales, científicos e intelectuales (02) Técnicos y profesionales de apoyo (03) Empleados de oficina (04) Servicios y vendedores del comercio (05) Industria extractiva, construcción (07) Operadores de instalaciones (08) Trabajadores no calificados (09)
<b>Sector</b>	Tertiary economic sector	cob_p	Grupo ocupacional Ocupación principal	Agricultura, pecuaria (06)
<b>Beneficiaries</b>	Beneficiary if pensionold >0	s602c	¿Cuánto recibió mensual por jubilación?	>0
		s602d	¿Cuánto recibió mensual por benemérito?	
		s602e	¿Cuánto recibió mensual por invalidez?	
		s602f	¿Cuánto recibió mensual por viudez?	
Variables Created	pensionold=s602c+s602d+s602e+s602f			

**Brazil**

<b>Variables</b>	<b>Sub-variables</b>	<b>Variables Code</b>	<b>Question</b>	<b>Answer</b>
<b>Employees</b>	Formal Employees	v4706	Posição na ocupação no trabalho principal da semana de referência para pessoas de 10 anos ou mais de idade	Empregado com carteira (01); Militar (02); Funcionário público estatutário (03); Trabalhador doméstico com carteira (06)
<b>Employees</b>	Informal Employees	v4706	Posição na ocupação no trabalho principal da semana de referência para pessoas de 10 anos ou mais de idade	Outros empregados sem carteira (04); Empregados sem declaração de carteira (05); Trabalhador doméstico sem carteira (07); Trabalhador doméstico sem declaração de carteira (08); Trabalhador na produção para o próprio consumo (11); Trabalhador na construção para o próprio uso (12)
<b>Independent</b>	Independent	v4706	Posição na ocupação no trabalho principal da semana de referência para pessoas de 10 anos ou mais de idade	Conta própria (09); Empregador (10); Trabalhador na produção para o próprio consumo (13)
<b>Education</b>	Primary and Secondary Education	v0607	Curso mas elevado que frequentou anteriormente	Elementar (primário) (01); Médio 1º ciclo (ginásial, etc.) (02) Médio 2º ciclo (científico, clássico, etc.) (03) Ensino fundamental ou 1º grau (04) Ensino médio ou 2º grau (05) Alfabetização de adultos (08) Creche (09) Pré-escolar (10)
<b>Education</b>	Tertiary	v0607	Curso mas elevado que frequentou anteriormente	Superior (06) maestrado ou doutorado (07)
<b>Education</b>	Finished Education	v0611	Concluiu este curso que frequentou anteriormente?	sim (01) não (03)



Variables	Sub-variables	Variables Code	Question	Answer
<b>Pension</b>	Contribution to Pension	v9059	Era contribuinte para instituto de previdência no trabalho principal da semana de referência?	Sim (1) Não (3)
<b>Sector</b>	Secondary and tertiary economic sector	v4808	Actividade principal do empreendimento do trabalho principal da semana de referência para pessoas de 5 anos ou mais de idade	Não-agrícola (2) Sem declaração (3)
<b>Sector</b>	Economic sector	v4808	Actividade principal do empreendimento do trabalho principal da semana de referência para pessoas de 5 anos ou mais de idade	Agrícola (1)
<b>Beneficiaries</b> Created variable	x9	Beneficiaries if (v9122=2 or v9123=1)	(v9122) Era aposentado por instituto de previdência ou directamente pelo governo federal na semana de referência?  (v9123) Era pensionista por instituto de previdência ou directamente pelo governo federal na semana de referência?	(v9122) Sim (2) Não (4) Sem declaração (9)  (v9123) Sim (1) Não (3) Sem declaração (9)

## Chile

Variables	Sub-variables	Variables Code	Question	Answer
<b>Employees</b>	Employees	o19	Categoría ocupacional	Empleado u obrero del sector público (03) Empleado u obrero de empresas públicas (04) Empleado u obrero del sector privado (05) Servicios domésticos puertas a dentro (06) Servicios domésticos puertas a fuera (07)
<b>Independent</b>	Independent	o19	Categoría ocupacional	Patrón (01) Trabajador por cuenta propia (02) Familiar no remunerado (08) Fuerzas armadas y del orden (09)
<b>Formal</b>	Formal	o20	¿En su trabajo actual: tiene contrato de trabajo?	Sí, firmo (01)
<b>Informal</b>	Informal	o20	¿En su trabajo actual: tiene contrato de trabajo?	Sí, pero no ha firmado (02) No tiene (03)
<b>Education</b>	Primary and secondary education	educ	Indique el curso o tipo de estudio actual (para los que está estudiando) o el último curso aprobado para los que no están estudiando)	[different than] técnico o universitario completa (06)
<b>Education</b>	Tertiary education	educ	Indique el curso o tipo de estudio actual (para los que está estudiando) o el último curso aprobado para los que no están estudiando)	Técnico o universitario completa (06)

Variables	Sub-variables	Variables Code	Question	Answer
<b>Pension</b>	Contribution to pension	o29	¿Se encuentra cotizando en algún sistema provisional (sistema de pensiones)?	Sí, AFP (Administradora de Fondos de Pensiones) (1)
				Sí, INP (Caja Nacional de Empleados Públicos (CANAEMPU); Caja de Empleados Particulares (EMPART); Servicio de Seguro Social (SSS) (2)
				Sí, Caja de Previsión de la Defensa Nacional (CAPREDENA) (3)
				Sí, Dirección de Previsión de Carabineros (DIPRECA) (4) Sí, otra (5)
<b>Pension</b>	Affiliated to pension	o29	¿Se encuentra cotizando en algún sistema provisional (sistema de pensiones)?	Está afiliado pero no está cotizando (6)
<b>Sector</b>	Secondary and tertiary economic sector	Rama	Rama de actividad	Industrias manufactureras (0) : referencia Explotación minas y canteras (2) Electricidad, gas y agua (4) Construcción (5) Comercio mayor/menor, hoteles (6) Transporte y comunicaciones (7) Establecimientos financieros de seguros (8) Servicios comunales (9) Actividades no bien especificadas (10)
<b>Sector</b>	Agricultural sector	Rama	Rama de actividad	Agricultura, caza y silvicultura (1)

Variables	Sub-variables	Variables Code	Question	Answer
<b>Beneficiaries</b> Variables Created	Contributory and non-contributory pension beneficiaries	Pensionold	(Ypasaj) ¿Recibió el mes pasado ingresos por alguno de los siguientes subsidios del Estado?	Pensión asistencial de vejez o ancianidad (\$44.186 mensual para edad entre 65 y 69 años) (1) Pensión asistencial de vejez o ancianidad (\$ 47.103 mensual para edad entre 70 y 74 años) (2) Pensión asistencial de vejez o ancianidad (\$ 51.503 mensual para edad entre 75 años o más) (3) Pensión asistencial de vejez o ancianidad Pensión asistencial de vejez
		(Beneficiaries if Pensionold=1) (Pensionold=1 if x>0 & age>65) (x= Yjubaj + Ypasaj)	(Yjubaj) ¿El mes pasado, recibió ingresos por?  Institución que le paga	Pensión de vejez o jubilación Montepío o pensión de viudez  AFP – Administradora de Fondos de Pensiones INP – Instituto de Normalización Previsional Cajas de las Fuerzas armadas (CAPREDENA o DIPRECA) Mutual Compañía de Seguros Otra Institución, especifique
<b>Beneficiaries</b> Variables Created	Contributory pension beneficiaries	Pensioncontrib (Beneficiaries if Pensioncontrib=1) (Pensioncontrib=1 if yjubaj>0 & age>65)		
<b>Beneficiaries</b>	Non-contributory pension beneficiaries	pension no contrib		

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<b>Variables</b>	<b>Sub-variables</b>	<b>Variables Code</b>	<b>Question</b>	<b>Answer</b>
Variables Created		(Beneficiaries if Pension no contrib =1)  (Pension no contrib.=1 if ypasaj>0 & age>65)		

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Mexico

Variables	Sub-variables	Variables Code	Question	Answer
<b>Employees</b>	Employees	posicion18	Posición en el trabajo	Obrero (a) o empleado (a) (01) Jornalero (a) rural o peón del campo (02)
<b>Independent</b>	Independent	posicion18	Posición en el trabajo	Trabajador (a) sin pago en un negocio que no es el hogar (03) Trabajador (a) sin pago en un negocio propiedad del Hogar (04) Trabajador por cuenta propia solo o con trabajadores sin pagos (05) Patrón (a) (contrata uno o más trabajadores con pago) (06) Miembro de una cooperativa (07)
<b>Formal</b>	Formal	contr141	Tipo de contratación	Temporal o obra determinada (01) / De base, planta o por tiempo indefinido (02)
<b>Informal</b>	Informal	contr141	Tipo de contratación	No tiene contrato por escrito (03)
<b>Education</b> Variables Created	Primary and secondary education	n_instr141	¿Hasta qué año o grado aprobó en la escuela?	Ninguno (0) Preescolar (1) Primaria (2) Secundaria (3) Preparatoria o Bachillerato (4) Normal (5)
<b>Education</b>	Tertiary education	n_instr141	¿Hasta qué año o grado aprobó en la escuela?	Carrera Técnica o comercial (6) Profesional (7) Maestría (8) Doctorado (9)

Variables	Sub-variables	Variables Code	Question	Answer
<b>Pension</b> Variables Created	Pension	presta1_01	¿Afiliación a sistema de pensiones?	Servicios médicos del IMSS
		presta1_02		Servicios médicos del ISSSTE
		presta1_03		Servicios médicos del ISSSTE estatal
		presta1_04		Servicios médicos de PEMEX , del ejército de la marina
		presta1_05		Servicios médicos de universidades
		presta1_06		Servicios médicos privados
		presta1_09		SAR o AFORE
<b>Sector</b>	Secondary or tertiary economic sector	scian101	Actividad económica de la empresa o institución	211-222 minería 236-239 construcción 311-339 industria manufacturera 400-469 comercio 481-493 transportes 511;515- 524;531;533;541;551;561;562;611;619; 621-625;629;711-713;721;722;811-814; 541;561; 562; 611/629 servicios 931-932 actividades de gobierno y de organismos internacionales
<b>Sector</b>	Tertiary economic sector	scian101	Actividad económica de la empresa o institución	111-115 agricultura
<b>Beneficiaries</b> Variables Created	Pensionold A person receives contributory and/or non contributory pension if: if jubila>0 & age>65  (Jubila> 0 if pension> 0)	Pensionold	(jubila) ¿Cuánto dinero recibió por...?	Jubilaciones y/o pensiones originadas dentro del país Jubilaciones y/o pensiones provenientes de otros países

Table A3. Pension Coverage rate by Occupation and sector in Bolivia  
(percentage of workers)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)		
	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent
<b>2001</b>	66.2	61.9	74.2	7.4	4.3	12.7	0.0	0.0	0.0	0.2	1.1	2.9	0.1	0.6	1.0	13.2	6.7	17.1
<b>2002</b>	23.8	37.7	58.4	3.9	3.5	9.5	0.0	0.0	0.0	1.4	1.2	2.6	0.1	0.4	1.2	34.5	2.7	13.3

Note: The data on coverage in based on enrolment.

Source: Based on Encuesta Continua de Hogares- Condiciones de Vida.



Table A4. Pension Coverage rate by Occupation and sector in Brazil  
(percentage of workers)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)		
	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluen t
<b>1996</b>	91.7	94.6	94.0	4.8	6.4	16.1	0.7	1.6	3.1	9.4	17.5	41.3	2.0	5.4	18.9	61.7	33.7	69.2
<b>1998</b>	99.7	99.4	98.2	4.2	6.5	16.0	0.4	0.8	2.2	9.0	14.3	37.8	1.5	4.6	16.3	61.3	39.9	64.8
<b>1999</b>	99.6	99.4	98.4	3.9	6.4	16.0	0.5	0.9	2.8	6.4	13.0	38.2	1.8	5.1	16.9	63.6	43.8	65.7
<b>2001</b>	99.8	99.5	98.6	4.9	8.1	19.2	0.5	1.0	1.6	6.6	11.9	36.1	1.7	4.7	14.5	56.2	43.2	64.6
<b>2002</b>	99.9	99.6	98.9	4.4	7.5	19.1	0.3	1.0	1.5	4.8	12.0	34.4	1.4	4.1	15.5	51.2	34.2	59.7
<b>2003</b>	99.6	99.5	98.8	4.7	8.2	19.6	0.4	1.0	2.3	5.2	12.0	36.9	1.4	5.5	17.5	56.1	35.0	62.4
<b>2004</b>	99.5	99.4	99.8	5.1	8.4	20.6	0.4	0.9	1.8	5.3	11.6	36.4	1.9	5.1	18.2	61.5	39.6	62.3
<b>2005</b>	99.4	99.5	98.9	5.8	9.8	22.2	0.5	1.1	2.3	4.7	11.7	37.8	2.6	7.2	18.4	51.0	31.2	63.2
<b>2006</b>	99.4	99.4	98.9	5.1	10.0	22.3	0.9	1.6	2.6	6.4	12.2	38.1	4.3	9.7	23.1	57.8	40.1	60.7

Source: Based on Pesquisa Nacional por Amostra de Domicílios.

Table A5. Pension Coverage rate by Occupation and sector in Chile  
(percentage of workers)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)		
	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent
<b>1994</b>	90.9	92.4	93.5	21.1	26.8	32.7	22.8	19.5	22.7	14.6	20.0	29.4	15.4	23.2	28.8	67.0	48.2	57.3
<b>1996</b>	90.3	93.0	93.3	15.6	22.6	31.5	14.1	18.7	19.4	8.0	16.9	31.6	3.8	9.3	22.9	6.1	16.1	47.8
<b>1998</b>	93.6	94.0	93.7	13.5	21.6	28.7	8.3	15.9	15.5	8.3	13.8	29.3	2.9	8.9	18.5	2.0	25.5	51.1
<b>2000</b>	89.7	94.1	95.1	13.5	20.8	30.8	9.5	14.1	26.8	5.0	14.4	30.0	3.9	8.6	25.1	45.5	27.5	53.6
<b>2003</b>	94.0	94.0	93.9	12.4	17.0	23.2	12.1	16.6	23.6	6.2	13.4	28.9	3.8	9.4	24.6	27.9	34.1	53.9
<b>2006</b>	92.4	91.8	92.9	10.3	13.5	29.7	14.1	22.2	25.6	9.2	14.1	29.4	6.1	10.3	24.8	37.2	21.6	44.6

Source: Based on Encuesta de Caracterización Socioeconómica Nacional.

Table A6. Pension Coverage rate by Occupation and sector in Mexico  
(percentage of workers)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)		
	Disad-vantaged	Middle Sectors	Affluent	Disad-vantaged	Middle Sectors	Affluent	Disad-vantaged	Middle Sectors	Affluent	Disad-vantaged	Middle Sectors	Affluent	Disad-vantaged	Middle Sectors	Affluent	Disad-vantaged	Middle Sectors	Affluent
<b>1998</b>	74.7	87.2	90.1	5.1	16.9	25.5	3.3	14.2	20.6	2.0	3.4	7.3	0.3	0.8	2.2	0.0	5.9	9.1
<b>2000</b>	81.7	89.0	91.4	3.6	15.2	25.6	2.8	7.3	20.2	0.8	4.2	6.0	0.0	0.4	0.2	0.0	12.0	10.9
<b>2002</b>	79.2	91.1	92.5	7.6	18.1	24.8	4.8	20.0	20.2	1.9	3.6	7.1	0.2	1.2	0.1	0.0	8.6	12.1
<b>2004</b>	40.7	74.9	85.2	8.0	16.0	33.7	4.0	8.2	23.0	0.5	3.3	8.5	0.0	1.2	4.2	0.0	7.3	13.4
<b>2005</b>	38.7	75.0	84.5	5.3	16.8	30.9	1.7	6.3	16.5	0.9	3.5	9.3	0.1	0.8	2.9	0.0	3.6	19.7
<b>2006</b>	48.5	80.0	87.2	5.7	17.8	31.1	3.6	8.8	25.5	0.9	5.0	10.9	0.4	0.8	1.3	4.5	9.4	21.2

Note: The data on coverage is based on enrolment.

Source: Based on Encuesta Nacional de Ingresos y Gastos de los Hogares.

Table A7. Population by occupation and sector in Bolivia  
(thousands)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)			
	Total	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent
2001	5 013	4	102	333	41	334	295	10	56	28	1 013	810	493	869	386	122	5	25	88
2002	3 579	15	128	370	37	291	304	3	15	12	126	456	399	938	290	71	3	26	95

Note: The data on coverage is based on enrolment.

Table A8. Population by occupation and sector in Brazil  
(thousands)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)			
	Total	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent
1996	68 664	2 349	10 757	13 771	2 648	6 191	4 093	3 227	2 447	4 082	1 494	4 489	6 081	2 800	2 130	865	37	30	1 173
1998	70 746	2 161	11 134	14 090	2 957	6 700	4 027	3 041	2 594	3 828	1 728	5 228	6 064	2 825	2 113	823	52	59	1 322
1999	68 703	2 070	11 316	14 131	2 884	6 953	4 091	3 081	2 831	440	1 814	5 421	6 225	2 791	2 364	854	54	61	1 322
2001	72 039	2 240	12 612	14 924	3 148	7 859	4 555	2 919	2 593	380	2 003	5 545	6 163	2 518	2 160	868	79	65	1 408
2002	74 802	2 276	13 268	15 204	3 286	8 315	4 697	2 928	2 842	451	2 052	6 029	6 193	2 494	2 241	877	57	77	1 515
2003	76 165	2 390	13 850	15 680	3 249	8 262	4 385	2 990	3 003	512	2 231	6 080	6 064	2 404	2 294	1 040	62	80	1 589
2004	78 921	2 363	15 015	15 884	3 351	8 917	4 557	2 939	3 115	478	2 259	6 218	5 916	2 577	2 548	1 054	87	97	1 546
2005	81 366	2 369	15 728	16 503	3 334	8 955	4 686	3 226	3 236	500	2 388	6 680	5 983	2 542	2 486	951	46	92	1 661
2006	84 384	2 525	17 626	16 579	3 398	9 486	4 600	3 120	3 335	463	2 343	7 037	5 988	2 406	2 520	947	85	115	1 811

Note: The data on coverage is based on enrolment.

Source: Based on Pesquisa Nacional por Amostra de Domicílios.

Table A9. Population by occupation and sector in Chile  
(thousands)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)			
	Total	Disadvantaged	Middle Sectors	Affluent	Disadvantaged	Middle Sectors	Affluent	Disadvantaged	Middle Sectors	Affluent	Disadvantaged	Middle Sectors	Affluent	Disadvantaged	Middle Sectors	Affluent	Disadvantaged	Middle Sectors	Affluent
<b>1994</b>	<b>5 283</b>	252	1 425	1 293	113	355	160	49	78	10	105	476	518	92	189	46	1	10	111
<b>1996</b>	<b>5 359</b>	324	1 473	1 247	135	354	180	89	102	14	66	412	561	70	132	66	5	14	115
<b>1998</b>	<b>5 415</b>	283	1 486	1 266	152	384	189	82	116	10	66	433	539	66	113	52	1	16	161
<b>2000</b>	<b>5 540</b>	294	1 522	1 305	176	387	176	85	94	9	101	505	547	64	106	51	2	6	112
<b>2003</b>	<b>5 844</b>	270	1 651	1 350	159	440	189	69	103	9	91	542	600	51	119	63	0	6	131
<b>2006</b>	<b>6 631</b>	318	1 987	1 515	160	511	251	67	106	12	104	556	598	43	107	65	6	29	196

Source: Based on Encuesta de Caracterización Socioeconómica Nacional.

Table A10. Population by occupation and sector in Mexico  
(thousands)

	Formal workers			Non Agricultural Informal Employees			Agricultural informal employees			Non Agricultural Self-employed			Agricultural Self-employed			Self Employed (with tertiary education completed)			
	Total	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent	Disad- vantaged	Middle Sectors	Affluent
<b>1998</b>	<b>38 003</b>	422	5 437	6 029	1 520	5 153	1 686	1 284	870	100	1 756	4 719	3 213	2 996	1 647	496	4	53	620
<b>2000</b>	<b>39 919</b>	394	5 702	6 995	1 478	6 237	1 980	1 740	797	63	1 780	4 603	2 729	2 713	1 492	317	10	101	791
<b>2002</b>	<b>42 209</b>	452	6 490	7 269	1 846	6 473	1 702	1 371	1 005	29	1 700	5 290	3 082	2 777	1 595	292	3	122	711
<b>2004</b>	<b>44 017</b>	983	8 149	7 607	2 758	7 869	2 231	19	67	42	3 463	6 528	3 256	13	16	1	12	289	716
<b>2005</b>	<b>45 061</b>	956	7 993	7 821	1 741	6 761	2 453	1 049	950	75	1 759	5 562	3 275	1 978	1 297	303	22	272	794
<b>2006</b>	<b>47 739</b>	921	8 399	7 322	1 953	7 500	2 341	1 150	914	112	2 030	6 567	3 345	2 168	1 642	278	20	320	756

Note: The data on coverage is based on enrolment.

Source: Based on Encuesta Nacional de Ingresos y Gastos de los Hogares.

Table A11. Summary statistics of variables used in economic analysis

	Brazil		Chile	
	Mean	Std.Dev.	Mean	Std. Dev.
logy	6.33	0.94	12.30	0.85
age	38.85	13.40	40.61	13.10
female	0.42	0.49	0.38	0.49
hhnumber	3.95	1.81	4.31	1.84
nb0_3	0.17	0.41	0.17	0.41
nb3_6	0.23	0.49	0.23	0.48
nb6_14	0.41	0.71	0.42	0.67
nb65	0.16	0.45	0.22	0.51
inde	0.30	0.46	0.22	0.42
indeeduc	0.03	0.16	0.03	0.18
inf	0.26	0.44	0.16	0.37
formalworker	0.41	0.49	0.58	0.49
education	2.48	1.84	3.57	1.59



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