CHAPTER 8

Microdeterminants of Incomes: Labor Markets, Poverty, and Traps?

The preceding chapters focused on the cross-national and spatial aspects of the coexistence of high and persistent poverty and low rates of economic growth in Latin America. The next two chapters amplify that analysis through the lens of households and individuals. This chapter examines the role that labor and other assets and their market returns play in generating persistent low earnings and inequality in the region. It concludes that public investments and policies to foster the poor’s accumulation of assets (including equitable returns to their investments) would facilitate their mobility and would exploit complementarities in the generation of income that are essential for ensuring that the poor benefit from and participate in the growth process.

Earnings traps can result from deficiencies in the endowments that enhance the productivity (quality) of labor assets (such as human capital or infrastructure) as well as from earnings differentials that arise from barriers to mobility in the labor market (such as discrimination or impediments to migration) and that are unrelated to skills.

This chapter examines some of the mechanisms that may prevent the Latin American poor from participating in the growth process, thus keeping them in persistent poverty. Unfortunately, little long-span panel data has been collected for the region, which prevents in-depth analyses of the duration of poverty and its main determinants throughout the region. The chapter instead relies on the limited, though highly consistent, evidence that is available on these issues. Drawing from cross-section survey data, the chapter discusses the variation in the level and growth path of labor earnings across individuals of different skills, demographics, and job characteristics, with

This chapter draws from the studies by Arias and Díaz (2004), Gasparini, Gutierrez, and Tornarolli (2005), Sosa-Escudero and Lucchetti (2004), and Sosa-Escudero and Cicowiez (2005), and from background analyses for this report by Bustelo (2005), Tannuri-Pianto, Pianto, and Arias (2005) and Sosa-Escudero, Marchionni, and Arias (2005).
attention to the quantitative importance of potential barriers to mobility (segmentation across sectors, occupations, or locations) as a source of low earnings and poverty traps. The chapter then analyzes the main determinants of income growth and poverty persistence, drawing primarily on analytical work from a unique panel household survey in rural El Salvador and evidence from other countries. The chapter pays special attention to complementarities (threshold or “bundling” effects) between publicly provided assets and household characteristics (observed and unobserved) as drivers of family income growth.

The chapter reaches two main conclusions. First, labor market segmentation is a second-order source of low earnings in the region relative to low levels of productivity. Most low earnings and thus poverty are not generated directly by the labor market, but largely reflect differences in workers’ productive endowments (chiefly education) and overall productivity levels in the countries of the region. The reduction of earnings disparities specifically associated with gender, ethnicity and race, the informal economy, occupation, sector of employment, or geographic location would have a larger immediate impact on inequality than on poverty, particularly in the poorest countries in the region. The feedback effects of inequality in the pricing of labor on human capital accumulation (discussed in chapter 9) and the unequalizing role of unmeasured worker characteristics (such as education quality, labor market ability, and family connections) deserve greater attention as potential sources of poverty traps.

Second, a detailed analysis of rural El Salvador and consistent evidence from other countries suggest that household-level poverty traps are a phenomenon of practical relevance in Latin America and the Caribbean. Not everyone benefits equally from growth: often individuals and families with bundles of favorable characteristics (observed and unobserved) reap faster-than-average income growth—this is especially true of the more mobile. Important complementarities between public investments and household characteristics mean that poor families often lack the minimum level of private and public assets required to exploit growth opportunities fully. While lack of family endowments is the main driver behind persistent low incomes and poverty, high volatility and the inability to ensure against shocks are also important sources of variation in incomes, much more so than in developed countries.

Policies to improve the functioning of labor markets, including sound regulations and institutions, should facilitate productivity growth while guarding equity in the labor market. The poor are generally disadvantaged in several dimensions. Public investments and policies in one area (such as credit or roads construction) may have heterogeneous impacts depending on the level of assets and other initial conditions affecting the poor. A minimum coordination of public interventions in poor areas can help exploit synergies and overcome the associated potential poverty traps that may affect households with a bundling of unfavorable characteristics.

The distribution of earnings: The role of worker endowments and labor markets

There are two distinct perspectives on how labor markets affect poverty and inequality (Fields 2004). In one view, earnings are mainly determined by the interplay of the supply and demand of labor in competitive, frictionless labor markets. Differences in wages arise from differences in marginal labor productivity and workers’ preferences, which in turn depend on individual characteristics either observed (such as education and work experience) or unobserved (such as unmeasured skills or industriousness) and the quality of the economic and institutional environment that determines overall productivity levels. In this view, low labor productivity—resulting, for example, from low human capital or technological innovations—is the main reason for persistent low earnings. A number of researchers adhere to an alternative view of labor pricing in developing countries that is best characterized by segmented, dualistic markets where earnings differences between workers of similar skills result from discrimination (ethnicity or gender) or barriers to mobility across occupations (such as informal/formal jobs), sectors (subsistence agriculture/off-farm jobs), and locations (rural/urban areas). These barriers can be related to labor market institutions such as unionization, minimum wages, and other labor regulations, and to labor market connections and geographic mobility costs. In this second view, labor markets per se generate unequal advantage and low-earnings traps.

While analytically useful, this distinction is artificial. Inequality in the pricing of skills has feedback effects to the incentives to invest in skills and innovation. As discussed in chapter 9, lower returns to schooling associated with exclusion can help sustain low-education poverty traps. Recent studies find that the process of job reallocation contributes
15 to 50 percent of productivity growth in an economy (IDB 2004). For instance, informality can trap significant resources in low-productivity activities. Lacking access to capital, many micro- and small enterprises cannot capitalize productivity gains through scale economies and innovation and may be trapped in a bad equilibrium: because of low productivity, they cannot afford the costs of participating in formal institutions, but informality in turn limits the potential for productivity growth. Hence, A fluid labor market is important for sustainable increases in productivity in the region.

Considerable evidence indicates that unobserved heterogeneity among individuals with the same human capital, sector of work, and demographic characteristics is very important in explaining earnings levels and earnings differentials in Latin America and the Caribbean. A large portion (around 40–60 percent) of earnings inequality in the region remains “unexplained” by measured worker characteristics. Factors unobserved by the analyst such as the quality of education, family background, labor market connections, and individual industriousness are distributed unevenly across workers. These characteristics may grant an advantage in access to high-paying jobs, affecting the returns to skills and the price of labor in the labor market. Workers from poor families may be disproportionately disadvantaged in these unobserved earnings determinants. With these issues in mind, this chapter review what is known about the main sources of the level and differences in earnings in the region, and the links to poverty and overall income inequality.

**Earnings and productivity: Education and the quality of the economic environment**

A key factor behind the persistent low levels of earnings in the region is low and stagnant productivity. Real wages moved one-for-one with labor productivity between the mid-1980s and early 2000s (IDB 2004), but labor productivity stagnated during this period, with half of the countries exhibiting a decline. Thus, the scope for sustained earnings gains has been limited, a reflection in part of the region’s sluggish skills accumulation and overall productivity trends.

Education is the single most important individual determinant of earnings, accounting for about one-third of overall earnings inequality in the region. One study found that disparities in educational endowments and in returns to education as one of the main factors driving differences in poverty and income inequality between Brazil, Mexico, and the United States (Bourguignon, Ferreira, and Leite 2002). High levels of education are needed to escape from poverty in most countries in Latin America. As discussed in detail in chapter 9, on average, Latin American workers with a university diploma earn one and a half to three times as much as uneducated workers, while those with a secondary degree earn up to one and a half times as much. Moreover, returns to schooling tend to be higher (often by 2 to 4 percentage points) for workers located higher up in the earnings distribution given observed characteristics, so the payoff to education may depend on a worker’s endowment of unobserved characteristics.

Earnings also depend on demand factors and, more generally, a country’s economic and institutional environment. Labor productivity trends mimic the region’s lukewarm overall productivity growth, measured by total factor productivity, which was negative in the 1980s and meager in the 1990s. In contrast, East Asia experienced a sustained increase in productivity and labor earnings during this period. Achieving significant poverty reduction is harder in countries with a low earnings base (where unskilled workers earn very little), a point illustrated in figure 8.1. The figure

![Figure 8.1: Productivity and wages go hand in hand](image-url)
reports hypothetical simulations for a sample of 12 countries where earnings of unskilled workers are made to match those of analogue Mexican workers—the country with the largest unskilled hourly wages (as measured in purchasing power parity dollars) in this particular sample of countries. In the poorest countries, the fraction of low-wage jobs would fall by more or at least as much in this scenario as in a scenario where the labor force had universal secondary education at prevailing earnings levels. While highly artificial, these results highlight that addressing low overall productivity through improvements in the economic and institutional environment (for example, with policies to foster private investment and technological change) can go a long way in lowering poverty rates in the region.6

**Earnings disparities unrelated to skills**

Differentials in earnings adjusted for human capital are quantitatively important in the region. Earnings disparities associated with gender and ethnic or racial background are often attributed to labor market discrimination. Sectoral, occupational, and location earnings inequality may reflect segmentation that impedes labor mobility to higher-paying jobs or earnings differentials related to fringe or nonmonetary characteristics of jobs.

While women likely experience some degree of discrimination in the labor market, it does not seem to be of first order. The gender gap in average earnings (adjusting for education and potential experience) ranges from 12 percent in Mexico to 47 percent in Brazil, and improved during the 1990s to almost match the gender gap in the United States, which nevertheless is still wider than the gender gap in most other OECD countries. The gender gap in Latin America also reflects the effect of women’s role in the household on their labor force participation and occupational choice. Moreover, women do not generally face a disadvantage in the returns to investments in schooling.

Race and ethnicity are a more significant source of earnings disadvantage.8 The indigenous population in the region on average earns 46 to 60 percent of the earnings of the nonindigenous population, while pardos (mixed race) and pretos (blacks) in Brazil earn just over half of average earnings for whites. Poverty rates are also higher for indigenous populations in Bolivia, Guatemala, and Peru and among African descendants in Brazil. The limited evidence suggests that these higher poverty rates arise largely from the disadvantage nonwhites face in human capital (quantity and quality) and its returns.9 In Brazil, after racial earnings gaps are adjusted for workers’ schooling, parental education, and school quality, a typical nonwhite worker with a secondary education faces a 16 percent lifetime average-earnings disadvantage; while significant, this is far short of the 50 percent unadjusted earnings gap. Contrary to findings for gender, differences in returns to schooling across ethnic and racial groups are significant (often 1 to 3 points). Whether they reflect gaps in school quality or labor market discrimination, these unequal returns may discourage skills accumulation by the nonwhite population (see chapter 9).

Evidence indicates there may be greater pay discrimination at higher-salary jobs for any given skill level.10 For instance, the earnings of the best-paid pardos in Brazil are similar to those of the best-paid white workers, but when comparing workers at the bottom of the salary scale pardos and pretos face the same earnings disadvantage relative to whites. Thus the gradient of skin color affects mobility opportunities, so that the saying in Brazil “money whitens” applies only to pardos. In Chile, the gender wage gap increases from 10 percent to about 40 percent as women move up the earnings distribution. The returns to experience are similar for women and men in the lower part of the earnings distribution, but are significantly lower in the top of the distribution. Thus, labor market discrimination seems more likely to occur when workers cannot be denied the higher-paying jobs within occupations on the basis of their observed productive attributes (Darity and Mason 1998).

The poor are often employed in agriculture, construction, retail-trade sectors, and informal occupations, and they tend to live in laggard areas, all of which cause their wages to be lower regardless of skills.11 As noted in chapter 7, regional earnings gaps within Latin America are also quantitatively important given that poorer regions lack natural resources as well as agglomeration externalities in skills, infrastructure, and other factors of production.

Of particular interest are earnings gaps between formal and informal jobs. Salaried workers in the informal economy and the self-employed account for 25 to 70 percent of employment across countries in the region. The average earnings gap between workers in small firms (a proxy for informal wage employment) and those in large enterprises is about 30 percent (similar to the gap in the United States) and ranges from 17 to 51 percent across countries (IDB 2004). Average earnings for the self-employed (most of whom are also informal) are typically far less than those of formal salaried workers. The informal-formal earnings gaps
primarily stem from low skill endowments despite unequal rewards to skills. Around two-thirds of the informal-formal average earnings gap is explained by differences in worker skill endowments, and the rest by a lower remuneration to these endowments in the informal sector.\textsuperscript{12}

Moreover, the pattern of informal-formal remuneration gaps along the earnings scale is consistent with a two-tier informal sector. This is illustrated in figure 8.2 for Bolivia. It decomposes the informal-formal earnings gap into a portion attributable to differences in measured characteristics across workers in each sector and a component attributable to differences in how each sector rewards such characteristics for workers in the 10th, median, and 90th earnings percentiles in each sector. The latter component is often taken, although not without question, as a measure of segmentation. The results suggest that segmentation might exist for informal salaried workers in low- to average-paying jobs and for the self-employed at low-paying jobs for their skills set. At the best-paid jobs for any skill level, the returns to skills are similar between sectors so that these workers can move between sectors with little wage penalties. Similar patterns are found in Argentina, Brazil, and the Dominican Republic.

Overall, the evidence summarized above suggests that earnings differentials unrelated to skills are a second-order source of low earnings relative to differences in workers’ productive endowments. While debate continues about the policy significance of these earnings differentials, it is clear that facilitating labor mobility is key if the poor are to escape their condition. This issue is discussed next.

**Market segmentation and mobility**

The applied literature on what makes growth more pro-poor has focused on how the pattern of growth affects poverty. As noted in chapter 5, studies have shown that growth brings about more poverty reduction when it extends to the geographical areas or sectors where the poor are concentrated so as to make more intensive use of unskilled labor. This report does not deal with the complex issues—such as the sources of growth or the political economy of government intervention—surrounding “industrial” (or selective) policies to induce a sectoral bias in growth. In any event, the evidence provided here and in the 2005 regional flagship report *Beyond the City: The Rural Contribution to Development* (de Ferranti and others 2005) points in another direction. The

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**FIGURE 8.2**

**Earnings gap between the formal and the informal sectors in Bolivia, 2002**

<table>
<thead>
<tr>
<th></th>
<th>Workers in the informal sector paid in the formal sector (using formal sector returns)</th>
<th>Self-employed workers paid in the formal sector (using formal sector returns)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10th quantile</strong></td>
<td>0.39 (low-pay jobs)</td>
<td>0.37 (low-pay jobs)</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>0.43 (average-pay jobs)</td>
<td>0.32 (average-pay jobs)</td>
</tr>
<tr>
<td><strong>90th quantile</strong></td>
<td>0.51 (top-pay jobs)</td>
<td>0.22 (top-pay jobs)</td>
</tr>
</tbody>
</table>

Source: Based on Tannuri-Pianto, Pianto, and Arias (2004).

Note: Earnings regressions controlled for education, work experience, economic activity, gender, ethnicity, demographic and regional effects, and corrected for differences in the probabilities of self-selection into each sector.
incomes of the poor thrive when the poor are able to diversify to more viable economic activities.

Since development involves a shrinking agricultural sector and increasing urbanization, longer-term poverty reduction depends crucially on the ability of the poor to engage in dynamic (competitive) economic activities. In some cases market segmentation may prevent mobility because workers in low-earnings sectors, occupations, and regions face high costs or barriers to mobility. In others, differences in nonmonetary benefits of jobs mean that observed mobility may be lower than one would expect given observed earnings differentials.

One important issue concerns movements out of subsistence agriculture to higher-yield crops or to nonfarm rural activities. As stressed in the 2005 flagship report, evidence from country studies underscores the critical importance for poor households of a minimum bundle of asset holdings (chiefly, human capital and rural roads) and risk protection (such as remittances and safety nets) so that they can undertake productive diversification strategies. For instance, using panel data for El Salvador, Tannuri-Pianto, Pianto, and Arias (2005) find that more-educated households and those with other asset holdings such as stable access to electricity and proximity to a paved road are more likely to rely heavily on off-farm activities for their income generation. Moreover, these effects are multiplicative. Closer proximity to rural roads increases the chances that individuals with more initial asset holdings will shift from agriculture to nonfarm employment compared with individuals with fewer assets. Remittances reinforce the impact of education on the probability of leaving agriculture. This means that families lacking a minimum bundle of assets and risk mitigation capacity are less likely to benefit directly from off-farm employment opportunities induced by rural investments.

In urban areas, a key question is the extent to which informal and formal sector participation reflects segmentation or voluntary choice. The conventional view of the inferiority of informal jobs has been questioned (Maloney 2004). An alternative view points out that many informal salaried and self-employed workers (especially youth, married women, and the unskilled) may voluntarily choose this sector as an entry point to the labor force and to enjoy nonmonetary benefits such as greater flexibility, the ability to exploit entrepreneurial skills to improve mobility, and avoidance of burdensome regulations. In studying patterns of transitions across employment states (including those who are unemployed and those out of the labor force) in Argentina, Brazil, and Mexico, Bosch and Maloney (2005) find significant evidence supporting the latter view. Figure 8.3 illustrates this for Mexico. Patterns of movements across sectors are consistent with the sectors showing a fair degree of integration and transitions not solely driven by earnings differentials, although informal jobs take on more slack during downturns.

However, as noted earlier, a nonnegligible fraction of informal workers face earnings penalties that are too large and that are not offset by nonmonetary benefits; these earnings penalties may be related to low-productivity traps resulting from lack of skills or credit constraints. Moreover, since access to social protection (such as health care or pensions) in most of the region remains tied to a formal employment contract and since informal workers face higher unemployment risk, they may be disinclined to upgrade their skills and diversify to more promising occupations (both formal and informal).

Recognizing the considerable heterogeneity in the informal sector, researchers are beginning to agree that the informal sector has two distinct components: workers who choose this sector voluntarily and conform more closely to entrepreneurship motives, and those who use this sector as employment of last resort. The relative size of each tier depends on country-specific contexts, particularly on the level of productivity in the formal sector, the demographic and skills composition of the labor force, and the incentives resulting from tax and labor regulations.

Finally, as discussed in chapter 7, the spatial pattern of economic growth can influence the effect that poverty reduction has on a given growth rate, especially if transportation and market connectivity are low and migration costs are high. That chapter highlighted some of the issues related to geography and cultural factors that may contribute to persistent spatial earnings differentials and thus be a source of poverty traps. Country case studies of household determinants of migration indicate that the young, moderately educated (secondary or primary), women, and smaller families are more likely to migrate to urban localities, but that individuals from the poorest locations and the indigenous are more prone to rural-to-rural migration (Tannuri-Pianto, Pianto, and Arias 2004; de Ferranti and others 2005; see also Taylor, Yúnez-Naude, and Cerón 2004, and Taylor 2001 for Mexico). The persistence of regional earnings gaps and small migration flows should receive more attention in the region's policy agenda.
Microdrivers of changes in the income distribution

In this section, we ascertain the quantitative importance of the numerous earnings determinants in driving the growth path of earnings for individuals with different characteristics. We do this by isolating the quantitative contribution of the different factors to past changes in the income distribution. This exercise also helps illustrate the profile of workers who have been benefiting from growth as well as the profile of those who have been left behind. We look particularly at changes in poverty and inequality in a few selected countries. Recent studies for Argentina (1992–2001), Bolivia (1993–2002), the Dominican Republic (1997–2002), and Peru (1997–2002) used fairly comparable microsimulations of counterfactual income distributions that allow unobserved worker skills to affect the returns to the worker’s characteristics. The analysis here extends the simple growth-redistribution decompositions in chapter 4. The main goal is to find answers to the question: what would the level of poverty (inequality) have been in the country if factor X (such as education or its returns) had not changed? The question is answered by simulating the distribution of income that results from changes in the relevant factor while all others are kept unchanged, that is, by estimating a counterfactual distribution (see annex 8A).

The selected countries reflect a variety of trends in poverty and inequality in the region. Argentina suffered a dramatic increase in income poverty and inequality during the 1990s. Peru also saw a significant increase in both variables between 1997 and 2002. Bolivia experienced a modest reduction in urban poverty during the first half of the 1990s, followed by an increase during 1997–2002. The Dominican Republic saw little change in poverty during this period, and a large increase in the inequality of labor incomes. Tables 8.1 and 8.2 illustrate the main results for Argentina and Peru.

Overall, changes in poverty and income inequality in the region during recent episodes of economic growth and downturn reflect several microforces, some reinforcing, others counteracting each other. Forces that lead to unequalizing income growth have dominated and explain the disconnect between the performance of the overall economy and incomes of families at the lower end of the distribution in several countries.

Particular note should be taken of two common forces. First, the unequalizing effect of a moderate upgrading of the educational level of the workforce is fairly visible and accentuated by the rise in the returns to higher education. Unskilled earnings, primarily in agriculture, tend to lag behind and prevent many rural families from benefiting from growth and escaping poverty. Second, researchers are
increasingly recognizing the importance of unmeasured worker skills for labor market performance; these skills include school quality, labor market connections, and unmeasured individual ability (such as spunk or industriousness). The effect on income inequality of changes in education returns is magnified by the uneven change in the returns across workers at different points of the adjusted earnings distribution (except in Argentina). This finding may suggest that among well-educated workers, those from better-quality schools or with better connections have been able to cling to the better-paid jobs.

Furthermore, the generally small contribution of individual factors to changes in poverty and inequality points to the inadequacy of single explanations for the sources of distributional change. Individuals with some bundling of favorable characteristics are more likely to take advantage of better employment opportunities throughout the growth process. Evidence on this is presented in the next section.

Determinants of income dynamics: Lessons from rural El Salvador

Our previous discussion of the main sources of labor earnings differences in the region and their evolution over time relied on cross-section data; this approach presumes that the growth path of earnings (and its determinants) for any given individual and his relative position in the earnings distribution is well represented by the growth path of average earnings and the rank of a typical individual with similar characteristics. For example, the change in average earnings of a typical college-educated worker is taken as a proxy for the increase in earnings experienced by all workers with a college education.

As discussed in chapter 2, this approach may not provide adequate answers to questions such as whether poverty is transitory or permanent. Nor does it reveal the factors that make poverty transitory for some individuals and permanent for others. Answering these questions requires longitudinal data sets that are rarely available in Latin America. In the following discussion, we examine in some detail the empirical relevance of some of the mechanisms that may lead to poverty traps by using a unique panel data set of close to 500 rural households in El Salvador (FUSADES–Ohio State University, hereafter dubbed BASIS) continuously followed during a six-year period (1995–2001; see the annex 8A). Although six years is not a great time span, it is a major improvement over the one-to two-year panels that have been used to study mobility in Latin America. This data set also allows more careful analysis of the confluence of unfavorable characteristics that may conspire to generate persistent poverty and inequality. We rely on existing studies using these data and new analysis of the main microdeterminants of growth in incomes.

### TABLE 8.1
Decompositions of poverty and inequality changes in Argentina, 1992–2001

<table>
<thead>
<tr>
<th>Effect</th>
<th>Inequality</th>
<th>Poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gini(^a)</td>
<td>FGT(0)</td>
</tr>
<tr>
<td>Observed change in hours of work</td>
<td>8.0</td>
<td>17.3</td>
</tr>
<tr>
<td>1. All the coefficients</td>
<td>2.9</td>
<td>7.5</td>
</tr>
<tr>
<td>Returns to education</td>
<td>0.8</td>
<td>-1.2</td>
</tr>
<tr>
<td>Gender gap</td>
<td>0.1</td>
<td>-0.8</td>
</tr>
<tr>
<td>Returns to regions</td>
<td>-0.1</td>
<td>-0.4</td>
</tr>
<tr>
<td>Number of children</td>
<td>-0.1</td>
<td>1.0</td>
</tr>
<tr>
<td>2. Structure education</td>
<td>-0.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>3. Structure children</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Observed change in earnings</td>
<td>7.5</td>
<td>7.6</td>
</tr>
<tr>
<td>1. All the coefficients</td>
<td>1.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Returns to education</td>
<td>-0.4</td>
<td>-1.1</td>
</tr>
<tr>
<td>Gender gap</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>Returns to regions</td>
<td>-0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Returns to sectors</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>2. Structure education</td>
<td>0.8</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

Source: Based on Bustelo (2005).
\(^a\) Based on equivalent household income.

### TABLE 8.2
Decompositions of poverty and inequality changes in Peru, 1997–2002

<table>
<thead>
<tr>
<th>Effects</th>
<th>Inequality</th>
<th>Poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gini(^a)</td>
<td>FGT(0)</td>
</tr>
<tr>
<td>Observed 1997–2002</td>
<td>3.5</td>
<td>6.3</td>
</tr>
<tr>
<td>Returns to education</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Gender wage gap</td>
<td>-1.3</td>
<td>-1.1</td>
</tr>
<tr>
<td>Returns to experience</td>
<td>6.5</td>
<td>-8.3</td>
</tr>
<tr>
<td>Education</td>
<td>1.0</td>
<td>-0.2</td>
</tr>
<tr>
<td>Regions</td>
<td>1.5</td>
<td>-0.1</td>
</tr>
<tr>
<td>Sectors</td>
<td>-0.7</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

Source: Based on Sosa-Escudero and Lucchetti (2004).
\(^a\) Based on equivalized household income.
accounting for the role of unobserved heterogeneity of households and individuals in rural El Salvador.\textsuperscript{14}

In addition to the availability of better-quality data, El Salvador offers a promising context in which to study these issues. The country achieved considerable improvements in poverty and other indicators of living conditions during the 1990s. Rural poverty fell by 20 points according to the national household survey and by 28 points using the BASIS data, which provide information on rural incomes in greater detail and probably greater precision (see World Bank 2005\textsuperscript{e}). Much of the progress in rural areas is related to a significant economic diversification away from traditional agriculture such as basic grains, coffee, and sugar to off-farm productive activities; important investments in rural infrastructure that improved access to markets; and an important inflow of international remittances. Yet half of Salvadorans in rural areas remain poor, and a quarter live in mere subsistence. While the findings of one country study clearly cannot be directly extrapolated to the entire region, they do offer important insights into the mechanics of income and poverty dynamics in a context of significant poverty reduction driven by private strategies and public investments. We first discuss the findings on the determinants of income growth and the importance of complementarities between income determinants (observed and unobserved).

The BASIS data confirm that determinants of income growth are fairly similar to those entering cross-sectional earnings functions. Numerous analyses with this data set indicate that assets endowments (land, education), access to markets and infrastructure (road, credit), household risk-coping strategies (productive diversification, microenterprise development, remittances), and household demographics (size, composition, gender) all affect family income growth. Tables 8.3 and 8.4 present the results of random effects (RE) and fixed effects (FE) regressions of individual wages and per capita household incomes on relevant socioeconomic characteristics (Tannuri-Pianto, Pianto, and Arias 2005).\textsuperscript{15} The FE results are presented for three quantiles of the earnings-income distribution to investigate whether the returns to observed characteristics depend on unobserved (unmeasured) income determinants. More detailed results are discussed in the next section.

The main overall findings are:

- Nonfarm jobs carry a large wage premium, which varies with gender and a worker’s initial education level.\textsuperscript{15} Switching to a nonfarm activity increases

\begin{table}[h]
\centering
\caption{Determinants of rural individual wages, El Salvador}
\begin{tabular}{lccccc}
\hline
\textbf{Effect on log hourly wages, in 2001 colones} & \multicolumn{3}{c}{\textbf{Mean regressions}} & \multicolumn{3}{c}{\textbf{Quantile fixed effects regressions}} \\
 & \textbf{Fixed effects} & \textbf{Random effects} & & \textbf{25th} & \textbf{50th} & \textbf{75th} \\
\hline
Education & 0.011 & 0.021\textsuperscript{***} & & 0.008 & 0.013 & 0.014\textsuperscript{*} \\
Experience & 0.028\textsuperscript{**} & 0.014\textsuperscript{***} & & 0.018 & 0.018 & 0.022 \\
Experience\textsuperscript{2} & −0.033 & −0.021\textsuperscript{**} & & −0.002 & −0.005 & −0.013 \\
Head household & & & & & & \\
Female & 0.114\textsuperscript{**} & & & & & \\
Nonfarm main sector & & & & & & \\
Distance from bus stop (km) & 0.135\textsuperscript{*} & 0.205\textsuperscript{***} & & 0.156\textsuperscript{*} & 0.252\textsuperscript{*} & 0.316\textsuperscript{*} \\
Distance from bus stop\textsuperscript{2} & −0.047\textsuperscript{***} & −0.045\textsuperscript{***} & & −0.031\textsuperscript{*} & −0.039\textsuperscript{*} & −0.038\textsuperscript{*} \\
Distance from bus stop * education & 0.0017\textsuperscript{*} & 0.0023\textsuperscript{***} & & 0.0003 & 0.0012 & 0.0017 \\
Distance from bus stop * Female & 0.002 & −0.001 & & 0.003\textsuperscript{*} & 0.001 & 0.000 \\
Nonfarm * Female & −0.236\textsuperscript{*} & −0.153\textsuperscript{**} & & −0.118 & −0.157 & −0.228\textsuperscript{*} \\
Nonfarm * Education & 0.023\textsuperscript{**} & 0.043\textsuperscript{***} & & 0.013 & 0.008 & 0.009 \\
Constant & 1.203\textsuperscript{***} & 1.144\textsuperscript{***} & & 1.150\textsuperscript{*} & 1.230\textsuperscript{*} & 1.220\textsuperscript{*} \\
Regional and year dummies & Yes & Yes & & Yes & Yes & Yes \\
\hline
\end{tabular}
\textit{Source:} Based on Tannuri-Pianto and others (2005).
\textsuperscript{*}Significant at 10 percent.
\textsuperscript{**}Significant at 5 percent.
\textsuperscript{***}Significant at 1 percent.
average wages for males by 14 percent. Meanwhile, only well-educated females benefit from joining the nonagriculture sector, those women with below-average education (three and five years in the traditional agriculture and nonfarm sectors, respectively) can even experience wage losses.

- Households that engage more intensively in non-agriculture activities accrue a 17 percent income gain. Surprisingly, there is no significant income difference between traditional and nontraditional agricultural households, suggesting that partial diversification to nontraditional crops fails to boost agricultural incomes once one controls for household characteristics and idiosyncratic effects that affect activity choice.

- Returns to education are seemingly low in the agricultural sector and at least twice as large in nonfarm employment, as identified through workers who switch sectors. Changes in education do not correlate significantly with mean earnings, likely as a consequence of very little real variation in educational levels over the panel. The income gains from education for a household that remains predominantly on the farm are lower (1.1 percent) than if they had switched to nonfarm activities, although again this finding may be downward biased (the effect is twice as large in the random effects regression). Workers that are closer to markets earn higher wages, perhaps because they incur lower transaction costs (in time and money) associated with engaging in the market economy. Earnings decrease with distance from the market, declining by about 4 percent per kilometer and reaching a maximum penalty of 27 percent for workers at about 10 kilometers from a bus stop (more than 80 percent of workers are at least that far away). Similarly, households that get closer to a paved road also derive higher per capita incomes, the effects being very similar to those on labor earnings.

- Having or gaining access to formal credit positively affects incomes by 15 percent, while informal credit has no discernible effect on average family incomes.

### Table 8.4
Determinants of rural per capita family incomes, El Salvador

<table>
<thead>
<tr>
<th>Effect on log yearly per capita income, in 2001 colones</th>
<th>Mean regressions</th>
<th>Quantile fixed effects regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed effects</td>
<td>Random effects</td>
</tr>
<tr>
<td>Average education workers</td>
<td>0.011*</td>
<td>0.026***</td>
</tr>
<tr>
<td>Log number of workers in household</td>
<td>0.118***</td>
<td>0.131***</td>
</tr>
<tr>
<td>Log number of children and elderly</td>
<td>-0.052**</td>
<td>-0.073***</td>
</tr>
<tr>
<td>Distance to paved road</td>
<td>-0.005</td>
<td>-0.006*</td>
</tr>
<tr>
<td>Distance to paved road^2</td>
<td>0.0002</td>
<td>0.0002**</td>
</tr>
<tr>
<td>Electricity</td>
<td>-0.058</td>
<td>0.023</td>
</tr>
<tr>
<td>Formal credit</td>
<td>0.153***</td>
<td>0.110***</td>
</tr>
<tr>
<td>Other credit</td>
<td>-0.005</td>
<td>-0.007</td>
</tr>
<tr>
<td>Remittances (*10,000)</td>
<td>-0.0122</td>
<td>-0.0115</td>
</tr>
<tr>
<td>Subsidies (*1,000)</td>
<td>0.0012</td>
<td>-0.0010</td>
</tr>
<tr>
<td>Activity diversification index</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>Number of Microenterprises</td>
<td>0.076***</td>
<td>0.084***</td>
</tr>
<tr>
<td>Non traditional farm sector</td>
<td>0.013</td>
<td>0.046</td>
</tr>
<tr>
<td>Non farm sector</td>
<td>0.163***</td>
<td>0.185***</td>
</tr>
<tr>
<td>Regional and year dummies</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Based on Tannuri-Pianto and others (2005).
*Significant at 10 percent.
**Significant at 5 percent.
***Significant at 1 percent.
• Families’ capacity to diversify risks has a mixed impact on family incomes. Income diversification (measured by the Simpson Diversification Index), remittances, and subsidies do not affect average family per capita income. However, opening a microenterprise increases income by about 8 percent.

These results offer some comfort that the conclusions derived from cross-section income differentials are a good approximation of the drivers of income growth. Next we focus on the role of complementarities between public investments and household characteristics (observed and unobserved) that lead to lower income growth for many poor families. These effects can rarely be isolated with cross-section data given the high colinearity between socioeconomic characteristics (such as the high confluence of unfavorable characteristics among the poor), a problem that is overcome by the time variation in a panel context.

**When it rains it pours: complementarities and initial conditions matter**

One of the main mechanisms behind poverty traps is the existence of minimum thresholds and strategic complementarities caused by externalities or coordination failures in production or income generation. These can arise under limited capacity to face catastrophic shocks, credit market restrictions (resulting from imperfect credit information and low collateral), and fixed costs of carrying an investment that households cannot amortize in the short term. Households may be unable to borrow or save the minimum amount necessary to go beyond the fixed cost or the outlay required for an investment to be profitable, be it the adoption of a more modern cropping technique or investments in higher education. In other words, convex or lower initial returns to investments may prevent making investments that become profitable only beyond a given investment threshold. Strategic complementarities occur when individual decisions or private rates of return to investments depend on a family’s initial assets and the broad capital stock. For example, whether a household benefits from the paving of rural roads may depend on its level of assets and human capital and on its access to credit. This interdependency can give rise to coordination failures that prevent entire regions or population groups from diversifying to economic activities with higher returns. Minimum coordination of investments at the national, regional, or group level may be needed for potentially profitable investments and income diversification to materialize.

These issues can be examined in two ways: first, by including nonlinear terms and interactions between relevant observed characteristics in the income (labor earnings) regressions shown in tables 8.3 and 8.4; and, second, by allowing the returns to observed characteristics to depend on the conditional income or earnings quantile of the household or worker, that is, on its rank in the income (earnings) distributions that would obtain if all workers had the same measured characteristics (for methodological details, see the annex 8A). The conditional quantile of a household or worker depends on unobserved characteristics such as school quality, or work ethic, or differences in household productivity, such as differences in cropping methods or soil yield. Coefficients that increase (decline) significantly over the quantiles indicate that unobserved income determinants operate as complements to (substitutes for) the relevant measured characteristic. For example, households with idiosyncratically low productivity may benefit less from having access to credit or being closer to markets, in which case the returns to credit and rural roads will be lower at the bottom quantiles of the conditional income distribution.

The results indicate that complementarities play an important role in determining which rural families share fully in income growth opportunities (Tannuri-Pianto, Pianto, and Arias 2005). Individuals and households with bundles of favorable characteristics observed or unobserved reap faster income growth, especially those moving out of agriculture. Some of these findings are illustrated in figure 8.4. The main conclusions are summarized here:

• Often a minimum level of education (an average of six years among family members) is needed for households to fully exploit the income gains from improvements in access to roads and credit and to leverage remittances.
• The impact of road proximity and human capital on income growth depends on unobserved income determinants. Closer road proximity does not affect incomes of households at the bottom 25 percent of the income distribution given their observed characteristics, while those in the top 25 percent reap the highest income gains.
• Higher remittances correlate with increases in labor income only among households with more education
and higher idiosyncratic productivity. For the less educated, the regression correlation is negative, which may suggest that remittances serve as a safety net (they smooth negative income shocks) or that they may induce negative labor supply effects (by increasing the reservation wage at which individuals accept work).

These results uncover evidence of threshold and interaction (bundling) effects that prevent the poor from benefiting fully from rural investments and their own diversification strategies and may also discourage them from undertaking potentially profitable investments. Individuals with largely unfavorable characteristics are more likely to sink in low-wage farm and off-farm jobs. Informal credit, remittances, and unobserved income determinants all complement a household’s human capital in generating income. In many cases, a minimum of primary education appears to be necessary for households to fully exploit the benefits from credit and remittances. Moreover, road access partially substitutes for lack of education (and vice versa) so that rural transportation investments have a greater benefit for more-isolated and less-educated households, which are more likely to be poor. Similar results were found in studies for Peru (Saavedra and Torero 2004) and for other countries in Central America (World Bank 2004c). A minimum coordination of public

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**FIGURE 8.4**

Complementarities in the income generation process in rural El Salvador

- Impact of nonformal credit on annual growth of average per capita income by household education level
- Impact of formal credit on annual growth of average per capita income by distance to paved roads
- Association between remittances and annual growth in average per capita nonremittance income by household education level
- Earnings gains of moving from agriculture to a nonfarm activity by quantile of the earnings distribution

Source: Based on Tannuri-Pianto and others (2005).
Note: The impact of remittances is illustrated for marginal changes of 1,000 colones.
interventions in rural areas is needed to exploit these synergies and overcome the associated threshold effects that constrain the incomes of households with a bundling of unfavorable characteristics.

Now that we have established the main microdeterminants of income growth and found that they usually interact in reinforcing or offsetting ways, it is natural to ask whether the dynamics of the income generation process are such that low-income status and thus poverty tend to persist over time. That is, what are the chances that low-income families in El Salvador in 1995 will still be low-income families in 2001? How much of this persistent poverty hinges on idiosyncratic and transitory characteristics of families (measured and unmeasured), and how much on external shocks or fortune? We turn to these questions next.

**Income and poverty persistence: Shocks, observed and unobserved endowments**

Income dynamics are best understood under the “permanent-transitory income hypothesis” of Friedman and Kuznets (1954), which assumes two components in the determination of incomes over time. One is a permanent component that reflects an individual or family long-term income potential related to productive characteristics such as human capital, other assets, and unmeasured skills. The second is a transitory component that captures external factors, such as economic swings, individual-specific shocks, or plain measurement error, that cause incomes to depart from their permanent level.

In subsequent empirical work, the issue of income and poverty persistence has been studied from the perspective of intergenerational income mobility and more recently of poverty vulnerability. In essence both views ask how likely it is that a household of given characteristics will find itself in poverty at a given future time. The answer ultimately depends on the household’s long-term consumption prospects and the consumption volatility it faces. In theory a household can be continuously poor because its endowments yield only low-income potential or because it is systematically affected by income shocks that it is unable to smooth. Each of these factors depends on the state and evolution of household characteristics (observed and unobserved) and on the aggregate environment. The literature on intergenerational income mobility has emphasized the first aspect. Starting with the classic work in the United States by Lillard and Willis (1978) and Macurdy (1982) and continuing more recently with work by Geweke and Keane (2000), this literature has focused on developed countries where relatively longer panel data allow examination of long-term income persistence. The second strand is more common in developing countries and regions like Latin America where short panels or cross-section data have been used to examine the link between poverty and the inability to insure risks (see, for example, Chaudhuri, Jalan, and Suryahadi (2002); Chaudhuri (2000); Pritchett, Suryahadi, and Sumarto (2000); Jalan and Ravallion (1999); and Ravallion and Chaudhuri (1997). Vulnerability arising from high volatility requires interventions to reduce and insure risks, while vulnerability arising from low endowments calls for policies to support the accumulation of endowments and long-term income potential.

Table 8.5 illustrates the transitory (vulnerability) and permanent (persistence) aspects of rural poverty in El Salvador. The BASIS data reveal the considerable income volatility faced by rural Salvadorans. In any given year, the results show, the poverty rate hides continuous movements in and out of poverty of different individuals. Around 6 out of 10 rural households fell into poverty temporarily during 1995–2001, although more than half of these had an income stream above the poverty line for most of the period. In addition to the inherent risk attached to rural incomes, this volatility reflects a series of aggregate shocks including two earthquakes and the impact of declining world coffee prices on coffee producers. At the same time, almost 4 out of 10 households never

<table>
<thead>
<tr>
<th>States</th>
<th>Percent of households</th>
<th>Percent with average per capita incomes over the period below the poverty line</th>
<th>Percent with average per capita incomes over the period above the poverty line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent poor (all 4 periods)</td>
<td>25.1</td>
<td>25.1</td>
<td>n.a.</td>
</tr>
<tr>
<td>Transient poor</td>
<td>61.9</td>
<td>27.9</td>
<td>33.9</td>
</tr>
<tr>
<td>3 of 4 periods</td>
<td>24.8</td>
<td>21.1</td>
<td>3.8</td>
</tr>
<tr>
<td>2 of 4 periods</td>
<td>19.7</td>
<td>6.0</td>
<td>13.8</td>
</tr>
<tr>
<td>1 of 4 periods</td>
<td>17.2</td>
<td>0.9</td>
<td>16.4</td>
</tr>
<tr>
<td>Nonpoor</td>
<td>13.1</td>
<td>n.a.</td>
<td>13.1</td>
</tr>
<tr>
<td>Percent of households</td>
<td>100</td>
<td>53.0</td>
<td>47.0</td>
</tr>
</tbody>
</table>

Source: Based on Beneke de Sanfelíu and Shi (2004).
Note: n.a. = not applicable.
crossed the poverty mark: one-quarter of all households remained poor the entire period, while 13 percent always stayed above the poverty threshold. This finding points to the significance of the structural determinants of poverty in rural El Salvador.

Which factors make poverty transitory for some individuals and permanent for others? What is the role of “uncontrollable” factors such as economic shocks or unexploited externalities such as a lack of public goods? Recent studies with the El Salvador data point to some valuable answers, illustrated in figure 8.5. With respect to poverty vulnerability, human capital of the family, its proximity to markets, and its reliance on subsistence agriculture (proxy of risk aversion or the inability to self-insure from risk) all increase the probability that a rural Salvadoran household remained permanently poor during 1995–2001. The level of human capital was a particularly strong factor in determining whether families were likely to sink into poverty or become highly vulnerable to falling into poverty.

In a study using the El Salvador data, Rodriguez-Meza and Gonzalez-Vega (2004) found evidence that the risks faced by households to materialize its future consumption prospects given its current characteristics (observed and unobserved) are a possible cause of poverty traps. Their study showed that recovery from an income shock is quick for the relatively rich in rural areas but much lengthier for the poor. This result, however, might be somewhat sensitive to estimation methods since they use a short time span to identify highly nonlinear income dynamics.

In a background study for this report, Sosa-Escudero, Marchionni, and Arias (2005) used a different approach that focuses on the sources of income persistency. Their evidence shows that transitory income shocks are the major source of variation in incomes across rural families in El Salvador, much more so than in developed countries. However, the correlation of bad shocks is relatively low (0.24) in these data. Over a lifetime, good shocks and bad shocks cancel each other out so that transitory shocks are not as important in determining whether an individual’s or a household’s income stays the same as are endowments, including unobserved income determinants. Indeed, about two-thirds of the persistency in low- and high-income states is attributable to idiosyncratic differences between families, including unobserved heterogeneity. Observed income determinants, chiefly education, account for about half of this income persistency. Consequently, low income potential is a strong predictors of low
incomes later in life. In other words, while a large proportion of total cross-section inequality (as measured by the variance of logarithmic incomes) is explained by income instability, life-cycle inequality results largely from the permanent income component, particularly from the relatively time-invariant productive characteristics of families and their members.

Being persistently poor in rural El Salvador thus seems more likely to result from the lack of endowments needed to escape a lifetime of low income than from the inability to ensure against income shocks. Many of these endowments can be influenced by policy interventions, although not always in the short term; in particular, it takes one to two decades for a family to accumulate levels of human capital sufficient to escape poverty.

**Implications for policies**

The findings reviewed in this chapter suggest several policy approaches that could improve the prospects for more equitable growth and poverty reduction:

- Most of the earnings differentials, and thus poverty and income inequality in Latin America and the Caribbean, are not generated by earnings differentials in the labor market; instead, these differentials reveal what firms and workers bring to the market. Many of the poverty and earnings disparities in the region reflect the level of productivity of firms and differences in workers’ productive endowments; distortions in the allocation of workers and jobs are of second-order importance. What is important are the feedback effects to human capital accumulation the labor market creates through the pricing of labor (earnings returns). There is a need to reverse the unequalizing role of unmeasured worker characteristics (such as deficiencies in early-childhood development, education quality, and labor market connections) in commanding higher wages. This is discussed in more detail in chapter 9.

- Labor markets do not seem to operate with pervasive segmentation. The reduction of residual earnings disparities associated with gender, ethnicity and race, informality, occupation, sector of employment, and geographic location would have a larger impact on reducing overall inequality than on reducing poverty levels, a finding that is symptomatic of overall low labor productivity. Although of second-order importance, reducing the portion of these earnings gaps associated with discrimination and labor market frictions can boost the incentives for disadvantaged groups to invest in skills acquisition and facilitate the mobility of workers.

- Bridging the gaps in education (both quantity and quality) and other productive characteristics of workers can go a long way toward reducing the wide earnings disparities in the region. But it will not be enough to reduce poverty significantly. In most countries, low levels of labor productivity are a chief constraint to earnings potential. Thus policies that promote an economic and institutional environment conducive to productivity growth are important for reducing the incidence of low-paid jobs and making investments in skills more attractive.

- Labor market interventions, including changes in labor legislation and its application, should focus on achieving a better balance between protecting workers and unleashing the potential for productivity growth in the region. This calls for actions aimed at reducing discriminatory practices or location-specific biases and facilitating the mobility of workers such as more effective enforcement of equal pay and merit promotion regulations, labor market intermediation services, more flexible work schedules, and establishment of child care centers.

- The evidence from rural El Salvador indicates that despite considerable persistence in individuals’ and households’ sectors of specialization, there is room for public policies to encourage mobility. Education and access to services (such as electricity and water) and markets (roads) affect the probabilities of transitioning from the farm to the nonfarm sector and vice versa.

- The poor are generally disadvantaged in several dimensions. We find significant evidence of important complementarities between rural investments and rural household characteristics (observed and unobserved) in determining the probability of sector participation and the returns to their income-deriving endowments. Public investments and policies in one area (such as credit access or road construction) may have heterogeneous impacts depending on the initial conditions affecting the poor, particularly their observed and unobserved productive endowments.
• Access to markets can be increased through investments in basic infrastructure, which contribute to a household's ability to attain the minimum level of wealth, educational skills, or credentials needed to move to modern occupations. Rural development could be made more effective with some minimum coordination of rural investments and programs—such as education, road construction, and the establishment of microcredit schemes—so that they benefit the more-isolated and poorest families.

• Policy interventions that generate synergies and break the mutually reinforcing mechanisms that lead to poverty traps could ignite a virtuous cycle between growth and broad poverty reduction. National development policies need to maintain a long-term perspective to give the investments needed to break low incomes and poverty persistence (for example, in human capital formation) time to mature and translate into significant improvements in family incomes.

Annex 8A

Data and methodological details

Data

Most of the new analysis for this chapter relies on the rural panel survey conducted by the Fundación Salvadoreña para el Desarrollo Económico y Social (FUSADES) in El Salvador and the Rural Finance Program at Ohio State University, in Columbus Ohio. The survey investigates demographic, occupational, and physical assets (such as infrastructure, land, and housing) among other characteristics that affect the income dynamics of rural households and their strategies for coping with risk. The panel data set is composed of four biennial observations for the years 1995, 1997, 1999, and 2001. The main sample used in our analysis is 449 households that were observed in all four years. The attrition rate (individuals dropping from the panel) is about 30 percent and largely occurred from the first to the second wave when it was decided the survey would be continued as a panel. The evidence from previous studies indicates that attrition does not appear to have a significant effect on either the sample composition or the validity of statistical inference from this sample (see Rodriguez-Mesa and Gonzalez-Vega 2004 for more details).

Estimation methods

A primer on quantile regressions

The technique of quantile regression (Koenker and Bassett 1978) is used extensively in the background studies for this chapter and chapter 9 because it provides a rich characterization of the effect of the explanatory variables on the conditional distribution of the dependent variable (such as the distribution of earnings). When there is sizable unobserved heterogeneity in the data, mean linear regression models provide only a limited characterization of this distribution and of the role of explanatory factors. Quantile incomes regression analysis is useful given the income inequality in Latin America and the Caribbean, as well as the limitations of existing surveys in collecting all relevant earnings determinants.

For example, we can estimate regression lines for various percentiles of the adjusted (conditional) wage distribution, that is, the distribution of earnings that results if all workers have the same observable characteristics. For instance, median regression (the 50th quantile) splits the sample in half (half of the residuals above and half below the regression line) and gives the same results as Ordinary Least Squares (OLS, mean regression) when the wage distribution is symmetric. This allows unobserved wage determinants to interact with measures of observed skills. This interaction is captured by regression coefficients that vary across percentiles of the adjusted wage distribution. This way we can recover different impacts of the explanatory variables throughout the entire distribution without imposing any prior assumptions such as normality or constant variance of regression errors. Results are also robust to outliers in wage data.

Suppose that \(X\) is a dummy variable for gender (women \(= 1\)). The quantile regression coefficient measures the gender wage gap between a woman and a man with similar education and experience at the same conditional quantile of the wage distribution. For example, the coefficient in the 90th percentile yields the wage disadvantage faced by women in the top 10 percent of best-paid jobs for any given level of observed skills while the 10th percentile coefficient yields the gap for women in the bottom 10 percent of jobs on the earnings scale. Now suppose that \(X\) consists of years of formal education. OLS provides a single estimate of the returns to education, the average for the whole population. Individual returns to education, however, may depend on some unobservable factors, like quality of education, unmeasured skills, or labor market...
connections, and hence may differ across workers (figure A8.1). In fact, recent studies for several countries suggest that returns are higher for workers at the top of the distribution. Moreover, it is possible for the returns to education to increase for workers in the upper quantiles of the wage distribution and decline for those in the bottom quantiles, leaving the average return unchanged (figure 8A.2). Quantile regressions allow an assessment of these important potential differences.

Explaining changes in income distribution

Microeconometric simulations of counterfactual distributions are helpful to characterize past distributional changes and to simulate the distributional impact of changes in economic factors and public policies. The idea is to simulate the distribution of labor income at time $t$ as a function of individual observable characteristics affecting wages and employment, the parameters that determine the effects of these characteristics on market hourly wages and employment outcomes (participation and hours of work), and unobservable characteristics. A counterfactual distribution in time $t_1$ is generated by taking some of its determinants (parameters or distribution of characteristics) as if they were those of time $t_2$ and then comparing this counterfactual distribution to the actual distribution observed in $t_1$. The difference between the two distributions can be attributed to the change in the selected determinants between $t_1$ and $t_2$. This method isolates the contribution of changes in observed household characteristics (endowments), the returns to those characteristics, and unobserved heterogeneity in the returns.

Four studies—Gasparini and others (2004) for Bolivia; Sosa-Escudero and Lucchetti (2004) for Peru; Sosa-Escudero and Cicowiez (2005) for the Dominican Republic; and Bustelo (2005) for Argentina—use these methods to estimate regressions for a reduced form of a labor supply model with two equations, one for the number of hours of work and one for wages. The explanatory variables include the typical measures of workers’ human capital (education and experience, proxied by age and its square), demographic characteristics such as gender and ethnicity, job characteristics (sector of activity and labor-informality indicators), and geographical location. The earnings equations are estimated separately for household heads and non-heads, both in rural (except in Argentina) and urban areas. The decompositions are carried out for one or two periods in the 1990s and early 2000s using national household survey data.

The decomposition analysis is enriched with estimates of quantile earnings equations that are used to generate counterfactual distributions when the whole family of returns to education (varying across quantiles) changes or for changes in each of the return quantile coefficients. This procedure, used throughout the report, may provide a richer characterization of past and predicted changes in the income distribution generated by economic and social changes or policy interventions. Particularly, when investigating changes in
In this formulation the covariates, on the conditional quantiles of the response. The effects of individual-specific “unobserved heterogeneity,” and the dynamic model for household income with first-order autocorrelation (classic work of Lillard and Willis (1978). This is a linear panel model with first-order serial correlation of the residuals. Sosa-Escudero, Marchionni, and Arias (2005) applied the method for the conditional quantile functions of the response of the $j$th observation on the $i$th individual $y_{ij}$

$Q_{y_{ij}}(\tau | x_{ij}) = \alpha_{y} + x_{ij}^\top \beta(\tau) \quad j = 1, \ldots, m_i, \quad i = 1, \ldots, n.$

In this formulation the $\alpha$s have a pure location shift effect on the conditional quantiles of the response. The effects of the covariates, $x_{ij}$ are permitted to depend upon the quantile, $\tau$, of interest, but the $\alpha$s do not. With least squares methods, one can transform $y$ and $X$ to deviations from individual means, and then compute $\hat{\beta}$ from the transformed data. This decomposition of projections is not available for quantile regression, and we are required to deal directly with the full problem and the computational complexities associated with it. For this we use the algorithm proposed by Koenker (2004) and rely on the bootstrap (300 replications) to obtain standard errors for the regression quantile coefficient estimates.

Analysis of income persistency

In their study of income persistency in rural El Salvador, Sosa-Escudero, Marchionni, and Arias (2005) applied the linear panel model with first-order serial correlation of the classic work of Lillard and Willis (1978). This is a linear dynamic model for household income with first-order autocorrelation:

$y_{it} = x_{it} \beta + \mu_i + \nu_{it},$

$\nu_{it} = \nu_{i,t-1} + \epsilon_{it}, \quad |\nu| < 1,$

where $\mu_i \sim iid (0, \sigma_{\mu}^2), \epsilon_{it} \sim iid (0, \sigma_{\epsilon}^2)$, independent of each other and of $x_{it}$. In this specification the potential sources of persistency are $x_{it}, \mu_i$, and the presence of serial correlation in the observation-specific error process. $\mu_i$ represents individual-specific “unobserved heterogeneity,” and the serially correlated structure in the error term represents “state dependence” of the shocks. Consistent estimation of all the parameters is done relying on the method of moments as in Baltagi (2001, 82–83).

The empirical strategy consists of the following:

- Implement the Bera, Sosa-Escudero, and Yoon (2001) robust test for the presence of unobserved heterogeneity, state dependence, or both, based on a “null” model of no persistency (plain pooled OLS).
- Estimate the dynamic model using instrumental variables to obtain some relevant parameters and corroborate the validity of the Lillard-Willis specification.
- Implement the Lillard-Willis approach: estimate a base model to measure overall persistency (only $y_{i,t-1}$ as regressor); control for $x_{i,t}$ and $x_{i,t-1}$; and control for $y_{i,t}$ and then for the presence of $x_{i,t}$ and $x_{i,t-1}$ under serially correlated errors. Four model specifications are considered: model 1 is only time dummies; model 2 adds basic educational and demographic characteristics and geographic controls; model 3 adds credit, market access, and other economic characteristics; and model 4 adds interactions between the latter characteristics. See Sosa-Escudero, Marchionni, and Arias (2005) for more details.

Notes

1. For studies based on an asset-based approach to poverty persistence, see Carter and Barrett (2005), and Attanasio and Székely (2002) for Latin America.
3. For recent studies for Africa, see Barrett Carter, and Little (forthcoming).
4. The $R^2$ of earnings regressions controlling for all of these characteristics are typically 0.4 to 0.6 (in Brazil).
5. For far more comprehensive surveys of earnings studies in the region, see de Ferranti and others (2003, 2004) and IDB (2004).
6. See IDB (2004), de Ferranti and others (2003), and recent World Bank poverty assessments for Bolivia, Brazil, Dominican Republic, Ecuador, and Peru, for example, for country-specific studies of the importance of productivity for escaping poverty and low earnings.
7. Females tend to have more intermittent labor force participation (rates in the region average 48 percent compared with 52 percent in East Asia and 70 percent in the United States). Women’s actual labor market experience is lower than men’s for a number of reasons, particularly child bearing. Married women often participate in informal sector jobs that grant more time flexibility, so their lower pay may partly reflect a flexibility premium. See Kim and Polachek (1994), Cox Edwards, Durylea, and Ureta (2001), and Cunningham (2001).
8. See, for example, the studies in Hall and Patrinos (2005) and Arias, Yamada, and Tejerina (2004).

9. Differences in schooling and other characteristics account for over 70 percent of ethnic earnings gaps in Bolivia; Guatemala, and Ecuador and about 50 percent in Peru.

10. For ethnicity and race, see Arias, Yamada, and Tejerina (2004) for Brazil; Gasparini and others (2004) for Bolivia; and Sosa-Escudero and Lucchetti (2004) for Peru. For gender in Chile, see Montenegro (2001).

11. Sector earnings differentials average 10 to 15 percent in the region (after falling with economic restructuring), not unlike those in the United States; some differentials reach more than 40 percent in some sectors and countries, however (IDB 2004).

12. See Tannuri-Pianto, Pianto, and Arias (2004a) for Bolivia; Carneiro and Henley (2002) for Brazil; World Bank (2005b) for the Dominican Republic; and Bustelo (2005) for Argentina (although Bustelo does not correct for self-selection into the informal and formal sectors).


14. We rely on Tannuri-Pianto and others (2005); the background paper for this report by Sosa-Escudero, Marchionni, and Arias (2005); Beneke de Sanfeliu and Shi (2004); Rodriguez-Mesa and Gonzalez-Vega (2004); Lanjouw (2001); and other references therein.

15. The latter are robust to omitted variable biases since the effects are identified from the within-period covariation between socioeconomic variables (such as workers who switch sectors or changes in distance to roads) and incomes or wages. However, the FE results for variables with little time variability such as education (a small fraction of workers remain in school) may be biased downward (because of higher signal-to-noise ratios). In this case RE are preferred, since they reflect both cross-section and within-period variation.

16. The sectoral classification of individuals and households—traditional and nontraditional agriculture and nonfarm—is based on primary occupation and the number of hours spent in each sector. See Tannuri-Pianto, Pianto, and Arias (2005) for details.

17. The diversification index is created by counting each different source of income weighted by its contribution to total household income; it captures the ability of households to diversify the economic activities (such as crops cultivated, variety of microenterprises) in which their members engage.

18. This approach relies on recent developments in quantile regression for longitudinal data (Koenker 2004). See the annex.

19. Beneke de Sanfeliu and Shi (2004) report that about 80–85 percent of households moved at least one decile upward or downward and 30–45 percent moved two deciles or more from period to period.
