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The Effects of the Colombian Trade Liberalization on Urban Poverty

Pinelopi Koujianou Goldberg and Nina Pavcnik

6.1 Introduction

The recent wave of trade reforms in the developing world has been followed by an intense debate as to whether these reforms contributed to the increase in wage inequality observed in many developing countries during this period. While this debate has not delivered a unanimous answer, free trade advocates emphasize that even if trade liberalization increased inequality (thus worsening the *relative* position of some groups in the population), it may still have improved the *absolute* position of the entire population, thus reducing poverty. Proponents of this view accordingly advocate a shift of focus from relative to absolute measures of well-being.

Despite the importance of the above argument, there has been little work on the effects of trade policy on absolute measures of well-being, such as poverty. The scarcity of studies on this topic is primarily due to the difficulties associated with the measurement of poverty on one hand, and the identification of the trade policy effects on the other. The present paper takes a step toward filling this gap. While our analysis faces many of the challenges encountered in previous attempts to establish a link between trade liberalization and poverty reduction, we believe that the importance of the issue from a public policy point of view justifies the attempt to more closely study this link.

Our analysis focuses exclusively on the *urban* sector in Colombia, a

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country that underwent major unilateral trade liberalization in the late 1980s and early 1990s following its 1981 accession to the General Agreement on Tariffs and Trade/World Trade Organization (GATT/WTO). The focus on the urban sector is dictated by the nature of the policy experiment we exploit to identify the relationship between openness and poverty reduction. The drastic tariff and nontariff barrier reductions between 1985 and 1992 were concentrated in the manufacturing sector, which is mainly located in urban areas. The average tariff in manufacturing dropped from 50 to 13 percent between 1984 and 1998; in contrast, the average tariffs in agriculture declined substantially less, from 26 to 12 percent. Given the relatively small magnitude of trade liberalization in rural areas, we do not expect the reforms to have had as significant an impact on rural poverty, at least not in the short or medium run. Furthermore, the wide use of domestic production and export-oriented agricultural policies by developed countries suggests that agricultural prices in the developing world would be potentially affected more by a multilateral liberalization of agricultural trade, such as the one currently debated in the Doha WTO negotiations, than a unilateral trade liberalization episode in a single country. Hence, although poverty is particularly problematic in rural areas, we confine our analysis to the urban sector. According to World Bank estimates, poverty rates in urban Colombia lie well above the poverty rates in developed countries, even though they are consistently lower than in rural areas.¹

Methodologically, we rely on a partial equilibrium approach to identify the link between poverty and trade liberalization in the short or medium run. To be more specific, we focus on the effects of trade liberalization on urban poverty via the *labor income channel*. We examine whether the trade reforms led to changes in employment conditions and wages in the short to medium run, which may have affected poverty. The obvious shortcoming of this approach is that we are not able to deliver an overall assessment of the effect of trade liberalization on poverty. By focusing on the labor income channel, we abstract from the effects that trade policy may have had on poverty through the consumption or household production channels.² Given that trade policy affects goods prices and that both consumption and household production decisions are a function of these prices, these channels are potentially important. This is demonstrated, for example, in two recent studies that have adopted a general equilibrium approach to as-

1. In particular, the 2002 World Bank Poverty Assessment report for Colombia reports a poverty rate of 55 percent for the urban sector in 1999, while the poverty rate in the rural sector is 79 percent. The national poverty rate is reported at 64 percent. The corresponding numbers for the “extreme” poverty rate in 1999 are 14 percent, 37 percent, and 23 percent respectively. We discuss the precise definitions of these poverty rates and their measurement in section 6.4.1.

2. For a discussion of the channels through which trade liberalization affects poverty see Goldberg and Pavcnik (2004) and Winters, McCulloch, and McKay (2004).

sess the poverty effects of trade reforms (Porto 2006 and Chen and Ravallion 2004b).

In addition, we potentially ignore one of the most important channels through which trade may affect poverty, namely growth. There is fairly robust evidence that growth reduces poverty (see Ravallion 2004, pp. 5–6 and figure 2) in the long run. However, the relationship between openness and growth has been more contentious. Given that establishing a clear link between free trade and growth has been empirically elusive (see Hallak and Levinsohn 2004 and Winters, McCulloch, and McKay 2004 for recent overviews), there is little hope that one could credibly demonstrate a relationship between free trade and poverty via the growth channel, especially since the growth effects of trade liberalization probably spread over several years.

On the positive side, the partial equilibrium approach does not require the strong assumptions inherent in the general equilibrium framework (see Goldberg and Pavcnik 2004 for a detailed discussion). Furthermore, the partial equilibrium approach allows us to link poverty (or at a minimum some of the variables that are highly correlated with it) to trade liberalization using plausibly exogenous variation in trade policy over time, so that identification of the pure trade policy effects is arguably more compelling. Finally, there is still little known about the short- and medium-run effects of trade reforms. Given that the adjustment costs associated with trade liberalization are potentially high, a study of the short- or medium-run effects is important from a policy point of view, especially since the negative stance toward free trade is often attributed to the negative effects that reforms are expected to have in the short run.

Our analysis proceeds as follows. We start by providing a brief overview of the policy experiment and the data we exploit in our empirical analysis. Next, we discuss how we measure poverty and compare our poverty measures to those used by the World Bank and Colombian policymakers. Based on these measures we then describe who is poor in urban Colombia. The purpose of this exercise is to establish whether poverty is correlated with particular conditions (e.g., unemployment, employment in sectors that experienced large tariff cuts, work in the informal sector, compliance with minimum wages) that are likely to be affected by trade liberalization. If it is, then the next step in the analysis is to examine whether the trade reforms did indeed have an impact on these conditions. The advantage of this step-by-step approach is that it allows us to infer not only whether trade liberalization had an impact on poverty, but also the specific channels through which this impact was realized. Finally, in the last step of the empirical analysis, we make an attempt to directly relate our poverty measures among the employed to trade liberalization, in order to assess the overall effect of the trade reforms on urban poverty via the labor income channel.

To preview our results, we find strong and robust evidence that urban poverty is highly correlated with certain conditions such as unemployment, employment in the informal sector, and wages below the minimum wage standard. However, we find little to no evidence that any of these conditions were affected by the recent trade liberalization in a significant manner. Perhaps not surprisingly, we then also fail to find any direct correlation between poverty and trade reforms in urban Colombia using a partial equilibrium approach. While it is premature to draw any general conclusions regarding the relationship between trade liberalization and poverty in developing countries based on a single-country study, our results seem to point to growth and general equilibrium effects as being potentially more important in reducing poverty.

6.2 The Policy Experiment: The Colombian Trade Liberalization

Starting in 1985 Colombia experienced gradual trade liberalization that culminated in 1990–91. As we have argued in our earlier work, several features of this trade liberalization episode make it attractive from an empirical point of view.³

First, because Colombia had not participated in the tariff-reducing negotiation rounds of the GATT/WTO, it used tariffs as one of the primary trade protection tools prior to the reforms.⁴ A big part of the Colombian trade liberalization consisted of reducing tariffs to levels comparable to those observed in other WTO members. The main advantage of tariffs relative to nontariff barriers to trade (NTBs) as a measure of trade policy is that they are easy to measure and comparable across years.⁵ NTBs were also reduced as part of the reforms. Unfortunately, industry-level information on NTBs is not consistently available on an annual basis. Fortunately, the existing data suggest that tariff levels (and their changes) are positively correlated with NTB levels (and their changes), so tariff changes are likely to provide fairly accurate measures of the overall trade policy changes (although the coefficients on tariffs in our regressions might overstate the pure tariff effect).

A second appealing feature of the Colombian trade reforms is that they affected not only the average level of protection but also its structure. Indicatively, although the correlation of industry tariffs between 1984 and 1986 was 0.94, the correlation between 1984 and 1992 (a year following the

3. See Attanasio, Goldberg, and Pavcnik (2004) and Goldberg and Pavcnik (2003, 2005) for a detailed description of the reforms and for tables and figures with descriptive statistics on the tariff and nontariff barrier reductions.

4. Colombia became a GATT member in 1981 but chose to make use of the developing-country exemption regarding tariff cuts (article XVII of GATT).

5. In particular, NTBs are measured by coverage ratios, which are notoriously problematic measures of the trade restrictiveness of NTBs.

peak of trade reform activity) was only 0.55. The changing structure arises from the fact that the reforms had a differential impact on each sector: sectors with initially high levels of protection (such as textiles and apparel) experienced the largest tariff cuts; in contrast, in sectors with lower pre-reform protection levels, the tariff cuts were more modest. It is this cross-sectional variation in tariff reductions that we exploit in order to identify the trade policy effects. In addition, this change in the trade protection structure was accomplished over the course of several years, which provides ample variation over time in the data for the purpose of identifying the trade policy effects.

Finally, because the main objective of the Colombian government was to bring industry tariffs to an almost uniform level in accordance with WTO guidelines, policymakers were less prone to succumb to industry pressure or lobbying. This implies that tariff changes can be plausibly considered exogenous.

These features of the Colombian trade reforms suggest that the cross-sectional variation in tariff changes provides an appealing policy experiment to study how trade policy changes have affected the Colombian economy. There are, however, two potential caveats associated with such an exercise. First, although tariff changes arguably provide accurate measures of the recent liberalization in Colombia, the “opening” of the Colombian economy might have also affected other trade-related variables that are not captured by tariffs. To address this concern we exploit changes in industry imports and/or exports over time as additional measures of exposure to trade. The use of quantity measures such as imports and exports is naturally controversial, as such variables are endogenous to trade policy changes.⁶ The advantage of using them is that any changes in trade policy that we may have missed by exclusively focusing on tariffs will probably lead to changes in the import and export volumes so that these variables may more accurately represent the cumulative effect of trade policy changes. Along the same lines, we have considered including foreign direct investment (FDI) in the analysis, especially as there is strong evidence that FDI has had strong distributional effects in Mexico (see in particular Feenstra and Hanson 1996, 1997). Unfortunately, FDI data are not available for Colombia at the industry level. However, FDI inflows in Colombia have been small relative to Mexico, so it is unlikely that they have had any significant impact on the labor market.

The second caveat is that the cross-sectional variation of tariff changes is useful only to the extent that we study outcomes that are likely to differ by industry (e.g., industry employment, wages). This is precisely the reason that we focus on partial equilibrium effects of trade policy changes. We ab-

6. To alleviate these endogeneity concerns we employ lagged values of imports or exports rather than their current values.

stract from economy-wide implications of tariff policy changes, because, while there is no doubt that economy-wide effects are important in the general equilibrium, we do not have a way of separating these trade-induced effects from other economy-wide shocks without imposing strong identification assumptions.

6.3 The Household Survey Data

Our ultimate empirical goal is to link the trade policy changes described above to poverty measures or to economic variables that are highly correlated with poverty. To construct these variables we rely on the June waves of the Colombian National Households Survey (NHS), which are administered biannually by the Colombian National Statistical Agency (DANE). We focus on the June waves because these waves include a special module on the informal sector of the economy (defined as the sector that does not comply with labor market regulations). Given that the informal sector accounts for 50 to 60 percent of urban employment and given that informality is a priori likely correlated with poverty, including information on those employed in the informal sector in a study of urban poverty is particularly important. To construct poverty measures we rely on the income information provided in the NHS. While expenditure survey data may be preferable for measuring poverty, the household expenditure survey in Colombia is available for only one year, so it is not possible to analyze the *evolution* of poverty using the expenditure data.

Our data cover urban areas in the years 1986, 1988, 1990, 1992, 1994, 1996, and 1998. This fourteen-year period covers several trade liberalization episodes. We construct several variables that control for household and individual demographics such as age, gender, marital status, family size, whether a person is a household head, education, literacy, geographical location, whether a person was born in urban area, and how long the person has resided in current residence. Based on the information on highest completed grade, we classify individuals by education as those with no complete schooling, complete primary school, complete secondary school, and complete university degree.

In addition, the survey contains detailed information on employment characteristics and wages. Individuals who are older than eleven are classified into three categories: inactive, unemployed, and employed.⁷ For all categories, the NHS reports income from sources other than earnings. For unemployed individuals, the survey reports the one-digit International Standard Industrial Classification (ISIC) code of the industry

7. DANE classifies individuals aged twelve and older as inactive if they are not employed and are not actively seeking work. The primary activity of inactive individuals is usually being a student, a homemaker, or a pensioner.

in which the individuals used to work and the industry in which they are looking for new work. There is a total of nine single-digit ISIC industries.

For those who are employed, the survey reports earnings, occupation, type of employer (i.e., private company, government, private household, self-employed, unpaid family worker), and the two-digit ISIC code of the industry in which the individuals are employed. There is a total of thirty-three two-digit ISIC industries per year.⁸ Based on the information on the reported earnings and the number of hours worked normally in a week, we construct hourly and monthly wages. We also create controls for whether an individual works for a private company, government, or a private household, and whether he or she is an employer or self-employed. Furthermore, the survey reports whether the worker's employer contributes to the worker's social security fund. The employer's compliance with the social security legislation (and thus labor market regulation) provides an excellent indicator for whether a worker is employed in the formal sector. Finally, based on the information on monthly minimum wage standard, we generate an indicator for whether a worker's monthly earnings are below minimum wage standard.⁹

The main disadvantage of our data is that we do not have information on unionization. However, Edwards (2001) and anecdotal evidence suggest that unions do not have significant power in most Colombian industries (with the possible exception of the public sector and the petroleum industry).

6.4 Who Is Poor in Urban Colombia

6.4.1 Measurement of Poverty

Poverty Lines

An operational definition of poverty presents many conceptual and measurement problems (see Ravallion 2004 for a detailed discussion). One of the most important ones is the distinction between *absolute* and *relative* poverty. In the first case, the measurement of poverty relies on a poverty line that has a fixed real value—the \$1-per-day poverty line at 1993 purchasing power parity (PPP), which is representative of poverty lines used in poorest countries, provides an example of such a fixed line. In contrast, the measurement of relative poverty relies on a line that increases with the mean income. The two measures have very different implications for the assessment of the impact of trade reforms on poverty. To see why, consider

8. We have tariff information for twenty-one of these industries (although tariffs are likely to be zero in the industry categories for which no tariffs are reported—i.e., services).

9. Information on monthly minimum wages is from Maloney and Nunez (2003).

the extreme case in which the (relative) poverty line moves proportionately with mean income. A trade policy that raises all incomes by the same proportion will in this case leave relative poverty unchanged. Still, the policy has raised—in absolute terms—the incomes at the bottom of the income distribution, reducing the (absolute) poverty of the lowest-income individuals.

We focus on absolute poverty for several reasons. First, the value judgment underlying the use of the relative poverty line is that well-being should be measured in relative terms only. This view seems extreme, especially when applied to low- or middle-income developing countries such as Colombia; while relative standing is certainly important for welfare, it is hard to argue that absolute standards of living are irrelevant in a country like Colombia. Second, when a relative measure of poverty is adopted, the question of how trade policy has affected poverty becomes equivalent to the question of how trade policy has affected inequality. The latter question has been researched extensively in the literature—see, for example, Atanasio, Goldberg, and Pavcnik (2004) for a detailed analysis of how the trade reforms have affected inequality in Colombia. However, the existing literature has mostly abstracted from the link between absolute poverty and trade policy.

Obviously, any measure of absolute poverty depends crucially on the setting of the fixed poverty line. DANE calculates its own poverty line based on some minimum calorie and nutrition requirements for an individual of average age. Urban poverty lines differ across cities. DANE further distinguishes between two poverty lines: the “extreme” poverty line and the regular poverty line, which according to the World Bank is 2 to 2.5 times higher than the extreme one (see World Bank 2002, p. 100, for a detailed description). Unfortunately, DANE does not make its poverty data publicly available, and the World Bank (2002) reports DANE poverty lines only for selected years. Moreover, it is not clear whether the consumption basket used in the DANE poverty calculations remains fixed over time; a changing consumption basket would complicate comparisons of poverty across years even further. For these reasons, we decided to adopt the “international” poverty lines that are based on multiples of the \$1-per-day (in 1993 PPP terms) measure. Details on how this line was chosen are provided in Chen and Ravallion (2001, 2004a).¹⁰ In the context of Colombia, this line will be expressed in 1995 Colombian pesos.

To make sure that our empirical results are not due to the particular choice of the poverty line, we consider several multiples of the \$1-per-day

10. Following Chen and Ravallion, we actually use the \$1.08-per-day (in 1993 PPP terms) line and its multiples, although this line is usually referred to as the “\$1-per-day” poverty line.

measure (\$2, \$3, \$4, \$5, and \$7) and conduct extensive sensitivity analysis. In addition, we compare individuals in the bottom 10 percent and 20 percent of the per capita income distribution in urban Colombia in 1986 to those who fare better. The income for the bottom 10 percent of the income distribution lies somewhere between the \$2 and \$3 poverty line; for the bottom 20 percent of the income distribution, the income is between \$3 and \$4 per day. Overall, we consider eight distinct measures of poverty (six measures based on multiples of the \$1-per-day line, and two measures based on the income distribution). These measures should cover the entire spectrum of plausible poverty measures.

Household Income Per Person

Household income is measured in the NHS on a monthly basis as the sum of the incomes of all individuals in the household. Income of employed individuals consists of reported wages or earnings from self-employment. The earnings of individuals who work as unpaid family workers are set to zero. In addition, the survey asks all individuals older than eleven (irrespective of their employment status) whether they have received income from other sources (such as interest payments, dividends, rents, pensions, public assistance, etc.). All monetary values are expressed in 1995 pesos.

To obtain per capita household income we adjusted the household income by the number of household members. To this end, we experimented with two alternative adult-equivalency formulas:

1. The first formula follows Deaton and Paxson (1997), who compute adult equivalency as $(N_a + \alpha N_c)^\theta$, where N_a is number of adults in a household, N_c is number of children (defined as individuals aged fifteen or less), α is adult equivalency scale, and θ is an economies-of-scale parameter. The parameters α and θ can take on the values 1, .75, and .5. This yields nine measures of per capita household income. This is the formula most commonly used in developing countries, although there is no consensus on the particular values of the parameters α and θ .

2. The second formula is the Organization for Economic Cooperation and Development (OECD) formula for adult equivalence: $1 + .7(N_a - 1) + .5N_c$ (based on World Bank Poverty Manual, online document, page 21).

Because there is little agreement in the development literature as to which equivalency formula is more appropriate, we have computed per capita income based on alternative equivalency and scale parameters, and examined the correlations across these alternative definitions. The results are reported in appendix table 6A.1 and suggest that alternative measures of per capita income are highly correlated, with the correlations ranging from 0.92 to 1. In general, the income measures seem more sensitive to

changes in the scale parameter θ than changes in the adult equivalency parameter α . As a further robustness check we have also computed poverty head count ratios using the \$1- and \$2-per-day measures for alternative adult equivalency formulas. The results are presented in appendix table 6A.2. While the exact head count ratio varies with the values of α and θ (as with table 6A.1, the estimates are more sensitive to the economies-of-scale parameter than the adult equivalency parameter), the time trends regarding the evolution of the poverty head count ratios are similar across alternative per capita income definitions. Hence, it is unlikely that different income measures will yield different conclusions regarding the effects of trade policy on poverty.

Given the high correlation coefficients across income definitions in table 6A.1 and the similar time trends in the poverty head count ratios, we chose to focus on a per capita income measure based on $\alpha = 1$ and $\theta = 1$ (in other words, simple per capita household income without any adult equivalency adjustment) for the rest of the analysis. This is consistent with the approach taken in Chen and Ravallion (2001, 2004a) and the World Bank Poverty Report (World Bank 2002).

Poverty Head Count Ratios

Based on the per capita income measure discussed above, we computed various poverty head count ratios, each corresponding to a different poverty line. Our estimates are displayed in table 6.1.

To assess whether the numbers in table 6.1 appear reasonable, we compared the head count ratios we obtained based on the \$2-per-day measure to those reported by the World Bank using the same measure (World Bank

Table 6.1 Poverty head count ratios

	1984	1986	1988	1990	1992	1994	1996	1998
\$1	.025	.025	.018	.014	.018	.011	.022	.028
\$2	.069	.067	.057	.051	.058	.037	.055	.073
\$3	.158	.157	.139	.129	.130	.100	.127	.159
\$4	.263	.259	.243	.241	.239	.182	.214	.248
\$5	.366	.377	.336	.344	.341	.278	.311	.346
\$7	.528	.541	.516	.513	.508	.431	.474	.489
DANE poverty			.55			0.48 ^a		0.55 ^b
DANE extreme poverty			.17			0.1 ^a		0.14 ^b

Notes: As in Chen and Ravallion (2001), \$1-a-day line in 1993 PPP is \$1.08-a-day line (same applies to its multiples). All estimates are computed using survey weights. The first column refers to the poverty line used in the computation of poverty rates in each row. The DANE poverty rate and extreme poverty rate are from World Bank (2002, table 2) based on DANE poverty lines. These rates are available only for selected years (1988, 1995, 1998).

^aNumber is for 1995.

^bNumber is for 1999.

2002, table 2, p. 12). Our estimates seem very close to those reported by the World Bank.¹¹

Table 6.1 exhibits several interesting features. First, note that the poverty rates based on the \$1-per-day measure are extremely small. This is not surprising given that Chen and Ravallion (2001) suggest that the \$1 line is indicative of poverty lines used in poor countries, and not of middle-income countries such as Colombia. Second, while the \$2-per-day line is presumably more appropriate for Colombia, note that the poverty rates computed based on this line are still well below the poverty rates reported by the World Bank based on DANE poverty lines. This suggests that the standard of living considered acceptable by Colombians is substantially higher than the one corresponding to the \$2-per-day measure. The urban poverty rates computed by the World Bank based on DANE poverty lines (available for selected years only in the World Bank Poverty Report; World Bank 2002, table 2, p. 12) are displayed at the bottom of table 6.1. A comparison of these rates to the ones we have computed based on multiples of \$1-per-day poverty lines suggests that the extreme poverty rate corresponds roughly to a definition of poverty that uses the \$3-per-day measure as the poverty line; the regular poverty rate corresponds roughly to the definition that uses the \$7-per-day measure. It is worth noting that these poverty lines, which are viewed as the appropriate benchmarks by Colombian policymakers, suggest that poverty is still substantial in urban areas.¹²

A final feature of table 6.1 worth noting is that even though the magnitudes of poverty rates differ depending on what poverty lines we use, they all exhibit similar time trends. In all cases, poverty steadily declines between 1984 and 1994 and rises thereafter. Hence, it seems safe to conclude that no matter what poverty definition we adopt, our empirical results concerning the effects of trade policy on poverty will not depend on the particular choice of the poverty line.

6.4.2 Descriptive Results: Who Is Poor

Before investigating the relationship between trade policy and poverty, we use the household survey data to describe which households are most

11. In particular, for 1988 we estimate the poverty rate based on the \$2-per-day measure to be 5.7 percent, while the World Bank reports a figure of 5 percent for the same year. The World Bank estimate for 1995 is 3 percent. While we do not have data for that particular year, our estimates for 1994 (3.7 percent) and 1996 (5.5 percent) seem in line with their estimates. Similarly, we do not have data for 1999, but our poverty estimate for 1998 (7.3 percent) is roughly in line with the World Bank estimate of 5 percent for 1999. Overall, it seems that our estimates are slightly higher than those reported in the World Bank report, but given that the World Bank uses a different wave of surveys (September instead of June) and that the years they use in their calculations differ from those we have available in our survey waves, the numbers seem to match up quite well.

12. These estimates are also in line with Porto's (2006) poverty numbers for Argentina, which imply extensive urban poverty when the internal Argentinean poverty line is used, especially in the period covering the Argentinean financial crisis.

Table 6.2 Poverty head count ratios by household head characteristics

	\$1	\$2	\$3	\$4	\$5	\$7	Bottom 10%	Bottom 20%
Employment								
Inactive	.028	.078	.151	.246	.360	.516	.115	.196
Unemployed	.188	.310	.477	.594	.704	.814	.388	.527
Employed	.016	.052	.141	.245	.363	.531	.091	.184
Education								
No school	.042	.118	.261	.405	.553	.726	.185	.323
Elementary	.022	.061	.149	.263	.393	.577	.100	.197
Secondary	.011	.018	.053	.087	.150	.296	.030	.065
University	.006	.006	.008	.014	.037	.077	.007	.011
Age								
≤20	.043	.115	.154	.261	.339	.572	.145	.176
21–30	.026	.064	.145	.264	.400	.567	.098	.193
31–40	.030	.083	.190	.296	.421	.581	.131	.236
41–50	.023	.063	.159	.264	.373	.548	.104	.203
51–60	.020	.051	.130	.213	.328	.486	.083	.163
>60	.030	.084	.169	.232	.331	.481	.106	.179
Female	.030	.084	.169	.267	.379	.523	.125	.208
Male	.024	.063	.154	.258	.376	.545	.103	.198

Notes: Households are grouped by the characteristics of the head of the household. Column headings refer to the poverty line used in the calculations of the head count ratio in each column. Bottom 10% (20%) refers to the individuals living in the bottom 10% (20%) of the income distribution in 1986. All figures are based on 1986 data, the first year of data with all relevant variables. All estimates are computed using survey weights.

affected by poverty. Correlations between poverty and various demographic and employment-related characteristics can give us a preliminary idea as to how likely it is that trade policy has had an impact on Colombian urban poverty.

Table 6.2 presents the fraction of individuals classified as poor in 1986 by the following characteristics of household head: employment status, education, age, and gender. As with our earlier tables, the magnitudes of the poverty rates differ depending on the poverty line used in the calculations, but the comparisons across different household groups exhibit the same patterns. We therefore focus most of our discussion on the \$3-per-day measure.

The most interesting pattern emerging from table 6.2 is that poverty is highly correlated with unemployment. For example, for the \$3-per-day measure, our calculations suggest that 47.7 percent of individuals living in households with an unemployed household head are poor; for the \$7-per-day line this proportion is as high as 81.4 percent. Clearly, one cannot contemplate a poverty reduction in urban Colombia without addressing the issue of unemployment.

Having said that, it is worth noting that even among the employed, the poverty rates are not negligible. The \$3-per-day line implies that 14 percent

of individuals living in households with an employed household head live in poverty; if one uses the \$7-per-day line as the benchmark, as Colombian policymakers do, then the poverty rate among the employed becomes 53 percent. These are sizable numbers!

The patterns revealed in table 6.2 are also evident in table 6.3, in which we examine the same correlations in a regression framework; this allows us to obtain correlations between poverty and employment-related variables *conditional* on demographics such as education, age, and so on. Consistent with the results based on the unconditional means in table 6.2, the estimates indicate that lack of education is associated with a higher probability of being poor. More important, we again find that, even conditional on education, poverty is highly correlated with unemployment (inactive is the base group). A comparison of the *R*-squares from regressions with and without employment indicators further suggests that employment status (i.e., employed, unemployed, inactive) has substantial explanatory power. For example, conditional on demographic and educational indicators, employment indicators account for 3.1 percent of the overall variance in poverty and 29 percent of the explained variance in poverty in the case of the \$3-a-day poverty line.

As noted earlier, poverty rates among the employed are not negligible either. We therefore turn our attention next to poverty among individuals living in households with an employed head of household. Which demographics and employment characteristics of such households are correlated with poverty? This question is addressed in tables 6.4 and 6.5. As before, we present our results both as unconditional correlations (table 6.4) and in a regressions framework that conditions on various demographics (table 6.5).

First, the results in table 6.4 suggest that poverty rates vary by industry of employment: at the one-digit ISIC level, the sectors of construction and of wholesale and retail trade are associated with the highest poverty rates. Using the \$3-per-day line, we find that 19 percent and 18.4 percent of individuals living in a household where the household head is employed in these two sectors respectively live in poverty; the financing, insurance, and business sector presents the lowest poverty rates (7 percent), while manufacturing is somewhere in the middle (11.5 percent). A further breakdown of employment by two-digit ISIC code shows that poverty rates also vary across two-digit ISIC codes. This variation is likely to be relevant for the assessment of the effects of trade policy on poverty; if tariff reductions are disproportionately concentrated on industries with higher poverty rates, leading to a decline in relative prices and potentially wages in these sectors, then trade liberalization may have adverse effects on poverty in the short run.

Second, no matter what poverty definition one adopts, poverty rates are substantially higher for individuals living in households where the

Table 6.3 Poverty and household head characteristics (regression results)

	\$1	\$2	\$3	\$4	\$5	\$7	Bottom 10%	Bottom 20%
Age	-0.0005 (0.367)	-0.0018** (0.030)	-0.0032*** (0.004)	-0.0061*** (0.000)	-0.0101*** (0.000)	-0.0120*** (0.000)	-0.0028*** (0.005)	-0.0043*** (0.001)
Age squared	0 (0.423)	0 (0.228)	0 (0.231)	0 (0.037)	0.0001*** (0.000)	0.0001*** (0.000)	0 (0.114)	0 (0.161)
Male	0.0016 (0.679)	-0.0041 (0.499)	-0.0018 (0.833)	0.012 (0.216)	0.0268** (0.011)	0.0331*** (0.002)	-0.0062 (0.396)	0.0123 (0.176)
Married	-0.0092*** (0.004)	-0.0288*** (0.000)	-0.0443*** (0.000)	-0.0616*** (0.000)	-0.0654*** (0.000)	-0.0391*** (0.000)	-0.0367*** (0.000)	-0.0603*** (0.000)
Elementary	-0.0237*** (0.000)	-0.0671*** (0.000)	-0.1152*** (0.000)	-0.1446*** (0.000)	-0.1704*** (0.000)	-0.1593*** (0.000)	-0.0946*** (0.000)	-0.1330*** (0.000)
Secondary	-0.0333*** (0.000)	-0.1031*** (0.000)	-0.1988*** (0.000)	-0.2981*** (0.000)	-0.3959*** (0.000)	-0.4364*** (0.000)	-0.1538*** (0.000)	-0.2476*** (0.000)
University	-0.0359*** (0.000)	-0.1054*** (0.000)	-0.2247*** (0.000)	-0.3445*** (0.000)	-0.4808*** (0.000)	-0.6219*** (0.000)	-0.1640*** (0.000)	-0.2815*** (0.000)
Household size	-0.0004 (0.495)	0.0077*** (0.000)	0.0240*** (0.000)	0.0398*** (0.000)	0.0462*** (0.000)	0.0511*** (0.000)	0.0145*** (0.000)	0.0299*** (0.000)
Unemployed	0.1559*** (0.000)	0.2441*** (0.000)	0.3026*** (0.000)	0.2990*** (0.000)	0.2861*** (0.000)	0.2121*** (0.000)	0.2778*** (0.000)	0.2960*** (0.000)
Employed	-0.0124*** (0.004)	-0.0168*** (0.010)	-0.0147* (0.098)	-0.0163 (0.118)	-0.0195* (0.084)	-0.0307*** (0.007)	-0.0191** (0.014)	-0.0242** (0.013)
R^2_1	.009	.035	.075	.122	.160	.199	.054	.095
R^2	.050	.076	.106	.144	.176	.209	.090	.121
No. of observations	16,933	16,933	16,933	16,933	16,933	16,933	16,933	16,933

Notes: p -values are reported in parentheses. Column headings indicate the poverty line used to create the poverty indicator in a given column. Bottom 10% (20%) refers to the individuals living in the bottom 10% (20%) of the income distribution in 1986. R^2 refers to R^2 from a regression that does not include employment and unemployment indicators. All figures are based on 1986 data, the first year of data with all relevant variables. Number of observations refers to number of households in 1986 data.

***Significant at the 1 percent level.
 **Significant at the 5 percent level.
 *Significant at the 10 percent level.

Table 6.4 **Head count ratios by household head characteristics for households with employed household head**

	\$1	\$2	\$3	\$4	\$5	\$7	Bottom 10%	Bottom 20%
Agriculture and hunting	.020	.046	.167	.292	.377	.509	.100	.215
Forestry and logging	.000	.000	.063	.337	.337	.337	.000	.337
Fishing	.000	.094	.172	.172	.172	.480	.094	.172
Coal mining	.000	.000	.071	.071	.233	.527	.071	.071
Petroleum and natural gas	.000	.000	.014	.034	.090	.205	.000	.034
Metal ore mining	.000	.000	.000	.000	.000	.229	.000	.000
Other mining	.119	.143	.306	.634	.778	.778	.195	.336
Food	.008	.038	.117	.237	.361	.538	.081	.168
Textile, apparel, leather	.011	.031	.120	.216	.344	.553	.063	.152
Wood	.006	.044	.129	.242	.460	.607	.086	.170
Paper	.015	.015	.048	.120	.215	.375	.023	.059
Chemical	.008	.026	.093	.167	.276	.440	.058	.127
Non-metallic mineral products	.022	.076	.162	.241	.458	.680	.099	.173
Basic metal industry	.000	.021	.146	.215	.419	.576	.021	.204
Machinery and equipment	.014	.030	.115	.235	.327	.533	.061	.165
Other manufacturing	.006	.033	.107	.154	.263	.426	.064	.107
Electricity, gas, steam	.000	.052	.123	.194	.303	.449	.059	.167
Water works and supply	.000	.063	.099	.219	.368	.600	.085	.146
Construction	.013	.058	.191	.326	.488	.675	.109	.246
Wholesale trade	.004	.004	.054	.118	.137	.324	.009	.063
Retail trade	.030	.099	.190	.299	.409	.560	.145	.244
Restaurants and hotels	.026	.063	.177	.291	.414	.612	.123	.227
Transport and storage	.015	.039	.122	.233	.351	.531	.082	.167
Communication	.000	.000	.053	.073	.163	.313	.000	.073
Financial institutions	.000	.000	.007	.016	.075	.214	.002	.009
Insurance	.000	.000	.000	.000	.091	.177	.000	.000
Real estate and business	.003	.011	.081	.192	.302	.441	.034	.105
Public administration	.000	.007	.044	.136	.232	.449	.015	.068
Sanity	.000	.000	.100	.300	.581	.759	.050	.235
Social and community services	.001	.008	.048	.105	.183	.285	.025	.068
Recreation and culture	.013	.053	.131	.209	.357	.490	.089	.187
Household and personal services	.029	.093	.243	.366	.492	.664	.158	.298
International bodies	.000	.000	.000	.000	.525	.525	.000	.000
Agriculture	.019	.046	.164	.291	.373	.505	.098	.217
Mining	.041	.049	.125	.247	.350	.465	.081	.144
Manufacturing	.011	.034	.115	.215	.347	.535	.067	.152
Utilities	.000	.056	.114	.202	.325	.500	.068	.160
Construction	.013	.058	.191	.326	.488	.675	.109	.246
Wholesale and retail trade	.029	.090	.184	.292	.401	.561	.138	.236
Transport	.014	.037	.118	.224	.340	.519	.077	.161
Financing, insurance, business	.002	.007	.053	.126	.219	.355	.022	.069

(continued)

Table 6.4 (continued)

	\$1	\$2	\$3	\$4	\$5	\$7	Bottom 10%	Bottom 20%
Community, social, personal services	.013	.046	.135	.230	.340	.497	.083	.174
Formal	.001	.013	.081	.127	.286	.456	.036	.111
Informal	.026	.080	.186	.298	.419	.586	.131	.237
Paid above minimum wage	.000	.008	.068	.154	.273	.450	.030	.097
Paid below minimum wage	.074	.215	.410	.577	.697	.832	.315	.502
Unpaid family worker	.187	.271	.385	.670	.707	.966	.385	.445
Private-sector employee	.005	.027	.125	.240	.374	.557	.064	.167
Government employee	.001	.006	.044	.120	.216	.389	.019	.073
Domestic employee	.022	.083	.310	.424	.528	.736	.168	.345
Self-employed	.041	.115	.224	.340	.453	.608	.174	.279

Note: See notes to table 6.2.

household head works in the informal (rather than the formal) sector. Third, a wage below the minimum wage standard is an excellent predictor of poverty: 41 percent of individuals living in a household where the household head is paid below the minimum wage live in poverty (according to the \$3-per-day line).¹³ While this is not surprising (obviously a poverty definition based on an income measure will be highly correlated with wage-related variables), it serves as a confirmation that individuals receiving minimum wages in their primary employment do not have other sources of income that would considerably improve their financial situation. Finally, poverty depends on the type of employer: unpaid family workers and members of their household are most likely to be poor, while government employees fare the best.

These empirical patterns are confirmed in the regression analysis conducted in table 6.5. The table reports results from regressions based on the \$3-per-day and \$4-per-day poverty lines respectively; additional results based on alternative poverty definitions can be found in appendix tables 6A.3, 6A.4, and 6A.5. Apart from confirming the robustness of the aforementioned correlations, the regression results allow us to assess the explanatory power of various characteristics of employed household heads in explaining poverty. First, the two-digit ISIC industry indicators (retail is the omitted one) are jointly significant. Comparisons of the *R*-squares across specifications that do and do not include industry indicators suggest that, conditional on demographic characteristics, industry indicators account

13. Minimum wages in Colombia are set at the national level. The monthly minimum wage over our sample period (expressed in 1995 pesos) lies well above the poverty lines used by DANE; in particular, it is about 4 times the extreme poverty line (\$3 per day) and 1.7 times the regular poverty line (\$7 per day).

Table 6.5 Poverty and household head characteristics for households with employed head (\$3- and \$4-per-day poverty line)

	\$3-a-day poverty line					\$4-a-day poverty line				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Agriculture and hunting	0.0012 (0.952)	0.0023 (0.908)	0.0234 (0.215)	0.0390* (0.054)	0.0344* (0.091)	0.0007 (0.978)	-0.004 (0.870)	0.0209 (0.354)	0.0397 (0.101)	0.0301 (0.218)
Forestry and logging	-0.0704 (0.600)	-0.0502 (0.707)	-0.0049 (0.968)	-0.0075 (0.955)	-0.0058 (0.965)	0.1372 (0.391)	0.1561 (0.329)	0.2099 (0.156)	0.2022 (0.204)	0.2032 (0.202)
Fishing	0.1522 (0.300)	0.1392 (0.342)	0.1444 (0.287)	0.129 (0.376)	0.1248 (0.391)	0.0307 (0.861)	0.0181 (0.917)	0.024 (0.882)	0.0067 (0.969)	0.0029 (0.987)
Coal mining	-0.1230* (0.095)	-0.0938 (0.202)	-0.0584 (0.391)	-0.0702 (0.337)	-0.0623 (0.394)	-0.2227** (0.011)	-0.1951** (0.026)	-0.1532* (0.060)	-0.1681* (0.055)	-0.1617* (0.065)
Petroleum and natural gas	-0.1076* (0.062)	-0.0921 (0.109)	-0.0352 (0.508)	-0.0561 (0.327)	-0.055 (0.336)	-0.1529** (0.026)	-0.1385** (0.044)	-0.0707 (0.266)	-0.0997 (0.145)	-0.0991 (0.147)
Metal ore mining	-0.2165 (0.351)	-0.2283 (0.324)	-0.1114 (0.603)	-0.1449 (0.529)	-0.1604 (0.486)	-0.3501 (0.207)	-0.3618 (0.191)	-0.2219 (0.387)	-0.2761 (0.316)	-0.2898 (0.293)
Other mining	0.1351* (0.074)	0.1186 (0.125)	0.0764 (0.286)	0.1715** (0.022)	0.1413* (0.066)	0.3191*** (0.000)	0.3203*** (0.001)	0.2696*** (0.002)	0.3566*** (0.000)	0.3444*** (0.000)
Food	-0.0802*** (0.000)	-0.0562*** (0.000)	-0.0258* (0.079)	-0.0323** (0.041)	-0.0263* (0.099)	-0.0741*** (0.000)	-0.0526*** (0.005)	-0.0166 (0.345)	-0.0246 (0.194)	-0.0209 (0.274)
Textile, apparel, leather	-0.0704*** (0.000)	-0.0577*** (0.000)	-0.0388*** (0.001)	-0.0367*** (0.003)	-0.0351*** (0.005)	-0.0813*** (0.000)	-0.0688*** (0.000)	-0.0465*** (0.001)	-0.0464*** (0.002)	-0.0448*** (0.003)
Wood	-0.0629*** (0.002)	-0.0640*** (0.002)	-0.0410** (0.030)	-0.0339* (0.094)	-0.0390* (0.055)	-0.0716*** (0.003)	-0.0711*** (0.003)	-0.0438* (0.052)	-0.0416* (0.085)	-0.0446* (0.067)
Paper	-0.0994*** (0.000)	-0.0738*** (0.007)	-0.0439* (0.086)	-0.0548** (0.046)	-0.0476* (0.083)	-0.1159*** (0.000)	-0.0919*** (0.005)	-0.0565* (0.065)	-0.0699** (0.033)	-0.0641* (0.051)
Chemical	-0.0610*** (0.005)	-0.0227 (0.307)	0.0039 (0.849)	-0.0108 (0.621)	0.0029 (0.898)	-0.0589** (0.024)	-0.0214 (0.422)	0.0064 (0.795)	-0.0072 (0.785)	0.0057 (0.831)

(continued)

Table 6.5 (continued)

	S3-a-day poverty line					S4-a-day poverty line				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Non-metallic mineral products	-0.0322 (0.226)	-0.0002 (0.995)	0.0085 (0.733)	0.0191 (0.473)	0.0294 (0.271)	-0.0456 (0.152)	-0.0142 (0.658)	-0.0042 (0.888)	0.0075 (0.814)	0.0172 (0.590)
Basic metal industry	-0.0502 (0.314)	-0.0243 (0.626)	0.0066 (0.887)	-0.0044 (0.930)	0.0027 (0.956)	-0.0767 (0.198)	-0.0522 (0.380)	-0.0155 (0.778)	-0.0293 (0.621)	-0.0235 (0.692)
Machinery and equipment	-0.0772*** (0.000)	-0.0541*** (0.002)	-0.0179 (0.268)	-0.0302* (0.082)	-0.0255 (0.146)	-0.0688*** (0.001)	-0.0459** (0.028)	-0.0029 (0.879)	-0.0202 (0.330)	-0.0155 (0.459)
Other manufacturing	-0.0551 (0.160)	-0.0525 (0.179)	-0.0409 (0.258)	-0.0483 (0.214)	-0.0481 (0.216)	-0.1052*** (0.025)	-0.1028** (0.028)	-0.0892*** (0.039)	-0.0982*** (0.035)	-0.0981** (0.035)
Electricity, gas, steam	-0.0684* (0.061)	-0.0312 (0.393)	0.0008 (0.980)	-0.0148 (0.683)	-0.0028 (0.939)	-0.0996** (0.022)	-0.0647 (0.138)	-0.0268 (0.508)	-0.0442 (0.308)	-0.0346 (0.427)
Water works and supply	-0.0799 (0.122)	-0.0413 (0.424)	0.0072 (0.881)	-0.0214 (0.676)	-0.0095 (0.853)	-0.0818 (0.185)	-0.0454 (0.462)	0.0121 (0.833)	-0.0214 (0.728)	-0.0117 (0.849)
Construction	-0.0395*** (0.001)	-0.0394*** (0.001)	-0.0176 (0.106)	-0.0178 (0.127)	-0.0213* (0.069)	-0.0217 (0.121)	-0.0224 (0.109)	0.0042 (0.744)	0.0006 (0.963)	-0.0033 (0.816)
Wholesale trade	-0.0819** (0.029)	-0.0638* (0.089)	-0.025 (0.472)	-0.0491 (0.188)	-0.0443 (0.235)	-0.0764* (0.088)	-0.0595 (0.183)	-0.0135 (0.745)	-0.0426 (0.340)	-0.0389 (0.384)
Restaurants and hotels	-0.0274* (0.081)	-0.0244 (0.120)	-0.0082 (0.575)	0.0044 (0.778)	0.0015 (0.922)	-0.0375** (0.046)	-0.0344* (0.067)	-0.0162 (0.353)	-0.0046 (0.807)	-0.0069 (0.715)
Transport and storage	-0.0643*** (0.000)	-0.0579*** (0.000)	-0.0225** (0.034)	-0.0421*** (0.000)	-0.0417*** (0.000)	-0.0766*** (0.000)	-0.0714*** (0.000)	-0.0293*** (0.021)	-0.0536*** (0.000)	-0.0542*** (0.000)
Communication	-0.0985** (0.019)	-0.0696* (0.096)	-0.0254 (0.513)	-0.0444 (0.286)	-0.0368 (0.377)	-0.1585*** (0.002)	-0.1314*** (0.009)	-0.0788* (0.089)	-0.1027** (0.039)	-0.0966* (0.053)
Financial institutions	-0.0999*** (0.000)	-0.0581** (0.011)	-0.0307 (0.146)	-0.0489** (0.029)	-0.0337 (0.139)	-0.1459*** (0.000)	-0.1058*** (0.000)	-0.0736*** (0.004)	-0.0932*** (0.001)	-0.0800*** (0.003)
Insurance	-0.1031** (0.046)	-0.0694 (0.185)	-0.0369 (0.447)	-0.0626 (0.223)	-0.0504 (0.334)	-0.1510*** (0.015)	-0.1180* (0.059)	-0.0796 (0.170)	-0.1091* (0.076)	-0.0979 (0.116)

Real estate and business	-0.0582*** (0.001)	-0.0402** (0.019)	-0.0149 (0.346)	-0.0328* (0.052)	-0.0266 (0.119)	-0.0430** (0.034)	-0.0171 (0.184)	0.0028 (0.884)	-0.0167 (0.409)	-0.0126 (0.535)
Public administration	-0.1071*** (0.000)	-0.0766*** (0.000)	-0.0227 (0.107)	-0.0529*** (0.000)	-0.0445*** (0.004)	-0.1159*** (0.000)	-0.0871*** (0.000)	-0.0231 (0.169)	-0.0598*** (0.001)	-0.0531*** (0.004)
Sanity	-0.1179** (0.022)	-0.0771 (0.135)	-0.0284 (0.553)	-0.0598 (0.244)	-0.0467 (0.363)	-0.0365 (0.554)	0.002 (0.974)	0.0599 (0.295)	0.0235 (0.701)	0.0342 (0.578)
Social and community services	-0.0766*** (0.000)	-0.0454*** (0.001)	-0.0105 (0.404)	-0.0261* (0.052)	-0.0168 (0.220)	-0.0836*** (0.000)	-0.0541*** (0.001)	-0.0128 (0.395)	-0.0314* (0.051)	-0.0237 (0.146)
Recreation and culture	-0.0644** (0.015)	-0.0467* (0.080)	-0.0283 (0.251)	-0.022 (0.405)	-0.0181 (0.497)	-0.0890*** (0.005)	-0.0713** (0.025)	-0.0495* (0.094)	-0.0452 (0.153)	-0.0409 (0.200)
Household and personal services	0.0459*** (0.000)	0.0405*** (0.020)	0.0237** (0.020)	0.0572*** (0.000)	0.0527*** (0.000)	0.0572*** (0.000)	0.0518*** (0.000)	0.0316*** (0.009)	0.0690*** (0.000)	0.0648*** (0.000)
International bodies	-0.0775 (0.683)	-0.0277 (0.883)	0.0275 (0.875)	-0.0149 (0.937)	0.0022 (0.991)	-0.1026 (0.650)	-0.0561 (0.804)	0.0095 (0.964)	-0.038 (0.866)	-0.0243 (0.914)
Family worker				0.2807*** (0.004)	0.2656*** (0.007)				0.3211*** (0.006)	0.3084*** (0.009)
Self-employed				0.1052*** (0.000)	0.0915*** (0.000)				0.1087*** (0.000)	0.0971*** (0.000)
Informal		0.0664*** (0.000)	0.0202*** (0.001)		0.0342*** (0.000)		0.0626*** (0.000)	0.0072 (0.342)		0.0284*** (0.001)
Paid below minimum wage			0.3195*** (0.000)					0.3818*** (0.000)		
R^2	.106	.113	.238	.122	.124	.156	.160	.278	.167	.168
No. of observations	13,035	12,943	12,932	13,035	12,943	13,035	12,943	12,932	13,035	12,943

Note: p -values are reported in parentheses. Column headings indicate the poverty line used in the calculations of the head count ratio in each column. All regressions also include controls for age, age squared, gender, whether a person is married, education indicators, and household size. All figures are based on 1986 data, the first year of data with all relevant variables. Number of observations refers to number of households.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

for 1.5 percent of the overall variance and 14 percent of the explained variance in poverty among households with employed heads. These regressions suggest that industry affiliation is correlated with poverty. Thus, if trade policy affects industry wages and trade policy changes differed across industries, the reforms may have in principle impacted the poverty rate. Second, the results in table 6.5 also point to an important role for informality and minimum wage in explaining poverty. Conditional on demographics and industry indicators, informality accounts for .7 percent of the overall variance and 6 percent of the explained variance in poverty. Conditional on demographics, industry indicators, and informality, the “below the minimum wage” indicator accounts for 12.5 percent of the overall variance and 53 percent of the explained variance in poverty (when the \$3-per-day measure is used).

6.4.3 Summary

Our descriptive analysis yields several findings that motivate our further work. First, poverty in urban Colombia is highly correlated with unemployment. A natural question is therefore whether the trade liberalization has had a significant impact on unemployment. However, poverty rates among the individuals living in households with employed heads are also high, ranging from 14 percent to 53 percent depending on the poverty line used. Within this group, poverty is highly correlated with employment of the household head in the informal sector and a wage below the minimum wage standard. The industry of employment also seems to matter. Given these patterns, it is natural to ask how the trade reforms affected the probability of a worker working in the informal sector, and whether trade liberalization affected compliance with minimum wage legislation. Furthermore, trade policy could also have affected poverty through its effects on worker wages. We take up these questions in the next section.

6.5 Trade Policy and Poverty

6.5.1 The Evolution of the Aggregate Poverty Rate: The Aggregate Trends

Before investigating the relationship between trade liberalization and poverty, it is useful to examine some aggregate trends in the evolution of poverty rates over our sample period. A clear pattern emerging from table 6.1 is that no matter what poverty definition one adopts, poverty rates seem to steadily decline between 1984 and 1994–95 and increase thereafter. By 1998 the poverty rates are close to the rates observed in 1984. The usual explanation offered in the literature for the 1996–98 increase in urban poverty is the recession (see World Bank 2002). The reasons for the steady decline of urban poverty between 1984 and 1995, however, are less clear.

Given that 1985–94 was the period of trade reforms, it is tempting to attribute the decrease of urban poverty to the changes initiated by the reforms.

To obtain a preliminary idea of what factors lowered the poverty rate between 1984 and 1994 we start our analysis by asking whether the decline in the poverty rate was primarily driven by a decline in unemployment or a decline in the poverty rate within the set of unemployed individuals. In particular, we decompose the decline in the poverty rate between 1986 and 1994, ΔP_t , into two components, the reduction in unemployment (the *between* component) and the reduction of poverty within the unemployed (the *within* component):¹⁴

$$\Delta P_t = P_t - P_\tau = \sum_j \Delta U_{jt} p_j + \sum_j \Delta p_{jt} U_{jt},$$

where j indicates the employment status of the household head (inactive, employed, or unemployed), U_{jt} indicates the share of individuals living in households with status j in year t , p_{jt} is the poverty rate within status j at time t , $U_{jt} = .5(U_{jt} + U_{j\tau})$, and $p_{jt} = .5(p_{jt} + p_{j\tau})$.¹⁵

The results are displayed in table 6.6. The top of the table includes all individuals, while the middle part of the table focuses only on those living in households whose household head is in the labor force (thus excluding the inactive category). What is striking about the decomposition in table 6.6 is that the within component accounts for over 90 percent of the decline in the poverty rate between 1994 and 1986. Hence, the decline in the poverty rate between 1986 and 1994 is explained mostly by an improvement in the position of household heads within each of our employment categories, rather than by movements out of unemployment. This is a rather surprising result, as we would have expected the decline in poverty to be associated with a decline in unemployment. The contribution of the within component is also significant for explaining the increase in the poverty rate between 1994 and 1998, although its magnitude is smaller than the one for the 1986–94 period. Thus, the results for the second subperiod of our sample (1994–98) are more consistent with the anecdotal claim that the increase in poverty during the late 1990s is due to the recession, as they suggest a larger role of the between component (movement into unemployment).

We next focus on poverty changes among the individuals living in households with employed household heads. In particular, we have further decomposed the decline in the poverty rate among the individuals living in households with an employed household head into within and between

14. In this decomposition, we focus on 1986 rather than 1984 because 1986 is the first year in our data with all available variables.

15. This decomposition is similar to the one often used in the literature on skill upgrading in order to decompose the increase in the share of skilled workers into a within-industry and between-industries component.

Table 6.6 Decomposition of changes in head count ratios

	Head count ratio			Change 1994-1986			Change 1998-1994		
	1986	1994	1998	Total	Within (share)	Between (share)	Total	Within (share)	Between (share)
All individuals	.157	.100	.159	-.057			.059		
Decomposition by inactive, employed, unemployed									
Individuals in households with household head in labor force	.158	.103	.161	-.055	.944	-.003	.056	.832	.168
Decomposition by employed, unemployed									
Individuals in households with employed household head	.141	.093	.137	-.048	.929	-.004	.071	.795	.205
Decomposition by									
Two-digit ISIC industry					1.028	.001	-.028	.993	.007
Informal sector					.940	-.003	.060	.867	.133
Paid below minimum wage					-.029	-.019	.399	.021	.023

Note: Head count ratios are based on \$3-a-day poverty line.

components for each of the variables highly correlated with poverty: industry affiliation, employment in the informal sector, and a wage below the minimum wage. The results from these decompositions are displayed at the bottom of table 6.6, and they exhibit the same pattern as the ones regarding unemployment: the within component dominates the between component in every case. With respect to industry affiliation and informality in particular, the share of the within component exceeds 90 percent, while for the minimum wage it is smaller but still significant (60 percent). Hence, the decline in poverty occurred predominately through improvements in the position of individuals at their current jobs, rather than changes in their employment.¹⁶

What does the above analysis imply about the role of trade policy in reducing poverty? Given that the trade policy changes were concentrated in the early period, when the between movements are small, it seems unlikely that any effect that trade liberalization may have had on poverty was driven *primarily* by movements of people out of categories associated with high poverty (e.g., unemployment, informality) and into categories with lower poverty (employment, formal-sector employment, minimum wage). It is possible, however, that trade policy affected poverty by impacting the wages of employees within the above-defined categories. In addition, trade liberalization could be relevant for explaining the between component of poverty changes, small as this may be. We therefore turn now to a more systematic investigation of the relationship between trade liberalization and poverty.

6.5.2 Trade Policy and Unemployment

The high incidence of poverty among the unemployed leads to the question of how trade liberalization has affected unemployment. Unfortunately, this is not a question that can be answered convincingly with the available data. Ideally, one would like to identify the relationship between trade policy and unemployment by relating detailed industry tariff changes to changes in industry unemployment. However, the lack of detailed data on industry affiliation of the unemployed in the NHS precludes such an analysis. The unemployed workers who were previously employed report the last industry of employment at the one-digit ISIC level. Similarly, the unemployed individuals who were not previously employed report the industry in which they are seeking employment at the one-digit ISIC level. This leads to nine industry observations per year, and only six of these nine

16. We have also replicated the analysis in table 6.6 focusing only on individuals that are in the labor force and using their own employment characteristics for decomposition (rather than the characteristics of the household head). This addresses the concern that numbers in table 6.6 might understate the between movements, if secondary breadwinners are more likely to lose jobs during a recession. Although (as expected) the between component increases somewhat, the within component continues to play the dominant role.

industries have available tariffs. Most important, most of the time-variation in tariffs occurred within the manufacturing industries, which are now treated as a single sector.

Nevertheless, given the importance of unemployment in explaining poverty in urban Colombia, we conduct two exercises to obtain a *rough* idea about the role of trade policy in affecting unemployment.

The first exercise is to examine whether the change in the probability of being unemployed over the time of trade reform was greater for workers employed in traded-good sectors (such as manufacturing) than for workers with the same observable characteristics in nontraded-good sectors (such as wholesale and retail trade, restaurants, hotels, construction, etc.). This exercise was conducted in one of our previous papers (Attanasio, Goldberg, and Pavcnik 2004, section 8). In particular, we regressed an indicator for whether an individual was unemployed, on one-digit ISIC industry indicators (the omitted category was wholesale trade, retail trade, and restaurants and hotels [ISIC 6]), an indicator for a year following the trade reform, the interaction of industry indicators with the year indicator, and a set of worker characteristics (age, age squared, male, married, head of the household, education indicators, literate, lives in Bogota, born in urban area, time in residence, urban birth interacted with time in residence). If the probability of being unemployed increased (decreased) relatively more over time in manufacturing relative to a sector such as wholesale and retail trade and restaurants and hotels (i.e., the coefficient on the interaction of the manufacturing indicator with year indicator were positive [negative] and significant), this could provide some indirect (and suggestive) evidence that trade reforms were associated with increases (decreases) in the probability of unemployment.

To summarize the results from that exercise, we found no evidence that the probability of unemployment changed significantly in the manufacturing sector relative to most nontraded-good sectors between 1984 and 1998, even though the manufacturing sector experienced drastic tariff declines. Given that the comparison of years 1984 and 1998 could have potentially missed short-term adjustments to trade reform, we also considered the unemployment adjustment in periods right before and after the major tariff declines by focusing on changes in unemployment between 1988 and 1992. The coefficient on the interaction of the manufacturing indicator with the post-trade-reform year indicator indicated in this case a decrease in the probability of becoming unemployed in the manufacturing sector relative to the wholesale and retail trade sector. It is not clear, however, whether this decline was due to the trade reforms per se or to the exchange rate depreciation in 1990–91 that lowered the demand for nontraded goods relative to traded goods. This decrease, however, seems short-lived. In the long run (i.e., 1984–98), we do not find any evidence that the probability of unemployment changed in traded sectors relative to nontraded sectors.

Table 6.7 Unemployment and trade exposure

	(1)	(2)
Tariff	.006 (0.596)	.042 (0.454)
Lagged imports		0.00003** (0.003)
Lagged exports		-0.00002 (0.773)
Industry indicators	Yes	Yes
Year indicators	Yes	Yes
R ²	0.073	0.073
No. of observations	304,393	304,393

Notes: *p*-values based on standard errors that are clustered on industry are reported in parentheses. All regressions also include controls for age, age squared, gender, whether a person is married, head of the household, education indicators, household size, literacy indicator, whether a person lives in Bogota, whether a person was born in urban area, time in current residency, and the interaction of urban birth with time in currency residency. Tariff, lagged imports, and lagged exports are for one-digit ISIC industry of previous employment (or industry in which a person is looking for work for the first-time job seekers). Industry indicators are on one-digit ISIC level. Observations refers to number of employed or unemployed individuals, which includes those in industries that did not report tariffs but where tariffs were likely (and were thus assumed) to be zero.

**Significant at the 5 percent level.

The second exercise is to directly relate the probability of becoming unemployed to trade-related variables, such as tariffs, lagged imports, and lagged exports. These variables refer to the (one-digit SIC) industry in which the currently unemployed person used to work (or, for the first-time job seekers, the industry in which a person is looking for work). In particular, we regress an indicator of whether an individual is unemployed on his or her demographic characteristics (listed in the note to the table), one-digit industry dummies, year dummies, one-digit SIC tariff rates, lagged imports and lagged exports. For industries for which National Planning Department (DNP) does not report tariffs we set the tariff rate equal to zero.¹⁷ When interpreting the results of this regression it is important to keep in mind that we only have variation in tariff rates in nine one-digit ISIC industries, some of which never actually experienced tariff changes. Hence, due to the high level of aggregation, we may not have sufficient variation in the data to identify the link between trade-related variables and unemployment, even though such a link might be evident at a finer level of aggregation.

The results are presented in table 6.7 and show no association between tariff and unemployment. Furthermore, there is no evidence that there is a

17. This is probably not a bad assumption because all these industries are services.

relationship between exports and unemployment. We do find, however, that as (lagged) imports increase, the probability of becoming unemployed increases. Overall, the evidence seems mixed and inconclusive. Although, as emphasized above, the results are only suggestive given the high level of aggregation and the potential endogeneity of some of the variables we employ on the right-hand side (such as imports or exports), it seems fair to say that whatever effects the trade reforms may have had on unemployment, they were not substantial enough to be evident in the raw data, at least not at the one-digit SIC level of aggregation. Even at a more disaggregate level, the stability of industry employment shares we observe over this period does not seem to support the idea that trade liberalization had a significant impact on unemployment. Specifically, in Attanasio, Goldberg, and Pavcnik (2004) we computed the employment shares by two-digit SIC industry for periods before and periods after the trade reforms. The changes were found to be surprisingly small, suggesting that despite the magnitude of tariff cuts and the extent of the overall reform, there was neither increased nor decreased unemployment at the industry level.

In sum, the above two exercises do not provide strong evidence that trade policy affected the probability of becoming unemployed in either direction.

So far, our analysis has concentrated on the question of whether unemployed individuals are unemployed because of trade-related reasons. A somewhat different question, yet one that is relevant for the poverty discussion, is whether, within the set of unemployed individuals, those who became unemployed because of trade-related reasons fare worse, in the sense of being poorer than the rest. This could be the case, for example, if individuals who were laid off from industries facing intense import competition have a harder time finding a new job, so that they remain unemployed for a longer period of time, or if increased import competition had affected their earnings in the past, when they were employed, leading to lower interest income when they became unemployed. Unfortunately, it is not possible to answer these questions definitively without panel data that would allow us to track individuals over time, trace their earnings, and compute unemployment hazard rates. But as before, we can obtain a rough idea about the empirical relevance of the above considerations by trying to link poverty within the unemployed directly to trade-related variables. In unreported regressions, we have regressed the likelihood of being poor among the unemployed on tariffs, lagged imports, lagged exports, industry indicators, and the aforementioned individual demographic characteristics. The results were again mixed and not robust across different definitions of poverty.

Overall, although poverty in urban Colombia is clearly highly correlated with unemployment, we do not find any strong and conclusive evidence that the trade reform activity affected unemployment in either direction.

6.5.3 Trade Policy and Informality

Having found no evidence of a link between trade liberalization and changes in unemployment at the industry level, we next turn to the question of whether the trade reforms affected poverty within the set of employed individuals. Given that within the set of employed individuals poverty rates were particularly high for those working in the informal sector, we start by examining whether trade liberalization led to worker reallocation across the formal and informal sectors.

In a previous paper (Goldberg and Pavcnik 2003) we presented evidence that the tariff declines in Colombia were associated with an increase in the probability of being employed in the informal sector, although the effects were small and applied only to the period preceding the labor market reform (but not thereafter).¹⁸ Moreover, we have found that informal work is associated with lower benefits and worse working conditions, and that informal workers face lower wages than workers with the same *observable* characteristics in the formal sector. Of course, these correlations do not necessarily imply that informal workers are worse off than formal workers, given that there may be sorting into the informal sector based on unobservable characteristics—for example, workers may self-select into the informal sector because they value the flexible hours that informal employment offers. Nonetheless, given that our descriptive results in section 6.4.2 suggest that a nonnegligible share of informal workers are not just worse off than formal workers in terms of monetary compensation but actually poor (especially when one considers the higher poverty lines), the concern arises that trade policy may have contributed to poverty by leading to a reallocation of labor toward the informal sectors.¹⁹

To examine this possibility more thoroughly we repeat the analysis of our earlier paper (that focused on a pooled sample of employed individuals) both for the entire sample and for subgroups of employed who might a priori face a higher likelihood of being pushed into the informal sector when the economy opens up to import competition. In particular, in table 6.8 we regress an indicator of whether an employed individual works in the informal sector on demographic characteristics (listed in the note to the table), industry indicators, year dummies, tariffs, and the interaction of tariffs with an indicator for whether the time period was covered by labor market reform. This approach is similar to the two-stage approach we have employed in our earlier work, and the results are similar. Column (1) of the

18. In 1990, Colombia instituted a labor market reform that significantly reduced the cost of hiring and firing workers (Kugler 1999; Edwards 2001).

19. For a detailed analysis of the arguments why this may happen and a formal model linking trade liberalization with changes in informal employment, see Goldberg and Pavcnik (2003).

Table 6.8 Informal employment and tariffs

	Employees and self-employed													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Tariff	-0.064* (0.054)	-0.053* (0.098)	-0.072* (0.054)	-0.073* (0.099)	-0.05 (0.155)	0.027 (0.397)	-0.088*** (0.000)	-0.069** (0.044)	-0.043 (0.187)	-0.084* (0.058)	-0.073 (0.133)	-0.061* (0.062)	0.026 (0.416)	-0.111*** (0.000)
Tariff · post-labor reform	0.351*** (0.002)	0.328*** (0.003)	0.407*** (0.002)	0.364 (0.101)	0.495** (0.012)	0.396** (0.015)	0.022 (0.754)	0.312** (0.045)	0.260* (0.075)	0.463** (0.021)	0.373 (0.145)	0.383** (0.015)	0.385** (0.019)	-0.018 (0.836)
Sample	All	Men	Women	Unskilled	Skilled	Large firm	Small firm	All	Men	Women	Unskilled	Skilled	Large firm	Small firm
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.342	0.324	0.373	0.319	0.302	0.13	0.132	0.29	0.262	0.336	0.282	0.196	0.126	0.133
No. of observations	100,131	57,668	42,463	70,049	30,082	37,786	62,205	76,770	45,279	31,491	52,547	24,223	37,615	39,038

Notes: *p*-values, based on standard errors that are clustered on industry, are reported in parentheses. All regressions also include controls for age, age squared, gender, whether a person is married, head of the household, education indicators, household size, literacy indicator, whether a person lives in Bogota, occupation indicators, type of employer indicators, whether a person was born in urban area, time in current residence, and the interaction of urban birth with time in current residency. Number of observations refers to number of employed individuals.

**Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

table corresponds to the specification we have used in our earlier work, except for the fact that our sample now includes unpaid family workers. It confirms our previous findings and suggests that higher tariff reductions are associated with a higher probability of being employed in the informal sector, but only in the period prior to the labor reform. In columns (2) through (7) we repeat the estimation separately for each of the following subgroups: men, women, unskilled workers, skilled workers, workers employed in large firms (eleven or more people) and workers employed in small firms (less than eleven people).²⁰ It is often alleged that women and unskilled workers are the most likely to switch to informal employment during trade reforms. The results in table 6.8 seem to provide some support for this claim, as the increase in informality *prior* to the labor market reform is more likely to occur among women than men (compare columns [2] and [3]) and among unskilled than skilled workers (compare columns [4] and [5]), even though both of these estimates lie within each other's confidence intervals. Note also that the results in columns (6) and (7) indicate that the increases in informality associated with the tariff declines prior to the labor reform occur mostly in small establishments (employing less than eleven people). Columns (8) through (14) repeat the analysis that excludes the self-employed, and they yield similar findings.

Table 6.9 extends the analysis by including, in addition to tariffs, lagged imports and exports as measures of trade exposure. The results regarding the effects of the tariff declines remain robust (although we now find evidence of increases in informality associated with the tariff declines in both large and small firms prior to the labor reform). What is interesting is that the results for exports suggest that higher exports are associated with lower probability of working in the informal sector. This result is mainly driven by large firms. The negative association between exports and informal employment is consistent with anecdotal evidence suggesting that large export firms are more likely to offer more permanent jobs, higher benefits, and better working conditions, possibly out of concern for public scrutiny.

Overall the results are in line with the evidence presented in our earlier work, suggesting that the Colombian tariff reductions were associated with a slight increase in informal employment, but only in the period preceding the labor market reform. Given that the poverty rate is higher in the informal sector, one would then have expected an increase in the aggregate poverty rate.²¹ This is clearly not the case; the aggregate poverty rate decreases during the 1986–95 period. Moreover, the decomposition in table 6.6 suggests not only that the role of between movements was limited, but also that to the extent that worker reallocation across the formal and in-

20. Our definition of large firms is driven by the survey question (which does not distinguish among the size of establishments that employ more than eleven people).

21. Of course, this is only true to the extent that the wages paid to informal workers did not simultaneously increase.

Table 6.9 Informal employment and trade exposure

	Employees and self-employed													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Tariff	-0.12260** (0.014)	-0.08814 (0.125)	-0.16836*** (0.001)	-0.12162* (0.067)	-0.09094 (0.108)	-0.10357** (0.028)	-0.09546*** (0.001)	-0.14604** (0.017)	-0.08469 (0.182)	-0.24276*** (0.000)	-0.14308* (0.081)	-0.10869* (0.088)	-0.10414** (0.024)	-0.12807** (0.010)
Tariff · post-labor reform	0.37414*** (0.000)	0.37878*** (0.000)	0.38164*** (0.000)	0.38038*** (0.029)	0.51134** (0.014)	0.53342*** (0.001)	0.03056 (0.671)	0.38202*** (0.001)	0.35282** (0.011)	0.49539*** (0.000)	0.45294** (0.021)	0.43403** (0.018)	0.52382*** (0.001)	0.02524 (0.748)
Lagged imports (t)	0.00011 (0.115)	0.00008 (0.544)	0.00011 (0.569)	0.00001 (0.940)	0.00022 (0.212)	0.00011 (0.116)	-0.00006 (0.476)	0.00005 (0.382)	0.00005 (0.717)	0.00001 (0.973)	-0.00009 (0.391)	0.00017 (0.272)	0.00011 (0.108)	-0.00018 (0.126)
I · post-labor reform	0.00010*** (0.001)	0.00013* (0.051)	0.0001 (0.644)	0.00020** (0.044)	0.00002 (0.832)	0.00004 (0.482)	0.00008 (0.137)	0.00013*** (0.000)	0.00014* (0.057)	0.00015 (0.546)	0.00025** (0.019)	0.00004 (0.596)	0.00004 (0.492)	0.00018** (0.025)
Lagged exports (E)	-0.00029*** (0.002)	-0.00032*** (0.001)	-0.00024* (0.055)	-0.00034** (0.016)	-0.00025*** (0.001)	-0.00049*** (0.000)	-0.00004 (0.464)	-0.00034*** (0.001)	-0.00034*** (0.006)	-0.00036** (0.031)	-0.00040*** (0.008)	-0.00025*** (0.000)	-0.00048*** (0.000)	-0.00007 (0.407)
E · post-labor reform	-0.00019** (0.018)	-0.00017* (0.056)	-0.00024** (0.012)	-0.00014 (0.221)	-0.00016 (0.193)	-0.00036*** (0.000)	-0.00004 (0.264)	-0.00025** (0.011)	-0.00019** (0.049)	-0.00041*** (0.003)	-0.00022 (0.106)	-0.00019 (0.159)	-0.00036*** (0.000)	-0.0001 (0.190)
Sample	All	Men	Women	Unskilled	Skilled	Large firm	Small firm	All	Men	Women	Unskilled	Skilled	Large firm	Small firm
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.343	0.325	0.373	0.32	0.303	0.132	0.132	0.29	0.263	0.337	0.283	0.196	0.127	0.133
No. of observations	100,131	57,668	42,463	70,049	30,082	37,786	62,205	76,770	45,279	31,491	52,547	24,223	37,615	39,038

Note: See notes to table 6.8.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

formal sectors contributed to the poverty reduction, this happened by workers moving out of the informal and into the formal sector. This is precisely the opposite of the effect attributed to tariff reductions. Hence, it appears that the tariff-induced changes in informal employment not only did not contribute to the poverty reduction witnessed during this period but, if anything, went in the opposite direction. It is important to keep in mind, however, that the estimated effects are small and disappear once the labor market reform becomes effective.²²

6.5.4 Trade Policy and Compliance with Minimum Wage Legislation

A different channel through which trade liberalization could have affected poverty is by increasing the noncompliance of firms with minimum wage legislation.²³ Noncompliance is definitely an issue in Colombia; according to our calculations, the percentage of earners receiving wages below the minimum wage standard ranges from 17 percent to 30 percent in individual years, with no clear time trend evident in the data. It is interesting to note, however, that noncompliance peaks in 1992, a year following the most drastic tariff reductions.

To examine whether noncompliance was affected by the trade reforms we employ the same approach as before and regress an indicator for whether an employed individual receives a wage above the minimum wage on demographic characteristics (see notes to table 6.10 for details), industry indicators, year dummies, and various measures of trade exposure. Although our preferred trade exposure measure is tariffs, we also consider lagged imports and exports. We estimate this relationship on a sample of employees (excluding self-employed and unpaid family workers) and experiment with different subsamples of these workers. To summarize the results, shown in table 6.10, there is no evidence that tariff declines are associated with changes in the compliance with minimum wage standard in the sample as a whole (columns [1] and [10]) or in various subsamples of workers.²⁴ We also find no association between (lagged) exports and noncompliance in the sample as a whole (column [10]). However, higher (lagged) imports are associated with greater noncompliance with minimum wage laws in the overall sample (column [10]), and this relationship holds in most subsamples of the data. Reassuringly, this relationship holds among the

22. Although tariffs are our preferred measure of exposure to trade, the results for exports suggest that because Colombian exports increased between 1986 and 1994, higher exports could have in principle contributed to 1994–1986 poverty reductions through reallocations of workers from informal to formal sector. However, as emphasized before, the reallocation (i.e., between) component of poverty declines accounts for a very small part of poverty reduction between 1986 and 1994.

23. Maloney and Nunez (2003) provide details on minimum wage legislation in Colombia.

24. Negative association between tariffs and noncompliance among men and in small firms in columns (4) and (9), respectively, is not robust to inclusion of lagged imports and exports.

Table 6.10 Noncompliance with minimum wage laws and trade exposure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Tariff	-0.014 (0.266)	-0.063 (0.170)	-0.017 (0.299)	-0.027** (0.054)	-0.014 (0.674)	-0.017 (0.298)	-0.018 (0.435)	-0.006 (0.821)	-0.082* (0.052)	-0.01114 (0.511)	-0.04061 (0.500)	-0.00069 (0.966)	-0.03012 (0.120)	0.02421 (0.664)	-0.02442 (0.246)	0.00419 (0.846)	-0.00055 (0.985)	-0.0518 (0.289)
Lagged imports										0.00010*** (0.007)	0.00005 (0.461)	0.00005* (0.061)	0.00008*** (0.000)	0.00022* (0.065)	0.00014*** (0.001)	0 (0.829)	0.00003 (0.114)	0.00017*** (0.003)
Lagged exports										-0.00003 (0.736)	0.00017 (0.159)	0.00011* (0.057)	-0.00011 (0.284)	0.00022 (0.408)	-0.00015 (0.268)	0.00025** (0.001)	0.00003 (0.713)	0.00014 (0.372)
Sample	All	Informal	Formal	Men	Women	Unskilled	Skilled	Large firm	Small firm	All	Informal	Formal	Men	Women	Unskilled	Skilled	Large firm	Small firm
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.208	0.197	0.075	0.165	0.207	0.182	0.094	0.099	0.189	0.208	0.197	0.075	0.166	0.207	0.183	0.094	0.099	0.189
No. of observations	82,183	35,930	32,006	48,914	33,269	58,114	24,069	34,679	33,690	82,183	35,930	32,006	48,914	33,269	58,114	24,069	34,679	33,690

Notes: *p*-values based on standard errors that are clustered on industry are reported in parentheses. All regressions also include controls for age, age squared, gender, whether a person is married, head of the household, education indicators, household size, literacy indicator, whether a person lives in Bogota, occupation indicators, type of employer indicators, whether a person was born in urban area, time in current residency, and the interaction of urban birth with time in current residency. Number of observations refers to number of employed individuals with all required data. The number of observations is lower in columns (2), (3), (9), and (10) because the information on informality is not available in 1984. These regressions exclude self-employed and unpaid family workers.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

unskilled workers, but not among the skilled workers (for whom the minimum wage legislation is less likely to be binding).

What does this imply about the role of trade policy in reducing poverty? Given that the massive trade liberalization of the late 1980s and early 1990s led to an increase in imports, the results in table 6.10 seem to suggest that, if anything, trade liberalization should have led to lower compliance with minimum wages, and hence to an increase in poverty. Hence, our results regarding the effects of trade liberalization on poverty via the minimum wage channel are similar to the ones we obtained regarding the informality channel: in both cases we find some evidence that trade liberalization affected the relevant variables (compliance with minimum wage laws in the first case, employment in the informal sector in the second case), but in both cases the direction of the effect suggests that trade liberalization should have led to an increase in poverty. Thus, it seems safe to conclude that the poverty reduction we observe between 1986 and 1994 cannot be attributed to trade-policy-induced changes in informality or to minimum wage compliance.

6.5.5 Trade Policy and Poverty: A Direct Assessment

Our empirical analysis so far has failed to find any strong link between the Colombian trade liberalization and variables that could be related to the poverty reduction between 1986 and 1994. This is consistent with the results in table 6.6 that show that the poverty reduction occurred mostly through within-group changes in poverty rates rather than movement of people between groups, regardless of whether the groups are defined in terms of employment, informality, or compliance with minimum wage laws. What remains as a residual explanation is the possibility that trade liberalization affected poverty by directly affecting worker wages.

In earlier work (Goldberg and Pavcnik 2005; Attanasio, Goldberg, and Pavcnik 2004) we have examined the impact of the Colombian trade liberalization on *relative* wages and found that the trade reforms have contributed to an *increase* in relative wage dispersion. This evidence was based on analyzing the response of industry wage premia to the tariff declines; specifically, our work showed that industry wage premia declined more in sectors that experienced the largest tariff cuts. Given that these sectors were sectors that had lower wage premia prior to the trade reforms and employed a higher share of unskilled workers (in industries like textiles and apparel, footwear, wood and wood products), the decline in the wage premia further widened the gap between the rich and poor.²⁵ Furthermore, our work found some suggestive evidence that the well-documented increase in the economy-wide skill premium over that period could be partly due to

25. The terms *skilled* and *unskilled* were defined based on education. In particular, we define as “unskilled” workers who have at most primary education.

the trade reforms. In particular, we documented that the largest increases in the share of skilled workers in each sector occurred in the sectors that had the largest tariff cuts. Hence, there are indications that the skill-biased technological change may have been in part induced, or at a minimum reinforced, by the trade reforms.

Given these previous results on the effects of the trade reforms on relative wages, trade liberalization would have had to have a large positive effect on *absolute* wages in order to reduce poverty. As we pointed out in the introduction, this effect would have been most likely realized through growth. However, the effect of trade policy changes on aggregate growth cannot be identified, as they cannot be separated from other policy changes and events that may have concurrently affected growth.

We therefore resort to the same partial equilibrium identification strategy we used in the earlier exercises to examine whether the trade policy changes can be directly linked to changes in the poverty rates by sector of employment. This identification strategy relies on the fact that the tariff reductions in the Colombian trade reforms affected industries differentially. Given our earlier results, we would be surprised if we found any effects. Nevertheless, examining the link between trade liberalization and poverty reduction in a direct way serves as a check that we haven't missed any other important channels through which the trade reforms may have affected poverty at the industry level.

In table 6.11, we regress an indicator for whether an employed individual is poor on individual characteristics, two-digit ISIC industry dummies, year dummies, and trade exposure measures.²⁶ While we do not find any *robust* evidence regarding the effects of tariff declines on poverty, higher imports are associated with higher poverty rates at the sectoral level, while higher exports are associated with lower poverty rates (although the latter results depend in part on the poverty line we use). Furthermore, we find that, conditional on imports and exports, lower tariffs are associated with a higher probability of being poor when the lower poverty lines (\$1, \$2, and \$3 per day) are used.

This evidence on the direct relationship between trade liberalization and poverty among the employed at the sectoral level is consistent with our earlier findings concerning the effects on informality and minimum wage compliance, and most likely partly driven by them. In all cases the empirical analysis suggests that either trade liberalization had no effects on poverty, or—to the extent that it had any—these effects went in the direction of increasing poverty.

26. For a discussion of the analysis of the same relationship for unemployed individuals, see end of section 6.5.2.

Table 6.11 Poverty and trade exposure among employed individuals

	\$1	\$2	\$3	\$4	\$5	\$7	\$1	\$2	\$3	\$4	\$5	\$7
Tariff	-0.007 (0.167)	-0.008 (0.199)	-0.011 (0.131)	-0.005 (0.537)	0.01 (0.217)	0.021* (0.086)	-0.00822* (0.097)	-0.01042* (0.088)	-0.01900** (0.026)	-0.015 (0.203)	.002 (0.889)	.018 (0.419)
Lagged imports							0.00001** (0.018)	0.00002*** (0.001)	0.00002 (0.158)	0.00003*** (0.002)	0.00006** (0.012)	0.00008** (0.032)
Lagged exports							-0.00002 (0.482)	-0.00004 (0.300)	-0.00009** (0.014)	-0.00012* (0.089)	-0.00012* (0.091)	-0.00008 (0.516)
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.022	0.057	0.099	0.138	0.171	0.217	0.022	0.057	0.099	0.138	0.171	0.217
No. of observations	97,798	97,798	97,798	97,798	97,798	97,798	97,798	97,798	97,798	97,798	97,798	97,798

Notes: *p*-values based on standard errors that are clustered on industry are reported in parentheses. Column heads indicate the poverty line used to create the poverty indicator in a given column. All regressions also include controls for age, age squared, gender, whether a person is married, head of the household, education indicators, household size, literacy indicator, whether a person lives in Bogota, occupation indicators, type of employer indicators, whether a person was born in urban area, time in current residency, and the interaction of urban birth with time in current residency. Number of observations refers to number of employed individuals that had nonmissing household income (and thus nonmissing measure of poverty).

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

6.6 Conclusions

Between 1985 and 1995 Colombia experienced massive trade liberalization. At the same time urban poverty declined by approximately 10 percent. The chronological coincidence of trade liberalization and poverty reduction raises the question of whether the former has contributed to the latter. In this paper we have tried to establish a link between the trade reforms and the changes in urban poverty, approaching the task from many different angles.

To summarize our findings, we fail to find evidence of such a link. Our descriptive results establish that poverty in urban areas is highly correlated with unemployment, employment in the informal sector, and noncompliance with minimum wages. The poverty rates among the employed also differ by industry, suggesting a potential role of industry affiliation in explaining poverty. However, we find no evidence that the trade reforms impacted any of the above variables in a significant way. To the extent that we find any effects, the effects are small and go in the wrong direction, suggesting that the trade reforms may have contributed to an increase in urban poverty. Perhaps more surprisingly, we find that most of the reduction in urban poverty between 1986 and 1994 is accounted for by within-group changes in poverty rather than movements of people out of groups with high poverty rates, such as the unemployed, informal-sector workers, and below minimum wage earners. Given these patterns, it is not surprising that we also fail to find any evidence of a direct link between the trade reforms and the poverty reductions by sector.

These results contrast with the ones reported in chapter 7 in this volume by Petia Topalova, who examines the effects of the Indian trade liberalization on poverty and finds that trade liberalization led to an increase in poverty in those regions that were more affected by the trade reforms. What accounts for the difference between the two sets of results? Before we try to answer this question it is worth noting the many similarities between the two papers in terms of methodological approach. Both papers use microdata to investigate the impact of trade reforms; both papers exploit plausibly exogenous variation in trade policy, measured by sizable tariff reductions; and finally, both papers exploit the fact that the tariff reductions differed by sector. In the Topalova paper this differential tariff reduction by sector translates into regional variation in the degree of trade liberalization given that different sectors are concentrated in different regions of the country, and she exploits the latter to identify the effects of the trade policy reform. Note also that both studies focus on a trade policy experiment (tariff reductions) whose immediate effect is to intensify import competition rather than expanding exports. Given these similarities, it is not surprising that the two papers yield similar results regarding many issues, such

as the extent of labor mobility (which in both cases is documented to be low) and the decrease of relative wages in sectors or regions that were hit harder by the tariff declines. Yet the two studies differ in their findings regarding the effect of increased openness on poverty.

While the reasons for this difference cannot be pinned down with certainty without further investigation, the most plausible explanation hinges on the differential impact of the two liberalization episodes on agriculture. Agricultural trade liberalization in Colombia was limited; given that most of the poor are concentrated in the rural areas, it is not a surprise that their fates were not altered (at least not in the short run) by a trade liberalization wave that affected mostly the manufacturing sector in the urban areas. In contrast, the Indian trade liberalization included significant tariff reductions in the agricultural sector, which are explicitly accounted for in Topalova's comprehensive study. Interestingly, Topalova documents that the poverty increase was concentrated in rural areas and agricultural sectors. The results of the two papers taken together seem thus to suggest that liberalization of the *agricultural* sector may have a significant effect on poverty in the short and medium run. There will certainly be many opportunities to put this claim to the test in the near future as many developed countries consider reforming their domestic agricultural policies in ways that would certainly impact the developing world. Furthermore, Topalova's results indicate that the issue of labor mobility may be a first-order concern when it comes to assessing the effects of trade liberalization on poverty; one of the reasons that people in areas affected by tariff reductions become poorer is that they do not move to regions or sectors that are better off. Similarly, in the case of Colombia, the decline of relative wages of unskilled workers is partly explained by the fact that these workers do not move quickly enough to industries with higher wages. Taking measures to increase labor mobility could potentially ease adjustment to trade reforms and mitigate some of the potentially adverse effects of trade liberalization in the short and medium run.

We are still left with the question of how to explain the Colombian poverty decline between 1986 and 1994. The residual explanation left to us is that there was an economy-wide increase in absolute wages, pronounced enough to compensate for the worsening of the relative position of individuals at the left tail of the income distribution. Whether this increase was brought about through the trade reforms is a question we cannot answer, given that the trade policy changes coincide with other reforms (e.g., labor market reform) and other events that may have also affected wages. But it seems fair to conclude that to the extent trade liberalization had any role at all in the decline of poverty during that period, this was through the operation of general equilibrium effects, the potential effects of lower tariffs on the prices of consumer goods, and the potential impact of free trade on growth.

Appendix

Table 6A.1 Correlation of per capita household income measures based on different adult equivalency scales

	$\alpha = 1, \theta = 1$	$\alpha = 0.75, \theta = 1$	$\alpha = 0.5, \theta = 1$	$\alpha = 1, \theta = .75$	$\alpha = 0.75, \theta = .75$	$\alpha = 0.5, \theta = .75$	$\alpha = 1, \theta = .5$	$\alpha = 0.75, \theta = .5$	$\alpha = 0.5, \theta = .5$	OECD
$\alpha = 1, \theta = 1$	1.00									
$\alpha = 0.75, \theta = 1$	1.00	1.00								
$\alpha = 0.5, \theta = 1$	.99	1.00	1.00							
$\alpha = 1, \theta = .75$	.98	.99	.99	1.00						
$\alpha = 0.75, \theta = .75$	.98	.98	.99	1.00	1.00					
$\alpha = 0.5, \theta = .75$	.97	.98	.98	1.00	1.00	1.00				
$\alpha = 1, \theta = .5$	.93	.94	.94	.98	.99	.99	1.00			
$\alpha = 0.75, \theta = .5$	.93	.94	.94	.98	.98	.99	1.00	1.00		
$\alpha = 0.5, \theta = .5$	.92	.93	.94	.98	.98	.99	1.00	1.00	1.00	
OECD	.99	.99	.99	1.00	1.00	1.00	.97	.97	.97	1.00

Table 6A.2 Sensitivity of head count ratios to adult-equivalency scales

α	θ	1984	1986	1988	1990	1992	1994	1996	1998
<i>A. \$1-per-day poverty line</i>									
1	1	.025	.025	.018	.014	.018	.011	.022	.028
0.75	1	.021	.023	.016	.012	.015	.010	.020	.024
0.5	1	.019	.020	.013	.011	.013	.009	.018	.022
1	0.75	.016	.018	.011	.010	.012	.008	.017	.019
0.75	0.75	.015	.017	.011	.009	.011	.008	.015	.019
0.5	0.75	.014	.015	.010	.008	.010	.007	.014	.017
1	0.5	.012	.014	.009	.007	.009	.007	.014	.015
0.75	0.5	.012	.013	.009	.007	.009	.007	.013	.015
0.5	0.5	.012	.013	.009	.006	.008	.007	.013	.014
OECD		.017	.018	.011	.010	.011	.008	.017	.020
<i>B. \$2-per-day poverty line</i>									
1	1	.069	.067	.057	.051	.058	.037	.055	.073
0.75	1	.054	.055	.043	.038	.043	.028	.045	.058
0.5	1	.041	.042	.034	.026	.035	.020	.038	.048
1	0.75	.032	.035	.028	.020	.027	.016	.031	.036
0.75	0.75	.029	.031	.023	.017	.024	.014	.027	.033
0.5	0.75	.025	.027	.020	.015	.019	.013	.024	.030
1	0.5	.021	.023	.016	.013	.015	.011	.021	.025
0.75	0.5	.020	.022	.015	.013	.014	.011	.020	.024
0.5	0.5	.018	.020	.013	.012	.013	.010	.019	.023
OECD		.034	.035	.028	.020	.027	.016	.031	.038

Table 6A.3 Poverty and household head characteristics for households with employed head (\$1- and \$2-per-day poverty line)

	\$1-a-day poverty line					\$2-a-day poverty line				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Agriculture and hunting	-0.0018 (0.824)	-0.0006 (0.942)	0.004 (0.624)	0.0122 (0.140)	0.0122 (0.143)	-0.0293** (0.035)	-0.0269* (0.054)	-0.0135 (0.301)	0.0008 (0.957)	-0.0007 (0.957)
Forestry and logging	-0.0368 (0.500)	-0.0304 (0.577)	-0.00205 (0.700)	-0.0135 (0.804)	-0.0127 (0.814)	-0.1208 (0.189)	-0.1055 (0.250)	-0.0767 (0.371)	-0.0708 (0.436)	-0.0693 (0.446)
Fishing	-0.0401 (0.503)	-0.0434 (0.467)	-0.0425 (0.465)	-0.0488 (0.411)	-0.0492 (0.407)	0.0689 (0.494)	0.0596 (0.553)	0.0629 (0.503)	0.0504 (0.613)	0.0479 (0.631)
Coal mining	-0.0269 (0.369)	-0.0179 (0.551)	-0.01 (0.734)	-0.0073 (0.807)	-0.0053 (0.859)	-0.0894* (0.077)	-0.0676 (0.180)	-0.0451 (0.339)	-0.0474 (0.343)	-0.0419 (0.403)
Petroleum and natural gas	-0.0209 (0.372)	-0.0162 (0.489)	-0.0034 (0.883)	-0.0018 (0.939)	-0.0014 (0.952)	-0.0710* (0.072)	-0.0596 (0.130)	-0.0235 (0.523)	-0.0301 (0.442)	-0.0294 (0.452)
Metal ore mining	-0.0251 (0.791)	-0.0283 (0.764)	-0.0017 (0.985)	0.0015 (0.988)	-0.0013 (0.989)	-0.0927 (0.561)	-0.1014 (0.523)	-0.0268 (0.857)	-0.0358 (0.820)	-0.0461 (0.770)
Other mining	0.0715** (0.020)	0.027 (0.392)	0.0173 (0.574)	0.0850*** (0.005)	0.036 (0.251)	0.0435 (0.401)	0.0096 (0.856)	-0.0172 (0.730)	0.0724 (0.158)	0.0281 (0.593)
Food	-0.0214*** (0.001)	-0.0140** (0.029)	-0.0073 (0.246)	-0.0036 (0.578)	-0.0021 (0.745)	-0.0562*** (0.000)	-0.0384*** (0.000)	-0.0192* (0.060)	-0.0181* (0.094)	-0.014 (0.198)
Textile, apparel, leather	-0.0209*** (0.000)	-0.0167*** (0.001)	-0.0125*** (0.011)	-0.0084* (0.095)	-0.0077 (0.130)	-0.0623*** (0.000)	-0.0532*** (0.000)	-0.0414*** (0.000)	-0.0355*** (0.000)	-0.0348*** (0.000)
Wood	-0.0157* (0.057)	-0.0152* (0.067)	-0.0101 (0.213)	-0.005 (0.546)	-0.005 (0.527)	-0.0459*** (0.001)	-0.0448*** (0.001)	-0.0302** (0.021)	-0.0229* (0.098)	-0.0244* (0.079)
Paper	0.0013 (0.904)	0.0092 (0.413)	0.0158 (0.149)	0.0179 (0.110)	0.0196* (0.080)	-0.0522*** (0.006)	-0.0332* (0.079)	-0.0143 (0.419)	-0.0168 (0.371)	-0.0119 (0.526)
Chemical	-0.0128 (0.151)	-0.0014 (0.874)	0.0044 (0.617)	0.006 (0.506)	0.0089 (0.327)	-0.0545*** (0.000)	-0.0268* (0.079)	-0.0101 (0.479)	-0.0146 (0.330)	-0.0059 (0.698)

(continued)

Table 6A.3 (continued)

	\$1-a-day poverty line					\$2-a-day poverty line				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Non-metallic mineral products	-0.0168 (0.120)	-0.0074 (0.497)	-0.0056 (0.598)	0.0022 (0.837)	0.0044 (0.688)	-0.0344* (0.059)	-0.0112 (0.543)	-0.0057 (0.740)	0.0064 (0.726)	0.013 (0.478)
Basic metal industry	-0.0278 (0.172)	-0.0197 (0.331)	-0.0129 (0.516)	-0.0107 (0.596)	-0.009 (0.658)	-0.0684** (0.046)	-0.0489 (0.152)	-0.0293 (0.359)	-0.0319 (0.346)	-0.0269 (0.428)
Machinery and equipment	-0.0187*** (0.008)	-0.011 (0.122)	-0.0029 (0.673)	-0.0012 (0.865)	0.0004 (0.954)	-0.0664*** (0.000)	-0.0479*** (0.000)	-0.0249** (0.026)	-0.0290** (0.015)	-0.0245** (0.041)
Other manufacturing	-0.0123 (0.441)	-0.0112 (0.480)	-0.0088 (0.573)	-0.0098 (0.536)	-0.0095 (0.547)	-0.0517* (0.054)	-0.0497* (0.063)	-0.0425* (0.090)	-0.0464* (0.081)	-0.0462* (0.082)
Electricity, gas, steam	-0.0225 (0.130)	-0.0113 (0.449)	-0.0042 (0.774)	-0.0026 (0.863)	0.0001 (0.996)	-0.0602** (0.016)	-0.0327 (0.191)	-0.0124 (0.596)	-0.0176 (0.479)	-0.0096 (0.701)
Water works and supply	-0.0286 (0.174)	-0.0169 (0.423)	-0.0062 (0.763)	-0.0068 (0.744)	-0.0042 (0.841)	-0.0415 (0.241)	-0.0129 (0.171)	0.0178 (0.592)	0.0049 (0.889)	0.013 (0.711)
Construction	-0.0173*** (0.000)	-0.0166*** (0.001)	-0.0115*** (0.014)	-0.0092* (0.054)	-0.0093* (0.052)	-0.0446*** (0.000)	-0.0444*** (0.000)	-0.0304*** (0.000)	-0.0274*** (0.001)	-0.0296*** (0.000)
Wholesale trade	-0.0104 (0.496)	-0.0049 (0.750)	0.0038 (0.800)	0.0018 (0.907)	0.0029 (0.848)	-0.0586** (0.023)	-0.0453* (0.078)	-0.0207 (0.388)	-0.0325 (0.202)	-0.0294 (0.249)
Restaurants and hotels	-0.0118* (0.064)	-0.0106* (0.097)	-0.0086 (0.169)	0.0001 (0.993)	-0.0002 (0.974)	-0.0334*** (0.002)	-0.0311*** (0.004)	-0.0218** (0.031)	-0.0081 (0.454)	-0.099 (0.358)
Transport and storage	-0.0100** (0.031)	-0.0079* (0.089)	-0.0001 (0.983)	-0.0018 (0.702)	-0.0015 (0.747)	-0.0473*** (0.000)	-0.0427*** (0.000)	-0.0203*** (0.006)	-0.0297*** (0.000)	-0.0296*** (0.000)
Communication	-0.0223 (0.191)	-0.0136 (0.426)	-0.0037 (0.824)	-0.0022 (0.897)	-0.0005 (0.978)	-0.0686** (0.017)	-0.0473* (0.099)	-0.0193 (0.473)	-0.0256 (0.369)	-0.0205 (0.472)
Financial institutions	-0.0196** (0.032)	-0.0073 (0.434)	-0.0012 (0.894)	-0.0006 (0.948)	0.0024 (0.792)	-0.0609*** (0.000)	-0.0305* (0.051)	-0.0133 (0.365)	-0.0203 (0.187)	-0.0107 (0.493)
Insurance	-0.022 (0.297)	-0.0122 (0.567)	-0.0051 (0.807)	-0.0069 (0.740)	-0.0046 (0.827)	-0.0614* (0.084)	-0.0373 (0.299)	-0.0168 (0.617)	-0.0292 (0.407)	-0.0218 (0.541)

Real estate and business	-0.0211*** (0.002)	-0.0157** (0.024)	-0.0101 (0.138)	-0.0116* (0.092)	-0.0102 (0.140)	-0.0647*** (0.000)	-0.0519*** (0.000)	-0.0359*** (0.001)	-0.0444*** (0.000)	-0.0408*** (0.000)
Public administration	-0.0237*** (0.000)	-0.0144** (0.020)	-0.0023 (0.699)	-0.0035 (0.566)	-0.0016 (0.797)	-0.0706*** (0.000)	-0.0479*** (0.000)	-0.0138 (0.156)	-0.0275*** (0.008)	-0.0218** (0.037)
Sanity	-0.0299 (0.155)	-0.0174 (0.407)	-0.0066 (0.747)	-0.0083 (0.693)	-0.0053 (0.800)	-0.0955*** (0.007)	-0.0650* (0.066)	-0.0342 (0.302)	-0.0493 (0.160)	-0.0403 (0.252)
Social and community services	-0.0216*** (0.000)	-0.0123** (0.026)	-0.0045 (0.402)	-0.0029 (0.601)	-0.0009 (0.877)	-0.0609*** (0.000)	-0.0380*** (0.000)	-0.0160* (0.066)	-0.0208** (0.024)	-0.0147 (0.116)
Recreation and culture	-0.0099 (0.358)	-0.0046 (0.674)	-0.0006 (0.958)	0.0058 (0.591)	0.0068 (0.528)	-0.0475*** (0.009)	-0.0348* (0.057)	-0.0232 (0.175)	-0.0138 (0.445)	-0.0115 (0.528)
Household and personal services	0.0049 (0.269)	0.0037 (0.400)	-0.0002 (0.965)	0.0091** (0.040)	0.0086* (0.054)	0.004 (0.593)	0.0004 (0.956)	-0.0104 (0.140)	0.0138** (0.080)	0.0103 (0.167)
International bodies	-0.0243 (0.752)	-0.0095 (0.902)	0.0026 (0.972)	-0.0011 (0.989)	0.0025 (0.974)	-0.0585 (0.653)	-0.0219 (0.866)	0.0129 (0.915)	-0.0087 (0.946)	0.0026 (0.984)
Family worker				0.0814** (0.042)	0.0785** (0.050)				0.2146*** (0.001)	0.2047*** (0.002)
Self-employed				0.0392*** (0.000)	0.0365*** (0.000)				0.0837*** (0.000)	0.0746*** (0.000)
Informal		0.0197*** (0.000)	0.0091*** (0.001)	0.0091*** (0.000)	0.0068** (0.019)		0.0492*** (0.000)	0.0198*** (0.000)		0.0229*** (0.000)
Paid below minimum wage			0.0723*** (0.000)					0.2030*** (0.000)		
R ²	.017	.020	.063	.031	.031	.058	.066	.179	.080	.082
No. of observations	13,035	12,943	12,932	13,035	12,943	13,035	12,943	12,932	13,035	12,943

Note: See notes to table 6.3.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 6A.4 Poverty and household head characteristics for households with employed heads (\$5- and \$7-per-day poverty line)

	\$5-a-day poverty line					\$7-a-day poverty line				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Agriculture and hunting	-0.0066 (0.805)	-0.0098 (0.714)	0.0154 (0.540)	0.0299 (0.262)	0.0218 (0.417)	-0.0293 (0.279)	-0.0309 (0.256)	-0.009 (0.730)	-0.0001 (0.792)	-0.0072 (0.792)
Forestry and logging	0.0221 (0.900)	0.04 (0.820)	0.0947 (0.566)	0.0828 (0.636)	0.0838 (0.633)	-0.1113 (0.534)	-0.0941 (0.599)	-0.0472 (0.783)	-0.0626 (0.726)	-0.0613 (0.731)
Fishing	-0.0888 (0.645)	-0.1008 (0.601)	-0.0951 (0.599)	-0.1113 (0.562)	-0.1149 (0.549)	-0.016 (0.935)	-0.0273 (0.889)	-0.0219 (0.907)	-0.0339 (0.862)	-0.0378 (0.847)
Coal mining	-0.1778* (0.066)	-0.1518 (0.116)	-0.1092 (0.228)	-0.1268 (0.188)	-0.1207 (0.211)	-0.065 (0.509)	-0.0397 (0.686)	-0.0031 (0.973)	-0.0241 (0.806)	-0.0164 (0.867)
Petroleum and natural gas	-0.1637** (0.030)	-0.1499** (0.047)	-0.081 (0.253)	-0.114 (0.130)	-0.1133 (0.133)	-0.1876** (0.015)	-0.1742** (0.023)	-0.1153 (0.117)	-0.1477* (0.054)	-0.1468* (0.056)
Metal ore mining	-0.4671 (0.125)	-0.4772 (0.117)	-0.3349 (0.241)	-0.398 (0.190)	-0.4103 (0.176)	-0.1367 (0.659)	-0.1471 (0.635)	-0.0259 (0.931)	-0.0813 (0.793)	-0.097 (0.754)
Other mining	0.3441*** (0.001)	0.3538*** (0.001)	0.3020*** (0.002)	0.3792*** (0.000)	0.3763*** (0.000)	0.1780* (0.078)	0.1875* (0.070)	0.1442 (0.146)	0.2062** (0.041)	0.2043** (0.048)
Food	-0.0730*** (0.000)	-0.0519** (0.013)	-0.0152 (0.435)	-0.0267 (0.200)	-0.0223 (0.287)	-0.0393* (0.059)	-0.0213 (0.315)	0.0102 (0.614)	-0.0022 (0.916)	0.0008 (0.969)
Textile, apparel, leather	-0.0496*** (0.002)	-0.0369** (0.023)	-0.0143 (0.347)	-0.0171 (0.296)	-0.0146 (0.373)	0.0127 (0.438)	0.0257 (0.120)	0.0452*** (0.004)	0.0389** (0.020)	0.0424** (0.011)
Wood	0.0137 (0.607)	0.0168 (0.530)	0.0445* (0.076)	0.0417 (0.117)	0.0414 (0.122)	0.0124 (0.647)	0.0139 (0.608)	0.0379 (0.146)	0.0349 (0.199)	0.0324 (0.235)
Paper	-0.1134*** (0.002)	-0.0905** (0.013)	-0.0545 (0.109)	-0.0704* (0.052)	-0.0647* (0.074)	-0.1126*** (0.002)	-0.0903** (0.014)	-0.0593* (0.093)	-0.0781** (0.034)	-0.0710* (0.055)
Chemical	-0.0580** (0.043)	-0.0209 (0.474)	0.0078 (0.775)	-0.0095 (0.743)	0.0043 (0.882)	-0.0511* (0.080)	-0.0133 (0.655)	0.0119 (0.677)	-0.0124 (0.674)	0.0054 (0.856)
Non-metallic mineral products	0.0383 (0.272)	0.0698** (0.048)	0.0799** (0.016)	0.0879** (0.012)	0.0990*** (0.005)	0.0896** (0.012)	0.1156*** (0.001)	0.1246*** (0.000)	0.1293*** (0.000)	0.1374*** (0.000)

Basic metal industry	0.0073 (0.912)	0.0306 (0.640)	0.0679 (0.269)	0.0516 (0.430)	0.0573 (0.381)	0.0034 (0.959)	0.026 (0.696)	0.058 (0.363)	0.0389 (0.558)	0.0459 (0.490)
Machinery and equipment	-0.0612*** (0.007)	-0.0382* (0.096)	0.0055 (0.800)	-0.0158 (0.490)	-0.01 (0.666)	-0.02 (0.386)	0.0019 (0.934)	0.0394* (0.079)	0.0164 (0.482)	0.0231 (0.327)
Other manufacturing	-0.0646 (0.209)	-0.0621 (0.227)	-0.0484 (0.315)	-0.0581 (0.257)	-0.0578 (0.259)	-0.0432 (0.410)	-0.0406 (0.437)	-0.0285 (0.569)	-0.0379 (0.468)	-0.0373 (0.474)
Electricity, gas, steam	-0.0854* (0.074)	-0.0523 (0.276)	-0.0138 (0.760)	-0.0337 (0.481)	-0.0243 (0.612)	-0.0351 (0.471)	-0.0031 (0.950)	0.0301 (0.520)	0.0064 (0.895)	0.0179 (0.715)
Water works and supply	-0.0603 (0.473)	-0.0257 (0.704)	0.0328 (0.607)	-0.0038 (0.955)	0.0055 (0.935)	-0.0324 (0.638)	0.001 (0.989)	0.051 (0.440)	0.0128 (0.853)	0.0244 (0.724)
Construction	0.0096 (0.530)	0.0084 (0.585)	0.0351** (0.015)	0.0306** (0.047)	0.0263* (0.089)	0.0559*** (0.000)	0.0563*** (0.000)	0.0801*** (0.000)	0.0726*** (0.000)	0.0696*** (0.000)
Wholesale trade	-0.1121*** (0.023)	-0.0960* (0.051)	-0.0492 (0.287)	-0.0805 (0.101)	-0.0768 (0.118)	-0.0941* (0.060)	-0.0784 (0.118)	-0.0382 (0.426)	-0.0688 (0.170)	-0.064 (0.201)
Restaurants and hotels	-0.0196 (0.343)	-0.016 (0.439)	0.003 (0.879)	0.0112 (0.589)	0.0096 (0.644)	0.0059 (0.778)	0.009 (0.668)	0.026 (0.197)	0.0305 (0.149)	0.0281 (0.186)
Transport and storage	-0.0652*** (0.000)	-0.0607*** (0.000)	-0.0179 (0.204)	-0.0437*** (0.004)	-0.0447*** (0.003)	-0.0398*** (0.009)	-0.0354** (0.021)	0.0013 (0.928)	-0.0225 (0.141)	-0.0234 (0.127)
Communication	-0.1759*** (0.001)	-0.1501*** (0.006)	-0.0966* (0.061)	-0.1237** (0.024)	-0.1178** (0.032)	-0.1018* (0.069)	-0.0768 (0.170)	-0.031 (0.563)	-0.06 (0.284)	-0.0526 (0.348)
Financial institutions	-0.1451*** (0.000)	-0.1063*** (0.000)	-0.0735*** (0.009)	-0.0959*** (0.001)	-0.0823*** (0.006)	-0.1083*** (0.000)	-0.0686** (0.025)	-0.0404 (0.168)	-0.0688** (0.023)	-0.0506* (0.098)
Insurance	-0.1111 (0.102)	-0.0758 (0.271)	-0.0368 (0.569)	-0.0719 (0.288)	-0.0571 (0.405)	-0.1744** (0.012)	-0.1370* (0.050)	-0.1035 (0.123)	-0.1431** (0.038)	-0.1230* (0.079)
Real estate and business	-0.0192 (0.387)	-0.0048 (0.831)	0.0255 (0.226)	0.0053 (0.810)	0.0086 (0.701)	0.0233 (0.304)	0.0351 (0.125)	0.0612*** (0.005)	0.0430* (0.058)	0.0451** (0.048)
Public administration	-0.1120*** (0.000)	-0.0846*** (0.000)	-0.0195 (0.299)	-0.0596*** (0.003)	-0.0530*** (0.009)	-0.0241 (0.224)	0.0012 (0.953)	-0.0568*** (0.004)	0.0179 (0.380)	0.0249 (0.226)
Sanity	0.0429 (0.527)	0.0795 (0.242)	0.1384** (0.030)	0.099 (0.143)	0.1094 (0.106)	0.1289* (0.062)	0.1644** (0.017)	0.2147*** (0.001)	0.1739** (0.012)	0.1868*** (0.007)

(continued)

Table 6A.4 (continued)

	\$5-a-day poverty line					\$7-a-day poverty line				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Social and community services	-0.0750*** (0.000)	-0.0479*** (0.007)	-0.0059 (0.723)	-0.0263 (0.139)	-0.0197 (0.273)	-0.0632*** (0.000)	-0.0373*** (0.039)	-0.0013 (0.938)	-0.0241 (0.182)	-0.0162 (0.376)
Recreation and culture	-0.0596* (0.087)	-0.0407 (0.246)	-0.0187 (0.571)	-0.0187 (0.592)	-0.0124 (0.723)	-0.0608* (0.086)	-0.0403 (0.258)	-0.0212 (0.534)	-0.028 (0.431)	-0.0192 (0.592)
Household and personal services	0.0681*** (0.000)	0.0638*** (0.000)	0.0429*** (0.001)	0.0790*** (0.000)	0.0757*** (0.000)	0.0814*** (0.000)	0.0777*** (0.000)	0.0605*** (0.000)	0.0902*** (0.000)	0.0868*** (0.000)
International bodies	0.1997 (0.422)	0.2438 (0.326)	0.3106 (0.183)	0.2602 (0.294)	0.2734 (0.270)	0.1292 (0.610)	0.172 (0.497)	0.2289 (0.345)	0.1777 (0.482)	0.194 (0.442)
Family worker				0.2643** (0.041)	0.2521* (0.052)				0.2537* (0.055)	0.2388* (0.070)
Self-employed				0.1016*** (0.000)	0.0902*** (0.000)				0.0814*** (0.000)	0.0674*** (0.000)
Informal		0.0590*** (0.000)	0.0026 (0.757)		0.0273*** (0.004)		0.0570*** (0.000)	0.0092 (0.289)		0.0332*** (0.001)
Paid below minimum wage			0.3889*** (0.000)					0.3292*** (0.000)		
R ²	.192	.196	.292	.200	.201	.233	.236	.299	.238	.239
No. of observations	13,035	12,943	12,932	13,035	12,943	13,035	12,943	12,932	13,035	12,943

Note: See notes to table 6.3.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 6A.5 Poverty and household head characteristics for households with employed head (bottom 10 and 20 percent)

	Bottom 10%					Bottom 20%				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Agriculture and hunting	-0.0335* (0.053)	-0.0332* (0.055)	-0.0148 (0.356)	0.0056 (0.745)	0.0005 (0.979)	-0.0137 (0.539)	-0.0187 (0.402)	0.0063 (0.759)	0.0278 (0.213)	0.0159 (0.478)
Forestry and logging	-0.1807 (0.114)	-0.1604 (0.159)	-0.1209 (0.250)	-0.1157 (0.306)	-0.1138 (0.313)	0.1996 (0.177)	0.2223 (0.131)	0.2763** (0.040)	0.2686* (0.067)	0.2703* (0.065)
Fishing	0.009 (0.943)	-0.0034 (0.978)	0.0013 (0.991)	-0.0149 (0.904)	-0.0184 (0.882)	0.0904 (0.576)	0.0758 (0.638)	0.0818 (0.578)	0.0649 (0.686)	0.0603 (0.707)
Coal mining	-0.0808 (0.198)	-0.0516 (0.410)	-0.0207 (0.720)	-0.0262 (0.673)	-0.0186 (0.765)	-0.1712** (0.035)	-0.1384* (0.087)	-0.0963 (0.192)	-0.1131 (0.160)	-0.1043 (0.195)
Petroleum and natural gas	-0.1043** (0.034)	-0.0888* (0.069)	-0.0392 (0.385)	-0.051 (0.293)	-0.0499 (0.304)	-0.1138* (0.073)	-0.0965 (0.127)	-0.0286 (0.620)	-0.0572 (0.363)	-0.0564 (0.370)
Metal ore mining	-0.1607 (0.417)	-0.1719 (0.383)	-0.0701 (0.700)	-0.0867 (0.658)	-0.1008 (0.606)	-0.2751 (0.282)	-0.2884 (0.258)	-0.1488 (0.523)	-0.1965 (0.438)	-0.2151 (0.396)
Other mining	0.0902 (0.162)	0.067 (0.309)	0.0304 (0.617)	0.1278** (0.045)	0.0909 (0.164)	0.1778** (0.033)	0.1694** (0.047)	0.1188 (0.127)	0.2177** (0.008)	0.1940** (0.022)
Food	-0.0638*** (0.000)	-0.0399*** (0.003)	-0.0133 (0.283)	-0.0143 (0.288)	-0.0085 (0.529)	-0.0758*** (0.000)	-0.0485*** (0.005)	-0.0123 (0.440)	-0.0231 (0.184)	-0.0161 (0.358)
Textile, apparel, leather	-0.0731*** (0.000)	-0.0604*** (0.000)	-0.0439*** (0.000)	-0.0381*** (0.000)	-0.0367*** (0.001)	-0.0896*** (0.000)	-0.0750*** (0.000)	-0.0527*** (0.000)	-0.0526*** (0.000)	-0.0506*** (0.000)
Wood	-0.0549*** (0.002)	-0.5030*** (0.002)	-0.0328** (0.040)	-0.0249 (0.147)	-0.0268 (0.121)	-0.0725*** (0.001)	-0.0728*** (0.001)	-0.0454** (0.027)	-0.0406* (0.068)	-0.0458** (0.041)
Paper	-0.0821*** (0.000)	-0.0565** (0.016)	-0.0304 (0.161)	-0.036 (0.123)	-0.0291 (0.213)	-0.1294*** (0.000)	-0.1007*** (0.001)	-0.0651** (0.019)	-0.0804*** (0.008)	-0.0724** (0.017)
Chemical	-0.0574*** (0.002)	-0.0199 (0.293)	0.0032 (0.853)	-0.0058 (0.755)	0.0067 (0.724)	-0.0628*** (0.009)	-0.0194 (0.427)	0.0082 (0.714)	-0.0077 (0.749)	0.0082 (0.738)

(continued)

Table 6A.5 (continued)

	Bottom 10%					Bottom 20%				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Non-metallic mineral products	-0.0454** (0.046)	-0.014 (0.540)	-0.0064 (0.762)	0.0077 (0.733)	0.0171 (0.453)	-0.0615** (0.036)	-0.0254 (0.389)	-0.0153 (0.570)	-0.0051 (0.861)	0.0066 (0.823)
Basic metal industry	-0.1153*** (0.007)	-0.0894** (0.035)	-0.0624 (0.111)	-0.0679 (0.107)	-0.061 (0.147)	-0.038 (0.490)	-0.0088 (0.873)	0.028 (0.576)	0.0124 (0.820)	0.0204 (0.708)
Machinery and equipment	-0.0806*** (0.000)	-0.0580*** (0.000)	-0.0264* (0.054)	-0.0320** (0.030)	-0.0280* (0.060)	-0.0781*** (0.000)	-0.0514*** (0.007)	-0.0083 (0.635)	-0.0264 (0.167)	-0.0205 (0.288)
Other manufacturing	-0.0466 (0.164)	-0.0437 (0.189)	-0.0336 (0.274)	-0.0395 (0.231)	-0.039 (0.236)	-0.1001** (0.020)	-0.0970** (0.024)	-0.0833** (0.034)	-0.0926** (0.030)	-0.0923** (0.031)
Electricity, gas, steam	-0.0821*** (0.008)	-0.0451 (0.147)	-0.0172 (0.549)	-0.0267 (0.386)	-0.0154 (0.619)	-0.0716* (0.074)	-0.03 (0.455)	0.008 (0.826)	-0.0128 (0.749)	0.0007 (0.986)
Water works and supply	-0.0602 (0.172)	-0.0217 (0.622)	0.0205 (0.613)	0.0003 (0.995)	0.0116 (0.791)	-0.0805 (0.157)	-0.0371 (0.513)	0.0206 (0.691)	-0.0163 (0.773)	-0.0029 (0.960)
Construction	-0.0516*** (0.000)	-0.0516*** (0.000)	-0.0329*** (0.000)	-0.0293*** (0.003)	-0.0328*** (0.001)	-0.0329** (0.011)	-0.0322** (0.012)	-0.0057 (0.629)	-0.0091 (0.478)	-0.0126 (0.327)
Wholesale trade	-0.0767** (0.017)	-0.0586* (0.066)	-0.0247 (0.401)	-0.0428 (0.176)	-0.0381 (0.228)	-0.1043** (0.012)	-0.0840** (0.042)	-0.0378 (0.315)	-0.683* (0.096)	-0.063 (0.125)
Restaurants and hotels	-0.0256* (0.057)	-0.0223* (0.095)	-0.0084 (0.495)	0.0072 (0.590)	0.0047 (0.725)	-0.0357** (0.039)	-0.0321* (0.064)	-0.0125 (0.431)	-0.0007 (0.968)	-0.004 (0.816)
Transport and storage	-0.0535*** (0.000)	-0.0471*** (0.000)	-0.0161* (0.073)	-0.0305*** (0.002)	-0.0301*** (0.002)	-0.0739*** (0.000)	-0.0671*** (0.000)	-0.0249** (0.031)	-0.0494*** (0.000)	-0.0497*** (0.000)
Communication	-0.0986*** (0.006)	-0.0699** (0.050)	-0.0313 (0.342)	-0.0427 (0.227)	-0.0355 (0.316)	-0.1203*** (0.009)	-0.0879* (0.056)	-0.0352 (0.403)	-0.0609 (0.184)	0.0253 (0.253)
Financial institutions	-0.0801*** (0.000)	-0.0388** (0.046)	-0.0149 (0.405)	-0.0273 (0.152)	-0.0133 (0.493)	-0.1236*** (0.000)	-0.0766*** (0.002)	-0.0442* (0.054)	-0.0676*** (0.006)	-0.0503** (0.045)
Insurance	-0.0828* (0.061)	-0.0497 (0.265)	-0.0214 (0.603)	-0.0409 (0.348)	-0.0298 (0.500)	-0.1292** (0.023)	-0.091 (0.114)	-0.0524 (0.319)	-0.0847 (0.135)	-0.0705 (0.219)

Real estate and business	-0.0754*** (0.000)	-0.0580*** (0.000)	-0.0359*** (0.008)	-0.0491*** (0.001)	-0.0437*** (0.003)	-0.0737*** (0.000)	-0.0533*** (0.005)	-0.0233 (0.176)	-0.0458** (0.014)	-0.0386** (0.040)
Public administration	-0.0999*** (0.000)	-0.0694*** (0.000)	-0.0225* (0.059)	-0.0439*** (0.001)	-0.0359*** (0.006)	-0.1242*** (0.000)	-0.0899*** (0.000)	-0.0258* (0.091)	-0.0647*** (0.000)	-0.0553*** (0.001)
Sanity	-0.1182*** (0.007)	-0.0775* (0.078)	-0.0351 (0.387)	-0.0581 (0.183)	-0.0457 (0.295)	-0.0509 (0.371)	-0.005 (0.930)	0.0531 (0.306)	0.13 (0.819)	0.0278 (0.623)
Social and community services	-0.0738*** (0.000)	-0.0428*** (0.000)	-0.0124 (0.245)	-0.0216* (0.059)	-0.0128 (0.269)	-0.0842*** (0.000)	-0.0491*** (0.001)	-0.0077 (0.573)	-0.0287* (0.053)	-0.0182 (0.227)
Recreation and culture	-0.0587*** (0.010)	-0.0414* (0.068)	-0.0253 (0.228)	-0.0149 (0.508)	-0.0113 (0.616)	-0.0690** (0.018)	-0.0486* (0.098)	-0.0268 (0.317)	-0.0225 (0.441)	-0.0177 (0.547)
Household and personal services	0.0154* (0.099)	0.0107 (0.249)	-0.0037 (0.665)	0.0272*** (0.003)	0.0236** (0.011)	0.0527*** (0.000)	0.0469*** (0.000)	0.0267** (0.015)	0.0651*** (0.000)	0.0601*** (0.000)
International bodies	-0.0716 (0.658)	-0.0224 (0.890)	0.0257 (0.863)	-0.007 (0.965)	0.009 (0.955)	-0.0959 (0.646)	-0.0401 (0.847)	0.0258 (0.892)	-0.0271 (0.896)	-0.0077 (0.970)
Family worker				0.3476*** (0.000)	0.3338*** (0.000)				0.3113*** (0.004)	0.2933*** (0.007)
Self-employed				0.1086*** (0.000)	0.0958*** (0.000)				0.1156*** (0.000)	0.0989*** (0.000)
Informal		0.0656*** (0.000)	0.0253*** (0.000)		0.0318*** (0.000)		0.0744*** (0.000)	0.0189*** (0.006)		0.0396*** (0.000)
Paid below minimum wage			0.2779*** (0.000)					0.3822*** (0.000)		
R ²	.082	.092	.225	.106	.108	.129	.137	.279	.144	.146
No. of observations	13,035	12,943	12,932	13,035	12,943	13,035	12,943	12,932	13,035	12,943

Note: See notes to table 6.3.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

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Comment Chang-Tai Hsieh

This paper by Goldberg and Pavcnik measures the effect of trade liberalization in Colombia on poverty reduction. There are two central facts that motivate this paper. First, Colombia undertook a substantial liberalization of its trade regime in the early 1990s: the average tariff rate in the manufacturing sector fell from 50 percent in 1984 to 13 percent in 1998. Second, there was an economic boom in Colombia over the same time period that had the effect of lowering poverty. For example, the head count ratio fell by 5 percentage points from 1984 to 1994.

The paper presents three pieces of evidence to measure the causal link between trade liberalization and poverty reduction. First, using successive cross-sectional data sets from Colombia's national household survey, the authors show that poverty is associated with unemployment, with informal employment (measured as somebody working in a firm that does not pay social security taxes), with pay lower than the minimum wage, and with work in low-wage industries (such as personal services). Second, the paper uses a between-within decomposition widely used in the skill-biased technical change literature to show that the decline in poverty is not due to changes in cross-sectional correlates of poverty. Specifically, the authors show that changes in the unemployment rate, in the share of workers in the informal sector, in the fraction of workers paid the minimum wage, or in the share of workers in low-wage industries are not responsible for the decline in poverty. Finally, the core of the paper exploits the differential impact of the tariff decline across industries to measure the effect of trade liberalization. Specifically, the authors show that the extent of tariff decline in an industry is not associated with unemployment, informality, industry, or fraction of workers paid less than the minimum wage. The paper thus concludes that there is little evidence that the poverty decline was due to trade liberalization.

There are two things I find puzzling about this paper. First, it's not clear to me why the paper focuses most of its attention on the correlates of poverty rather than on poverty itself: there is only one table in the paper that measures the link between poverty and trade liberalization. Before looking at the correlates of poverty, one should first determine whether the poverty decline was associated with the trade liberalization. In addition, the correlates of poverty that the paper focuses on seem to be weak correlates. The *R*-squares from the cross-sectional regression of poverty on the indicators of poverty (informality, unemployment, etc.) seem quite low. Thus, by focusing on variables that have limited power to explain poverty, the research design seems set up to find no effect of trade policy. The low

explanatory power of the cross-sectional regression is particularly puzzling since the measure of poverty is basically based on income, the explanatory variables include all the variables typically included in a Mincerian wage regression, and we know that a standard Mincerian wage regression typically yields *R*-squares of 20 to 30 percent.

Second, using their simple accounting decomposition, the authors show that the decline in poverty cannot be attributed to changes in their correlates of poverty. Given this fact, however, the core of the paper—the correlation between the extent of trade liberalization and changes in the correlates of poverty—seems beside the point. Put differently, if we already know that changes in the correlates of poverty are not important in explaining the poverty decline, why are we bothering to measure the extent to which trade liberalization is associated with changes in the correlates of poverty?

Finally, more broadly, it seems difficult to make the case that one can use the differential impact of the trade reform across industries to measure its effect on poverty. There are (at least) two reasons for this. First, if the magnitude of job creation and destruction is at least as high in Colombia as it is in the United States, it seems difficult to pick up the effect of a sectoral shock by looking at workers in a given industry. For example, it could well be the case that trade liberalization was responsible for large losses for many people in protected sectors. However, if unemployment spells were short for most people, it would be difficult to pick up this effect from the cross-industry correlation of poverty and trade liberalization. One way to deal with this problem might be to use the differential regional impact of the trade reform, with the argument that interregional migration is lower than intersectoral movement.

Second, Colombia underwent many other policy reforms at exactly the same time. For example, it underwent a banking reform and labor market reform in 1990, liberalization of foreign direct investment and of the capital account in 1991, and a significant social security reform in 1993. It seems likely that many of these reforms would have a differential effect across industries. For example, social security reform presumably would have a different effect in industries that, prior to the reform, were paying social security taxes relative to firms that were not. The question, obviously, is the extent to which the differential effect of these other reforms is correlated with the differential impact of trade liberalization.