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The Wage Labor Market and Inequality in Vietnam

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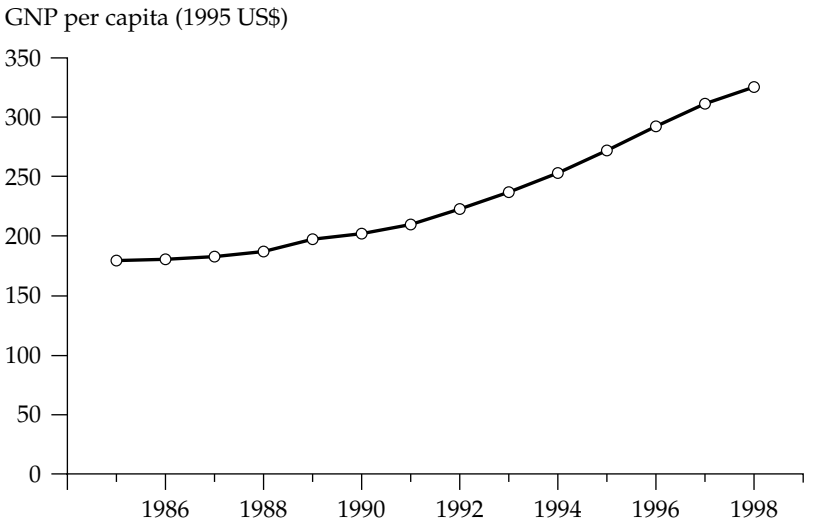
Vietnam has had rapid economic growth since the implementation of the *Doi Moi* (renovation) policies in the late 1980s, despite a sometimes fitful market reform process. This fitfulness has been due to ideological doubts about moving toward a market-based economy, as well as concern about the social impact of a market-based transformation.

The changes have indeed been dramatic. Output per person grew at an average rate of 5.5 percent per year from 1988 to 1998, raising the average level of output per person by 73 percent in a decade (see figure 3.1).[1] This transformation has been of such magnitude that it has touched all facets of society and dramatically reduced poverty.

Family farms and small household enterprises still dominate the income-generating activities of the population, and much of the initial change due to *Doi Moi* occurred in the small farm and small household enterprise sectors. But wage employment is the future. Historically, the process of economic development has always caused a transition out of small farms and household enterprises into wage employment, as worker productivity increases and nonhousehold enterprises dominate the economy. Scrutinizing the evolution of the labor market in the 1990s gives us clues about how economic development in Vietnam will continue to affect households and society in the coming decades.

The economic transformation in Vietnam, despite its positive impact on poverty, could increase inequality. If that occurs, the labor market is likely to be the source of the disparity. The development of urban private enterprise could polarize workers between those in high-paying skilled jobs and others, often immigrants from the countryside, who are eligible only for low-skilled, low-paying jobs. If employment creation concentrates in the cities, it widens the gap between rural and urban dwellers. In a situation where there

Figure 3.1. Economic Growth in Vietnam



Source: World Bank 2000b.

is a lack of opportunity for the poor and an increasing disparity of income, the economic transformation could contribute to many social problems.

This chapter uses the two completed rounds of the Vietnam Living Standards Survey (VLSS)[2] to evaluate the contribution of wage employment to inequality and income growth over the period of rapid economic growth in the 1990s that followed market reforms. It will address the question: Has the expansion of wage employment in Vietnam exacerbated social inequalities, despite its contribution to income growth? If Vietnam is able to sustain its economic development, wage employment will become an increasingly important source of household income as family farms and small household enterprises become less prevalent. Comparing the recent evolution of wage employment to farm and nonfarm self-employment provides clues as to how economic development will change Vietnamese society, in particular its impact on income inequality within and between communities.

This chapter shows that standard methods for calculating income inequality can be severely biased by measurement error when decomposing the contribution of different sectors, regions, or groups to overall inequality. An easily calculated, alternative, consistent method for decomposing income inequality is proposed.

The first section reviews developments in the Vietnamese labor market in the 1990s, focusing on wage employment as opposed to self-employment. The following section explores the determinants of wages to find the individual and community characteristics that explain why different people are paid different wages. A presentation of standard inequality measures follows. This section considers the important impact of measurement error on inequality statistics and proposes a new statistic that is not subject to the

biases of standard inequality measures. The section on Vietnamese wage inequality describes wage inequality in the country and how it has changed during the last decade. This is followed by a discussion of the contribution of wage employment to overall income inequality. Finally, the relationship between income sources and overall inequality is used to predict future changes in income inequality, followed by the conclusion.

The Vietnamese Labor Market

This section evaluates how the rapid economic changes in Vietnam have affected labor force participation, unemployment, sectoral shifts in employment, and the growth and regional differences in wages.

Labor Force Participation and Unemployment

In Vietnam, a high percentage of the working-age population works. Even when housework is excluded (but work on the household farm or household business is included), 81 percent of all Vietnamese women and 85 percent of men ages 16 to 60 were working in 1993 (see table 3.1).[3] As income rose during the 1990s, participation rates rose by 2 percent for women and were unchanged for men.

In rural villages, participation rates are even higher—83 percent for women and 87 percent for men in 1993. Rural participation rates jumped by 4 percent for women and stayed unchanged for men, so that both rural men and rural women had the same 87 percent participation rate in 1998.

Participation rates were lower in urban areas than in rural areas in 1993, at 74 percent for urban women and 78 percent for urban men. Unlike rural

Table 3.1. Labor Force Participation, Ages 16–60
(percent)

Population	*1993*	*1998*	*Change, 1993–98*
Female			
Rural	82.8	87.0	4.2
Urban	73.4	70.4	−3.4
Total	80.5	82.8	2.3
Male			
Rural	87.1	87.1	0.0
Urban	77.7	77.3	−0.4
Total	84.7	84.7	0.0

Note: Labor force participation is the percentage of the working age population (16–60) who were working in the previous seven days or who were looking for work.

Source: Author's calculations from the 1993 and 1998 VLSSs.

Table 3.2. Unemployment Rates
(percent)

Sector	*1993*	*1998*
Rural	0.5	0.4
Urban	1.6	1.5

Note: The unemployment rate is the percentage of people ages 16 to 60 in the labor force in the seven days before the survey who were not working and who were looking for work.

Source: Author's calculations from the 1993 and 1998 VLSSs.

women, urban women's participation fell substantially by 3 percent to 70 percent in 1998. Urban men's participation also fell slightly to 77 percent in 1998.

Unemployment—people looking for work who do not have a job—is very low in Vietnam. In 1993, the unemployment rate was 0.5 percent in rural areas and 1.5 percent in urban areas (table 3.2). Unemployment fell by 0.1 of a percentage point from 1993 to 1998, an insignificant change. The virtual absence of unemployment is probably due to a combination of factors, including the fact that Vietnam's income level is too low to permit people to be without work while job searching, and the wide availability of self-employment on a household farm or enterprise.

The Composition of Employment

Vietnam is still a highly agricultural country, with half of all workers working on family farms, but the share of agricultural employment is shrinking.

"Self-employment" is defined here in an unconventional way because of inconsistencies between the two rounds of the VLSS. The survey question asking whether the survey respondent was self-employed in his or her main job in the previous seven days was changed from the 1993 to the 1998 survey.[4] Using this self-employment question results in dramatic, but spurious, changes in type of self-employment between 1993 and 1998. To ensure comparability, tables 3.3, 3.4, and 3.5 use the questions about whether the respondent has worked in any job in the three sectors (wage employment, nonagricultural self-employment, and agricultural self-employment) during the previous week, so that the sector designations are not mutually exclusive. To make the sectors mutually exclusive, "wage employment" includes anyone who has worked in wage employment, whether it was the person's main job or not. "Nonagricultural self-employment" excludes anyone who has participated in any wage employment, and "agricultural self-employment" excludes anyone with any other employment. This tends to exaggerate the number of wage employees and nonagricultural self-employed at the expense of the agricultural self-employed, but it should not bias the rate of change over time.

The share of agricultural self-employment (family farms) fell from 52 percent in 1993 to 50 percent in 1998 (table 3.3). The 2 percentage point drop in

Table 3.3. Sectoral Composition of Employment
(percent)

Employment sector	*1993*	*1998*	*Change, 1993–98*
Wage employment	23.9	24.9	1.0
Agricultural self-employment	51.6	49.7	−1.9
Nonagricultural self-employment	24.5	25.4	0.9

Note: Sectoral employment is the percentage of workers ages 16 to 60 employed in each of the three sectors in the previous seven days. See text for definition of sector.

Source: Author's calculations from the 1993 and 1998 VLSSs.

Table 3.4. Rural Composition of Employment, by Sex
(percent)

Sector	*1993*	*1998*	*Change, 1993–98*
Men			
Wage employment	24.5	26.3	1.8
Agricultural self-employment	57.4	54.8	−2.6
Nonagricultural self-employment	18.0	18.9	0.9
Women			
Wage employment	13.0	12.7	−0.3
Agricultural self-employment	67.1	66.1	−1.0
Nonagricultural self-employment	20.0	21.2	1.2

Source: Author's calculations from the 1993 and 1998 VLSSs.

Table 3.5. Urban Composition of Employment, by Sex
(percent)

Sector	*1993*	*1998*	*Change, 1993–98*
Men			
Wage employment	50.9	53.0	2.1
Agricultural self-employment	12.9	8.2	−4.7
Nonagricultural self-employment	36.2	38.8	2.6
Women			
Wage employment	35.0	37.7	2.7
Agricultural self-employment	15.0	12.7	−2.3
Nonagricultural self-employment	50.0	49.6	−0.4

Source: Author's calculations from the 1993 and 1998 VLSSs.

the employment share of agricultural self-employment was equally shared by increased wage employment and nonagricultural self-employment. Wage employment and nonagricultural self-employment each grew to 25 percent of total employment.

Rural men's employment changed more decidedly than overall employment toward the wage labor market. Of the 3 percentage point fall in rural men's agricultural self-employment from 1993 to 1998, 2 percentage points went into wage employment, but only 1 percentage point went into nonagricultural self-employment.

Rural women's employment is the most highly agricultural, with two-thirds of employed women working on family farms. It also fell the least, by 1 percentage point. Rural women's wage employment also fell slightly, while nonagricultural self-employment expanded by 1 percentage point.

The changes in the urban sectoral composition of employment were more dramatic (table 3.5). For urban men, agricultural self-employment still accounted for 13 percent of employment in 1993, but it had fallen 5 percentage points by 1998. There was a roughly equal transfer of employment into nonagricultural self-employment and into wage employment, which made up 53 percent of all employment by 1998.

Urban women saw the greatest increase in wage employment, almost 3 percentage points from 1993 to 1998. The expansion of the wage employment came from a sharp reduction in agricultural self-employment and a small reduction in nonagricultural self-employment.

Agricultural employment shrank for everyone between 1993 and 1998. It fell twice as much in urban areas as rural areas, and twice as much for men as for women. Where the agricultural workers went differed for men and women. Men's employment expanded roughly equally into wage employment and nonagricultural self-employment in both urban and rural areas. Rural women's movement out of agricultural work was entirely absorbed by nonagricultural self-employment, while urban women's reduced participation in agriculture went entirely into wage employment.

This chapter will focus on wage employment of adults and its impact on inequality. Questions of agricultural and nonagricultural employment are left aside, but other chapters in this volume focus on agriculture (see chapter 5, by Dwayne Benjamin and Loren Brandt) and household enterprise (see chapter 4, by Wim P. M. Vijverberg and Jonathan Haughton).

Wage Growth

As shown above, there was a steady expansion of wage employment in Vietnam in the 1990s for men and urban women. What happened to wages as this expansion occurred? Despite the increase in the supply of wage workers, wages in Vietnam grew extremely rapidly. Average hourly wages increased by 10.5 percent per year in real terms between the 1993 and the 1998 VLSSs (table 3.6). Over the course of just five years, wage levels jumped by two-thirds. Wage growth was considerably faster than the growth in household income

Table 3.6. Wage Levels and Growth, by Region

Region	*1993 wage*	*1998 wage*	*Annual change, 1993–98 (percent)*	*Percent of 1998 Ho Chi Minh City wage*
Ho Chi Minh City	2.60	4.70	11.9	100.0
Hanoi	1.94	4.91	18.6	104.5
Medium urban	1.64	3.10	12.8	66.0
Small urban	1.81	2.91	9.5	61.9
Rural north	1.54	2.39	8.8	50.9
Rural central	1.50	2.41	9.5	51.2
Rural south	1.93	2.65	6.4	56.4
Total	1.85	3.13	10.5	66.6

Note: Wages are mean hourly compensation in thousand 1998 dong.
Source: Author's calculations from the 1993 and 1998 VLSSs.

per person in the same period, which grew at 8.7 percent per year, as well as output per person in the economy as a whole, which grew at 6 percent per year.[5]

Regional Wage Differences

Wage growth and wage levels were distributed unevenly across different regions of the country, with a split between the two primary cities—Ho Chi Minh City and Hanoi—and the rest of the country (table 3.6).[6] The two urban centers had higher wages than the rest of the country in 1993, and their wages grew much faster from 1993 to 1998.

In 1998, average Ho Chi Minh City and Hanoi wages were more than 50 percent higher than in all the other regions. Ho Chi Minh City wages started out 37 percent higher than all other regions in 1993, and grew 1 percentage point faster than overall wages from 1993 to 1998.

Wages in Hanoi were not much higher than wage levels in other parts of the country in 1993, but grew by 19 percent per year to become the highest wages in the country. In 1998 wages in Hanoi were even 5 percent higher than they were in Ho Chi Minh City.

Ho Chi Minh City and Hanoi together make up a significant part of Vietnam's wage labor market, accounting for 25 percent of all wage jobs in 1998, although they account for only 8 percent of the country's population (18 percent of all wage employment is in Ho Chi Minh City and 7 percent is in Hanoi).[7]

Outside Ho Chi Minh City and Hanoi, average wages were surprisingly similar across regions in 1993, and they had become even more similar by 1998. Regions with lower wages in 1993 are the ones that saw the largest wage increases in the 1993–98 period, and the regions with the highest wages initially tended to grow more slowly. Medium-size urban and rural central regions had the lowest average wages in 1993 and saw the largest

Table 3.7. Skilled, Private, Nonagricultural Wages, by Region

Region	1993 wage	1998 wage	Annual change, 1993–98 (percent)	Percent of 1998 Ho Chi Minh City wage
Ho Chi Minh City	2.34	5.57	17.3	100.0
Hanoi	1.50	5.75	26.8	103.1
Medium urban	1.53	3.16	14.5	56.7
Small urban	1.82	2.95	9.7	53.0
Rural north	1.90	2.58	6.2	46.4
Rural central	2.57	3.02	3.2	54.2
Rural south	2.23	3.62	9.7	65.1
Total	2.01	3.78	12.6	67.9

Note: Wages are mean hourly compensation in thousand 1998 dong.
Source: Author's calculations from the 1993 and 1998 VLSSs.

increase in wages by 1998. The rural south, which had the highest wages outside the two largest cities in 1993, saw the lowest increase in the following five years. With the exception of the two largest cities, labor markets seem to have been equilibrating over this period, with wages becoming more similar over the course of the decade.

The divergence of the largest cities from the rest of the country could be due to the fact that the demographic characteristics of workers and the kinds of employment are different in different parts of the country. If the best-educated, most productive workers are drawn to the main cities, the wage disparity could be due to differences in worker characteristics rather than differences in wages for the same kinds of workers. Table 3.7 makes wage rates more comparable across regions by restricting wages of those workers with at least a lower secondary school education, working for a private nongovernmental or non-state-owned enterprise, and a nonagricultural business. Wages for skilled, private, nonagricultural work show even faster growth and a stronger convergence across regions over the 1993–98 period than overall wages, again with the exception of the two primary cities. Hanoi had the lowest level of skilled private wages of any region in 1993 but caught up so fast that it had the highest wages of all by 1998, with wage growth of 27 percent per year.[8] When considering workers with high education and private, nonagricultural, employers, Hanoi and Ho Chi Minh City still have more than a 50 percent wage premium. Except for the rural south, the two largest cities have a 75 percent wage premium over the rest of the country for skilled private employment.

Hours Worked

At the same time that hourly wages grew extremely rapidly and employment shifted toward the wage labor market, hours worked in wage labor also increased rapidly, all of which contributed to the large rise in wage income.

Table 3.8. Average Annual Hours Worked in Wage Employment

Region	*1993*	*1998*	*Change, 1993–98 (percent)*
Ho Chi Minh City	2,176	2,365	8.7
Hanoi	2,022	2,113	4.5
Medium urban	2,027	2,184	7.7
Small urban	1,816	2,169	19.4
Rural north	1,113	1,460	31.2
Rural central	1,321	1,576	19.3
Rural south	1,276	1,628	27.6
Total	1,572	1,862	18.4

Source: Author's calculations from the 1993 and 1998 VLSSs.

On average, hours worked in wage employment increased by 18 percent from 1993 to 1998 (table 3.8). In 1993, there was a sharp difference between rural and urban wage employment in terms of total hours worked. Workers in medium-size and large cities worked, on average, about 50 percent more hours per year than rural wage laborers. Workers in Ho Chi Minh City worked the longest hours in 1993, averaging 2,176 hours per year. Assuming an eight-hour workday and a five-day workweek, this works out to 272 work days, or 54 workweeks.[9] These are long hours by any standard. Despite this, by 1998, working hours in Ho Chi Minh City had grown by 9 percentage points. Ho Chi Minh City, Hanoi, and medium-size urban centers had the highest average working hours in 1993, but their increases in working hours were more modest than the increases in rural areas and small urban centers. Rural areas and small urban centers partially caught up with the working hours in the medium-size and large cities between 1993 and 1998, with very large increases in rural wage labor working hours.

State-Owned Enterprise Employment

The Vietnamese government has made plans for the reform of state-owned enterprises (SOEs) since the beginning of *Doi Moi* in the late 1980s. Despite plans for staff reductions, the political commitment to reform has not always been clear because SOE employees are an important political constituency for the government. All of Vietnam's 5,740 SOEs are scheduled to be privatized or restructured by 2005 (Belser and Rama 2001), so it is useful to review what was accomplished between 1993 and 1998.

SOE personnel account for 5 percent of the labor force and more than 15 percent of wage employment. Surprisingly, SOE employment as a share of wage employment *grew* by almost 1 percent from 1993 to 1998 in the VLSS sample, from 15.9 to 16.7 percent (table 3.9). The estimates of SOE employment in the VLSS should be reasonably accurate because there is a sample of 340 SOE employees in 1993 and 563 employees in 1998.

Table 3.9. State-Owned Enterprise Employment

SOE employment measures	*1993*	*1998*	*Change, 1993–98 (percent)*
SOE share of wage employment (percent)	15.9	16.7	0.8
Average hourly wage in SOEs (thousand 1998 dong)	1.72	2.90	68.4
Share of SOE employees, female (percent)	7.6	7.4	−0.2
Share of all wage employees, female (percent)	43.0	39.8	−3.1

Source: Author's calculations from the 1993 and 1998 VLSSs.

The increasing share of SOE employment in wage employment occurred while wage employment was growing as a fraction of total employment (table 3.3), while employment participation was growing (table 3.1), and while the total population was growing. If we apply the total population growth of 8.3 percent from 1993 to 1998 (World Bank 2002, p. 108) to the working population, that implies that SOE employment grew by 20.2 percent from 1993 to 1998, or 3.7 percent per year.

Wage levels at SOEs mirrored the changes in other wage employment. SOE wages increased by 68 percent in real terms from 1993 to 1998, while all wages grew by 69 percent (table 3.9). SOE wages remained slightly lower than average wages in other jobs, at a steady 93 percent of average wages in both 1993 and 1998. Although SOE wages were typical of overall wages, the rapid increase in SOE wages in the 1990s is surprising during a period of planned retrenchments of SOEs.

The VLSS data show that SOE employment is predominantly male. Only 7.6 percent of SOE workers were women in 1993, and this stayed essentially the same in 1998. The small participation of women in SOEs is untypical of overall wage employment, where 43 percent of workers were women in 1993, although this fell to 40 percent by 1998.

Wage Employment Patterns

In sum, wage employment shows remarkable growth in wage levels and hours worked, as well as a more modest increase in the fraction of workers employed outside the home. Hanoi and Ho Chi Minh City maintain large wage premia, probably because the residency permit restrictions in these cities exclude people who were not born in the city. SOE employment levels showed a surprising 20 percent increase between the surveys, and SOE wages kept up with the rapid increase in overall wages.

Determinants of Wages

Which individual characteristics or employment characteristics determine how much an individual earns in the labor market? Previous work shows that wages are typically positively correlated with education levels and with work experience (at a decreasing rate).[10] In other countries, wages are typically negatively correlated with being female or being a member of an ethnic minority.[11] Wages also typically vary by regions within a country. In the case of Vietnam, where much of wage employment is still offered by the state and there is still a large amount of agricultural employment, indicators of private and nonagricultural employment also explain wage levels.

Returns to Education and Experience

The determinants of wages can be explored with a simple earnings equation:

$$\log(Wage_i) = \beta_0 + \beta_1 X_{1i} + \cdots + \beta_K X_{Ki}$$

where $Wage_i$ is the wage of individual i, $X_{1i}, \ldots, X_{Ki}$ are the K correlates of wages (such as education, experience, and so on), and $\beta_0, \beta_1, \ldots, \beta_K$ are the effects of the correlates on wages. Log(·) is the natural logarithm. With certain assumptions, the coefficient on education (β_1) can be interpreted as the internal rate of return to an additional year of schooling (Berndt 1991, p. 162).

The estimated effect of education and experience on wages is shown in table 3.10. The estimated rate of return to schooling in Vietnam in 1993 was quite low, just 2.9 percent. The rate almost doubled to 5 percent in 1998, but it is still very low compared with other developing countries. Psacharopoulos (1985, p. 588), for example, reports an average rate of return of 11 percent for

Table 3.10. Wage Regressions: Estimated Effect of Education and Experience

Independent variables	*1993*	*1998*	*Difference, 1998–93*
Schooling (years)	0.029	0.050	0.021
	(6.29)***	(14.61)***	(3.84)***
Experience (years)	0.033	0.025	−0.008
	(5.42)***	(4.80)***	(0.93)
Experience squared	−0.001	−0.001	0.000
	(5.37)***	(4.52)***	(0.66)
Constant	7.269	7.757	0.488
	(91.40)***	(128.23)***	(4.76)***
Observations	2,007	3,033	
R^2	0.04	0.08	

***Significant at 1 percent level.

Note: Absolute value of *t* statistics in parentheses.

Source: Author's calculations from the 1993 and 1998 VLSSs.

Asia, 13 percent for Africa, and 14 percent for Latin America, averaging over many similar studies using this model of wage determinants. The increase in the rate of return to schooling from 1993 to 1998 of 2.1 percent is statistically significant.

The average rate of return to a year of education was quite low in the 1990s, but there was considerable variation in the return to different levels of schooling, at least for private employment, as shown in chapter 16 of this volume. Particularly for the small number of university graduates in the sample, the return to a year of university in private employment was negligible in 1993 but had become a very good investment in 1998.

"Experience," which is actually years since completion of schooling, is strongly positively correlated with wages, but at a decreasing rate, as expected, and its effect shows no sign of changing from 1993 to 1998.

Table 3.11 shows a broader group of correlates of wages: being female, a member of a non-Chinese ethnic minority, having Chinese origins, working for a nonagricultural employer, working for a nongovernmental employer, and indicators of living in the two primary cities in Vietnam. The correlation of real wages with years of schooling is still strongly positive, though even lower with the inclusion of other correlates, and it still has a statistically significant increase from 1993 to 1998. Experience has a stable, positive correlation with wages.

Women in Vietnam earn much less than men with the same observable characteristics, although the difference in earnings decreased between 1993 and 1998. In 1993, wages for women were 31 percent less than for their male counterparts, even after controlling for education and experience.[12] The gap between men's and women's wages in Vietnam became smaller by 1998, when women's wages were 17 percent smaller. The wage gap between men and women halved between 1993 and 1998, a statistically significant change.

Non-Chinese ethnic minorities do not show lower wages in 1993, but they do show a 10 percent lower wage in 1998. Ethnic Chinese in Vietnam had a 25 percent wage premium in 1993, but this all but disappeared by 1998.

In both 1993 and 1998, nonagricultural employers paid higher wages, and in 1998, private employers paid a statistically significant higher wage than state employers.

The regression in table 3.11 properly tests whether the two primary cities, Ho Chi Minh City and Hanoi, have significant wage premia, other things being equal. Residents of both cities earn much higher wages than residents of other regions with the same characteristics. Workers in Ho Chi Minh City earned a remarkable 80 percent higher wage than rural or small and medium-size urban area residents with the same education, experience, and so on in 1998. Hanoi residents earned 47 percent higher wages in 1998 than Vietnamese living outside the two largest cities. There is no sign that the wage premia of Ho Chi Minh City and Hanoi fell during the period of 1993 to 1998.

Table 3.11. Wage Regressions: Broader Group Correlates

Independent variable	*1993*	*1998*	*Difference, 1998–93*
Schooling (years)	0.019	0.035	0.016
	(3.27)***	(8.01)***	(2.19)**
Experience (years)	0.027	0.028	0.001
	(4.72)***	(6.04)***	(0.15)
Experience squared	−0.001	−0.001	−0.000
	(4.71)***	(5.55)***	(0.29)
Female	−0.370	−0.182	0.188
	(10.69)***	(6.83)***	(4.27)***
Non-Chinese ethnic minority	0.030	−0.107	−0.137
	(0.39)	(2.05)**	(1.58)
Chinese origins	0.224	0.005	−0.220
	(2.66)***	(0.07)	(2.17)**
Nonagricultural employment	0.126	0.289	0.163
	(2.79)***	(6.42)***	(2.45)**
Private (nongovernmental) employer	0.001	0.082	0.081
	(0.01)	(2.38)*	(1.37)
Ho Chi Minh City	0.609	0.589	−0.020
	(11.19)***	(16.24)***	(0.32)
Hanoi	0.296	0.384	0.088
	(4.15)***	(6.58)***	(1.06)
Constant	7.353	7.530	0.177
	(71.91)***	(91.24)***	(1.24)
Observations	2,007	3,033	
R^2	0.18	0.22	

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

Note: Absolute value of *t* statistics in parentheses.

Source: Author's calculations from the 1993 and 1998 VLSSs.

It should be noted that only 18 percent and 22 percent of the variation of wages in 1993 and 1998, respectively, were explained by the correlates in table 3.11 (as measured by the R^2 statistics), so the largest part of wage variation is due to other unidentified factors.

Table 3.12 shows the effect of correlates on wage levels in 1998 separately by seven regions. The regional differences are strong. The rates of return to schooling are especially low in the rural central region, in small urban areas, and in the rural south, where the rate of return is not significantly different from zero. The rate of return to schooling in Hanoi and the rural north is more than double the level in the three lowest regions, approaching a respectable 8.5 percent in Hanoi and 6.9 percent in the surrounding rural north.

The disadvantage of being female is similar around the country, except in the rural north and the rural central region, where women come closer to

Table 3.12. Wage Regressions, by Region, 1998

Independent variables	*Ho Chi Minh City*	*Hanoi*	*Medium urban*	*Small urban*	*Rural north*	*Rural central*	*Rural south*
Schooling (years)	0.054	0.085	0.045	0.032	0.069	0.027	0.015
	(6.11)***	(4.20)***	(3.86)***	(2.44)**	(4.63)***	(2.54)**	(1.59)
Experience (years)	0.019	0.029	0.022	0.047	0.026	0.020	0.035
	(1.76)	(1.58)	(1.79)	(3.15)***	(2.28)**	(1.63)	(3.54)***
Experience squared	−0.000	−0.001	−0.000	−0.001	−0.001	−0.000	−0.001
	(1.25)	(1.43)	(1.06)	(2.72)***	(2.44)**	(1.43)	(3.90)***
Female	−0.241	−0.284	−0.204	−0.196	−0.134	−0.066	−0.249
	(3.99)***	(2.40)**	(3.19)***	(2.84)***	(1.54)	(1.02)	(4.47)***
Non-Chinese ethnic minority	−0.345	1.561	0.116	−0.301	0.138	−0.067	−0.202
	(3.36)***	(15.18)***	(0.51)	(1.16)	(1.17)	(0.71)	(2.25)**
Nonagricultural employment	0.245	1.218	0.235	0.502	0.896	0.300	0.352
	(0.87)	(5.50)***	(1.74)	(3.02)***	(4.70)***	(3.48)***	(5.12)***
Private (nongovernmental) employer	0.012	0.014	−0.154	−0.052	0.260	0.406	0.057
	(0.15)	(0.11)	(1.98)**	(0.46)	(2.65)***	(5.07)***	(0.78)
Constant	8.093	6.480	7.774	7.205	6.312	7.384	7.727
	(24.73)***	(12.30)***	(32.66)***	(25.19)***	(22.52)***	(36.55)***	(51.21)***
Observations	556	215	499	402	270	433	658
R^2	0.13	0.19	0.13	0.12	0.23	0.15	0.16

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

Note: Robust *t* statistics in parentheses.

Source: Author's calculations from the 1993 and 1998 VLSSs.

obtaining their male counterparts' earnings. The disadvantage of being a woman is greatest in Hanoi, where average wages for women are 25 percent lower than wages for men with similar characteristics.

The disadvantage of being a non-Chinese ethnic minority varies widely across regions.[13] Only in Ho Chi Minh City and the rural south did ethnic minorities have statistically significantly lower wages in 1998—29 percent lower in Ho Chi Minh City and 18 percent lower in the rural south. In Hanoi, the wages of ethnic minorities were, on average, almost four times higher than the wages of Kinh and Chinese workers with the same observable characteristics. This may be due to a small sample effect, because this reflects just 16 persons out of the small Hanoi sample of 215 wage earners, but the coefficient remains significant and of similar size in a quantile regression (not shown).

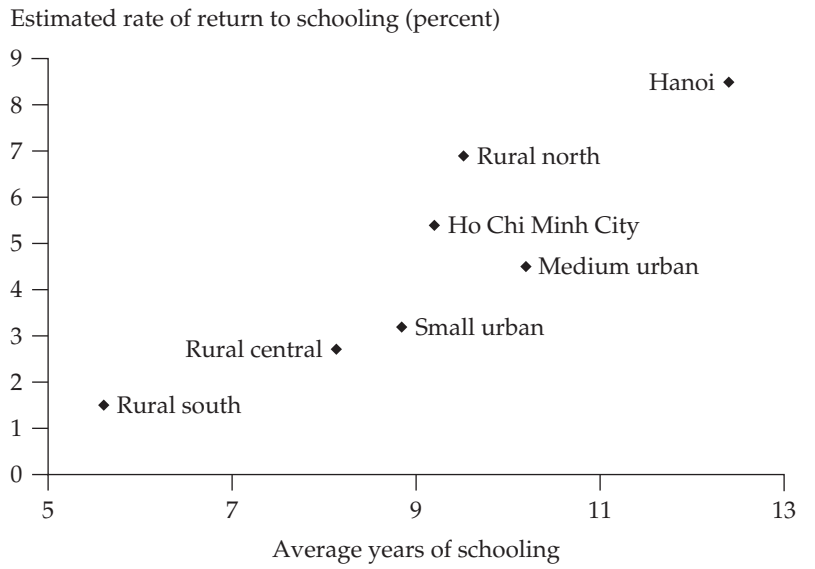
Nonagricultural employers paid higher wages in all the regions, but the effect was most pronounced in Hanoi, the rural north, and small urban areas. Private (nongovernmental) employers clearly paid a wage premium only in the rural north and the rural central region; this wage premium could be due to the traditionally strong communist roots in these two regions, which could motivate workers to take government jobs despite low government wages.

The most notable results from exploring the determinants of wage levels are very high wage premia in Hanoi and Ho Chi Minh City, and low returns to schooling in Vietnam. With the same observable characteristics, workers in the two primary cities earned 50–80 percent higher wages than similar workers elsewhere in the country. The high wages in the primary cities create disparities with the countryside and drive up the cost of doing business in two crucial markets. The wage disparities are underpinned by the system of household registration, which prevents nonnatives from obtaining residency permission in the primary cities except for those obtaining government jobs or (with difficulty) those sponsored by their employer. The distorting impact of this system is suggested by anecdotal evidence that residency papers for Hanoi and Ho Chi Minh City improve young people's marriageability and are even the basis for marriages of convenience.

The wage premia in the primary cities reported here are for registered residents. The VLSS data are based on household registration records, so unfortunately they leave out unregistered migrants to the primary cities. The unregistered migrants almost certainly find higher wages than they would have in the countryside, or they would not have moved to the city, but their wages are much lower than the wages of legal residents. The difficulty in obtaining residency status in the primary cities has created a strong disparity between native residents and the class of illegal residents who are dispossessed by law. The unregistered migrants are not allowed to use government services, including education and health care, nor can they obtain jobs in most registered businesses.

The labor market rate of return to schooling in Vietnam is quite low, though it seems to have improved during the 1990s. Figure 3.2 shows the strong correlation between estimated rates of return to schooling and average level of schooling across regions. It points to a vicious cycle in regions with

Figure 3.2. Levels of Schooling versus Labor Market Returns to Schooling by Region, 1998



Source: Author's calculations from 1998 VLSS data.

low education, because the rate of return is lowest in those parts of the country with the lowest education levels, and the rate of return to education is highest in the regions with highest education. This pattern may be explained by poor education quality in regions with low educational attainment.

There is also a significant male-female wage gap, although it diminished during the 1990s.

Methods for Measuring Inequality

The previous sections explored the remarkable growth of Vietnamese wages in the 1990s. The rest of the chapter will examine the impact of wage employment on inequality in Vietnam, starting with a consideration of a number of different measures of inequality that have desirable properties.

Inequality measures are chosen according to three criteria: (a) they satisfy the principle of transfers, (b) they are additively decomposable across subgroups, and (c) they can handle negative income values.[14] The principle of transfers is the intuitively appealing requirement that a transfer of income from a poorer to a richer person will increase the measure of inequality, as long as the transfer is not so large as to reverse the two persons' relative positions. All the commonly used inequality measures satisfy the principle of transfers. In particular, the Gini coefficient, the generalized entropy measures, and the Atkinson inequality measures all adhere to the principle of transfers.

The decomposition of inequality across a set of groups is useful for assessing how much of total inequality is due to differences *within* the groups and how much is due to differences *between* the groups. These groups can be any mutually exclusive subgrouping of the population, such as region of residence or a household characteristic. Among inequality measures with standard characteristics, only the generalized entropy measures of inequality are additively decomposable, where the inequality within subgroups and the inequality between subgroups sum to total inequality (Shorrocks 1984).

The decomposition of inequality across the source of income is a different problem because the sources are not mutually exclusive categories. Many households have income sources from more than one sector, for example, from farming and wage employment. The additive decomposition of inequality across sources or uses of income is possible for any inequality index, and Shorrocks (1982) shows that there is only one rule for decomposing the inequality that satisfies a small number of reasonable properties.

Only two of the common inequality measures that satisfy the principle of transfers are well defined for negative income levels, such as occur when there are year-on-year losses to farm and enterprise self-employment: the Gini coefficient and one of the generalized entropy measures (I_2, which is half the squared coefficient of variation).

This study uses four measures of inequality: the Gini coefficient and three generalized entropy inequality measures (see appendix 3A for formal definitions of the inequality measures). The Gini coefficient is probably the most commonly used inequality measure, and it can be defined as a multiple of the covariance of individual income and the rank of individual income divided by average income. The Gini coefficient ranges between zero (perfect equality) and one (perfect inequality).

The generalized entropy measures of inequality are designated I_α, where the more positive the α parameter, the more sensitive the index is to differences at the top of the income distribution rather than the bottom. This chapter uses I_0 (also known as the mean logarithmic deviation), I_1 (also known as the Theil index), and I_2 (one-half the squared coefficient of variation).

For mutually exclusive groups of people, a generalized entropy income inequality index for the whole population decomposes into a weighted sum of the inequality indexes of the groups that make up the whole. Generalized entropy indexes I_α can be written as the sum $I_\alpha = I_{\alpha W} + I_{\alpha B}$ of the total within-group inequality $I_{\alpha W}$ and between-group inequality $I_{\alpha B}$.[15] The formulas for $I_{\alpha W}$ and $I_{\alpha B}$ are in appendix 3A.

The solution for decomposing the share of inequality from income sources is simpler and more elegant (see equation 3.1). For any J sources of income, overall income inequality can be decomposed into the inequality contributed by each source:

$$I = \sum_{j=1}^{J} \frac{\text{cov}(y_j, y)}{\text{var}(y)} I, \tag{3.1}$$

where cov(·) is the sample covariance and var(·) is the sample variance. Because the inequality index I appears on both sides of the equation, it implies that the shares of inequality sum to one, and that they are independent of any particular inequality index chosen. Our interest is the relative contribution of each income source; thus, the actual inequality index can be dispensed with entirely. Note that if the covariance of the income from a particular source is negatively correlated with total income, that income source makes a *negative* contribution to total inequality. In particular, income sources characteristic of poor households may contribute negatively to inequality—when these sources predominate in the household, total income is lower, resulting in a negative correlation.

Measurement Bias

Measurement error is a serious problem when studying inequality, even more serious than when studying other issues. Averages and growth rates of averages are typically unbiased in the presence of random measurement error, due to the law of large numbers. Inequality measures, in contrast, are typically biased and inconsistent in the presence of measurement error. Inequality is a measurement of variability, which is systematically increased by errors. Positive and negative errors balance out in a sample average, but both positive and negative errors add to the variance.

More important for this study than biases in the estimated level of inequality is that different income sources are likely to suffer from very different levels of measurement error. Wage incomes are usually well known by the survey respondents and others, making them easier to report accurately. Income from household farms and household enterprises is very difficult for the household and the researcher to calculate correctly. If household self-employment income has systematically large measurement error, household enterprises would appear (spuriously) to contribute a great deal to inequality compared to wage employment, even when true income from both sources has the same inequality.

Most inequality indexes depend on the variance of some transformation of income. The bias to inequality measures caused by measurement error is easily seen in the case of the I_2 inequality measure, which is the sample variance of income divided by its sample mean squared. If measured income y_i^* is assumed to be equal to actual income y_i plus a mean zero measurement error ε_i, with variance σ_ε^2, then:

$$y_i^* = y_i + \varepsilon_i.$$

Actual income y_i has mean μ and variance σ^2 and is uncorrelated with the measurement error. Average measured income $\bar{y}^*$ is unbiased, $E(\bar{y}^*) = E(\bar{y}) = \mu$, but the sample variance of measured income *is* biased, $\text{var}(y^*) = \text{var}(y) + \text{var}(\varepsilon) = \sigma^2 + \sigma_\varepsilon^2$. This causes inequality measures such

as I_2 to be inconsistent when income is measured with error:

$$I_2^* = \frac{\text{var}(y^*)}{2\bar{y}^{*2}}$$

$$\text{plim } I_2^* = \frac{\sigma^2 + \sigma_\varepsilon^2}{2\mu^2} > \frac{\sigma^2}{2\mu^2} = \text{plim } I_2.$$

The larger the measurement error, the larger the bias in the inequality index.[16]

In a similar way, if the relative contribution to inequality is calculated from different income sources using Shorrocks' formula in equation 3.1, the calculated contribution to inequality of income from sources that are poorly measured would be greater than the calculated contribution of income sources measured more accurately, simply as a result of measurement error. This is shown formally in appendix 3B.

Measurement Error in Income

Measurement of household income is fraught with error, especially in low-income countries. Survey respondents may be reluctant to state their true incomes; this is especially true where household farm and nonfarm enterprises predominate, as in Vietnam, and households may not even know their precise incomes. Calculating net revenue for household enterprises requires aggregating large numbers of recurrent input and labor costs and product sales, as well as addressing intractable practical and conceptual problems. How does one account for home production, barter arrangements, and, especially, purchases of expensive capital equipment that will provide services over many years? The VLSS makes a valiant effort to measure *all* of these items across hundreds of categories of inputs and outputs, but the overall aggregation of household net revenues nonetheless inevitably contains substantial errors. There are quite extreme positive and negative outliers in farm and nonfarm household net revenues. There is no practical way to ensure that answers to all these questions about components of household net revenues add up to a consistent inventory of costs and revenues (although it would be interesting to confront the survey respondents with the calculated net result to see if they felt it corresponded to reality!). Researchers using the calculated household net income often resort to more or less arbitrary ways of trimming the outliers, but this does nothing to solve the problem of statistical bias caused by measurement error.[17]

Researchers usually work around this problem by ignoring the income data and using instead the household expenditure data that are more accurately measured. In fact, household expenditure—that is, consumption—is what should be measured, because it is a direct measure of the material well-being attained by the household.

Household expenditure can be thought of as an estimate of "permanent income" (Friedman 1957). Household consumption decisions and well-being

depend on the household's assessment of the smoothed expected income rather than on the fluctuating annual transitory income. Because we care about the inequality in household well-being rather than inequality of transitory annual income, the measured annual income could be viewed as subject to two kinds of measurement error. One is the mismeasurement of annual income due to imperfect collection of household information; the other is the mismeasurement of permanent income using accurately measured annual income data. In a context of highly variable annual income from year to year, inequality in well-being using household income data will be overestimated when households are able to smooth consumption.[18]

The simple solution of using household expenditure data rather than income data for inequality calculations does not work when studying income sources. Expenditure does not tell us how wage employment, relative to other sources, contributes to household income. Using income data directly for investigating the contribution of wages to inequality is especially problematic, because measurement errors are large for household self-employment earnings, but the errors in wage earnings data are probably much smaller. Survey respondents usually know precisely what they are paid, and they know that people around them already have a good idea of what they earn, so they have less reason to hide what they earn.[19] This makes calculating the contribution to income inequality of wage employment versus household production misleading. Even with exactly the same distribution of income from wage employment as from household self-employment, measurement errors in the self-employment data would spuriously show that self-employment contributes much more to income inequality, giving the false impression that wage employment is an equalizing force. In addition, household farm and nonfarm production revenues are inherently variable because of natural weather and market fluctuations, whereas wage payments are relatively stable. The distribution of well-being is what is important here; thus, estimating the inequality contribution of household production income versus wage employment income, even with perfectly measured annual income data, would also spuriously show that household production was disequalizing, even when permanent income actually had the same inequality across the income sources.

Nevertheless, the contribution of wage employment versus household production to the distribution of household income can be consistently estimated by combining the data on source-specific income with total expenditure data. Because the measurement errors for income are generally uncorrelated with the measurement errors in expenditure, we can derive an estimator for which measurement errors cancel out as in averages and do not accumulate as in variances. The result is a consistent estimate of the contribution of income sources to inequality, as shown formally in appendix 3B.

Vietnamese Wage Inequality

The methods described in the previous section can be applied to look empirically at the relationship between wages and distribution in Vietnam using the two VLSSs, but first we look at average wages by quintile.

Table 3.13. Wages, by Quintile

Quintiles	*1993 wage*	*1998 wage*	*Annual percent change*
Poorest quintile	0.59	1.18	13.8
Middle three quintiles	1.60	2.58	9.6
Richest quintile	3.94	7.01	11.5
Total	1.87	3.13	10.3

Note: Wages are mean hourly wages in thousand 1998 dong.
Source: Author's calculations from the 1993 and 1998 VLSSs.

Table 3.14. Changes in Wages, by 1993 Quintile

Quintiles in 1993	*1993 wage*	*1998 wage*	*Annual change (percent)*
Poorest quintile in 1993	0.61	2.07	24.4
Middle three quintiles in 1993	1.60	3.03	12.8
Richest quintile in 1993	3.82	4.80	4.6

Note: Wages are mean hourly wages in thousand 1998 dong.
Source: Author's calculations from the 1993 and 1998 VLSSs.

The distribution of wages equalized to some extent during the 1990s (see table 3.13). Wage earners can be divided into the "rich," the highest 20 percent of wages (the highest quintile), the "middle class" with the middle 60 percent of wages (the three middle quintiles), and the "poor" with the lowest 20 percent of wages (the lowest quintile). The wages of the poor grew at 14 percent per year, which was faster than the growth in the wages of the middle class (which was 10 percent per year) and the rich (12 percent per year). Note that households in the rich, middle, and poor categories in 1993 are not necessarily the same households in those categories in 1998.

Since the VLSS reinterviewed the same households in 1998 that were in the original 1993 survey, evidence of what happened to those who were in the poorest or richest quintile in 1993 can be seen (table 3.14). There was a high degree of earnings mobility, both up and down.[20] Of those who started out in the poorest quintile in 1993, only 34 percent were among the poorest in 1998. Because of this wage mobility, average wages of the poorest 20 percent in 1993 grew, on average, 24 percent per year. However, of those in the richest 20 percent in 1993, only 54 percent were still among the richest wage earners in 1998, and average wages of the richest in 1993 grew by only 5 percent per year.

It is also possible to look back from the perspective of those who ended up in the richest or poorest quintile of earners in 1998 (see table 3.15). The picture is quite different from this angle. Those who ended up the poorest actually

Table 3.15. Changes in Wages, by 1998 Quintile

Quintiles in 1998	*1993 wage*	*1998 wage*	*Annual percent change*
Poorest quintile in 1998	1.25	1.20	−0.7
Middle three quintiles in 1998	1.78	2.66	8.1
Richest quintile in 1998	2.81	6.40	16.4

Note: Wages are mean hourly wages in thousand 1998 dong.
Source: Author's calculations from the 1993 and 1998 VLSSs.

saw their average wage decline by 1 percent in the previous six years, while those who were the richest saw their wages grow by 16 percent per year. How can the prospective view of the richest and poorest in 1993 look so different from the view in hindsight in 1998? The poor in 1993 were not the same group as the poor in 1998. Most of the poorest wage earners in 1993 did not stay poor, and most of the poor in 1998 did not start out poor in 1993. Only 34 percent of those who were the poorest in 1998 had started out poor in 1993. This great churning within the labor market showed that those who held a job throughout this period had many opportunities to succeed and to fail. There was a strong tendency of regression to the mean—receiving especially low or especially high wages was usually a transitory phenomenon.

The simple table of wages by lowest, middle, and highest quintiles in table 3.13 suggests that the distribution of wages became more equal over the 1990s. This is confirmed by the summary measures of wage inequality in tables 3.16 and 3.17. The statistics calculated are I_0, I_1, I_2, and the Gini coefficient, as defined in appendix 3A. Overall wage inequality in Vietnam indeed fell from 1993 to 1998 by all measures except I_2, which most strongly weights high-wage earners.

The overall pattern of decreasing wage inequality contrasts sharply with what happened in the medium-size and large cities. Hanoi, Ho Chi Minh City, and the second-tier medium-size urban centers had by far the lowest wage inequality in 1993. They are also the only regions of the country to see a rise in wage inequality over the 1990s. Wage inequality in Hanoi and Ho Chi Minh City rose quickly, while it stayed the same in medium-size urban areas and fell sharply in the rest of the country. It is likely that this unusual pattern in wage inequality, similar to the wage premia in the two largest cities, is influenced by the residency permit restrictions that are enforced there. In fact, wage inequality was probably worse in 1998 than these statistics show: The VLSS sample does not properly cover illegal migrants into the two largest cities, who lack residency permits, because the survey sample was drawn from local residency records. The illegal migrants almost surely have among the lowest wages in the large cities.

Another factor that could explain the low inequality in 1993 and the high inequality in 1998 for the medium-size and large cities is the prevalence of government employment there. In 1993, government employment was likely a large part of the wage labor market, which tends to equalize wages,

Table 3.16. Inequality Measures of 1993 Annual Wages, by Region

Regions	I_0	I_1	I_2	*Gini*
Ho Chi Minh City	0.204	0.178	0.221	0.312
Hanoi	0.188	0.182	0.210	0.332
Medium urban	0.239	0.236	0.318	0.365
Small urban	0.351	0.306	0.388	0.420
Rural north	0.310	0.261	0.301	0.393
Rural central	0.242	0.231	0.276	0.372
Rural south	0.322	0.263	0.303	0.394
Total within group	0.280	0.238	0.304	n.a.
Between groups	0.036	0.039	0.044	n.a.
Overall	0.316	0.277	0.348	0.403

n.a. Not applicable.

Note: The Gini coefficient cannot be consistently decomposed into total within-group and between-group changes.

Source: Author's calculations from the 1993 VLSS.

Table 3.17. Inequality Measures of 1998 Annual Wages, by Region

Regions	I_0	I_1	I_2	*Gini*
Ho Chi Minh City	0.264	0.259	0.359	0.378
Hanoi	0.243	0.232	0.311	0.355
Medium urban	0.223	0.216	0.281	0.351
Small urban	0.241	0.243	0.356	0.362
Rural north	0.190	0.163	0.170	0.314
Rural central	0.158	0.144	0.162	0.290
Rural south	0.235	0.211	0.250	0.351
Total within group	0.222	0.218	0.329	n.a.
Between group	0.039	0.042	0.046	n.a.
Overall	0.261	0.260	0.375	0.377

n.a. Not applicable.

Source: Author's calculations from the 1998 VLSS.

because government wage levels tend to be similar across jobs. These cities are also the locations that saw the greatest structural transformation during the 1990s; thus, government employment played a much smaller role in 1998.

The three generalized entropy inequality indexes—I_0, I_1, and I_2—allow us to compare the within-region inequality versus the between-region inequality in wage rates. Despite the wage premia in the two largest cities, between-region inequality accounted for only between 12 percent and 15 percent of overall wage inequality in 1998, depending on the index (table 3.17). The balance of the inequality is due to variation within regions. Eliminating the cross-regional differences in wages would have some effect on wage inequality, but most of it would remain.

Wages and Income Inequality

If wage inequality fell between 1993 and 1998, what happened to the contribution of wages to overall income inequality? In this section, the impact of wages on income inequality is measured, using both the simple, but biased, method in equation 3.1 and the consistent method derived in appendix 3B.

The inequality of household expenditure per person (as a measure of permanent income) rose from 1993 to 1998 (table 3.18) at the same time that the inequality of wages was declining. Depending on the inequality measure, inequality rose by 5 percent to 13 percent. Wages are the major source of income for only a minority of Vietnamese households (only 18 percent of households in 1998, accounting for 21 percent of household expenditure per person—see table 3.19). Fifty-four percent of households depend on farming for their main income source, and another 18 percent rely on income from a household enterprise for their main income. The remaining 10 percent get most of their income from other sources in a given year, primarily overseas remittances and other gifts, with some interest and leasing income.

Farming households have the lowest average per capita expenditure, only 60 percent of the income of predominantly wage employment households. But the average expenditures of wage-earning households are not the

Table 3.18. Inequality of Household Expenditure Per Capita

Year	I_0	I_1	I_2	*Gini*
1993	0.188	0.211	0.308	0.339
1998	0.207	0.235	0.347	0.357

Source: Author's calculations from the 1998 VLSS.

Table 3.19. Per Capita Household Expenditure, Broken Down by Main Income Source, 1998

Income source	*Population share*	*Mean household expenditure per capita (dong)*	*Ratio of income source to overall average household expenditure per capita*	*Share of total household expenditure per capita*
Farming	0.541	2,157	0.722	0.391
Household enterprise	0.176	4,019	1.345	0.237
Wage employment	0.179	3,570	1.195	0.214
Other income sources	0.103	4,574	1.531	0.158

Source: Author's calculations from the 1998 VLSS.

Table 3.20. Decomposition of Household Income Inequality, by Source, 1993

Income source	*No correction Share of inequality (percent)*	*Consistent estimates Share of inequality (percent)*	*Share of income (percent)*
Farming	4.0	−5.2	36.3
Household enterprise	40.2	40.4	25.0
Wage employment	15.1	17.0	22.9
Other income	40.6	47.9	15.8

Source: Author's calculations from the 1993 VLSS.

Table 3.21. Decomposition of Household Income Inequality, by Source, 1998

Income source	*No correction Share of inequality (percent)*	*Consistent estimates Share of inequality (percent)*	*Share of income (percent)*
Farming	15.6	−3.4	39.0
Household enterprise	39.3	38.9	24.1
Wage employment	17.0	29.3	19.3
Other income	28.1	35.2	17.6

Source: Author's calculations from the 1998 VLSS.

highest. Households running their own businesses had an average per person expenditure 13 percent higher than wage-earning households, and households that receive their main incomes from other sources do even better, on average.

As discussed above, household income data suffer from substantial measurement errors, especially for farms and household enterprises, because income must be netted out of the large number of costs and revenues. Measurement errors tend to be large, and less obvious to survey respondents, when income is the difference between much larger numbers, the costs and revenues.

Tables 3.20 and 3.21 (in the columns labeled "No correction") present the biased calculation of the share of inequality attributed to each income source using the formula in equation 3.1. The "Consistent estimates" column in tables 3.20 and 3.21 presents the consistent calculation of inequality shares using the formula in appendix 3B.

There are large differences between the uncorrected estimates and the consistent estimates of inequality shares. Farming's contribution to inequality is overestimated by the biased calculation, and the contribution of wage

employment and other income is underestimated. In both 1993 and 1998, the biased estimate shows that farming contributes to inequality, while the consistent estimate shows that farm income actually reduces income inequality. In 1998, the differences are especially dramatic. The biased calculation gives the impression that farming contributes about as much as wage employment to total income inequality. In fact, the consistent estimates show that wage employment contributes 33 percentage points more than farming income of total inequality. Whereas wage employment accounts for 29 percent of total income inequality in 1998, farming income reduces inequality by 3 percent. The consistent estimates also show how important "other income"—largely overseas remittances—is to income inequality, contributing almost one-half of all inequality in 1993, despite providing the smallest share of income, at 16 percent. The income share of other income rose to 18 percent in 1998, but its contribution to inequality fell to one-third of the total, presumably because remittances were being spread more equally among households in 1998.

The share of inequality due to wage employment increased from 26 percent in 1993 to 33 percent in 1998, at the same time that the inequality of wages declined. This is possible because wage income was strongly negatively correlated with other income sources in 1993, but essentially uncorrelated with other income sources in 1998.[21] In other words, comparing 1998 with 1993, high-wage earners are more likely to be in households with high incomes from other sources, such as farming and household businesses. In fact, all income sources have become both less negatively correlated with other sources and less variable from 1993 to 1998, but the negative correlation of wage income fell more than for the other income sources. This pattern suggests a diversification of economic activity within the household that one would expect from the period of rapid development that Vietnam has experienced in the past decade.

Another way of quantifying the contribution of wage employment to household inequality that proves useful for projecting future inequality is to divide households according to their primary income sources and decompose household expenditure inequality by type of household. Tables 3.22 and 3.23 show that households whose income source is predominantly farming have expenditure much more equally distributed than nonfarm households. Inequality of household expenditure among other kinds of nonfarm households is roughly similar, with the highest inequality among households whose income source is predominantly wage employment. Wage employment households had the highest inequality among household types in 1998, even though the previous analysis showed that wage employment income is responsible for a smaller share of household inequality than enterprise income (table 3.21), because high-income wage employment households are more likely to have extra income from nonwage sources. Households that earn income predominantly from wage employment had higher inequality in 1998 than in 1993 as a result of earned income from other sources, not from high inequality of the wages themselves.

Table 3.22. Inequality Measures of Household Expenditure, Per Capita, by Main Income Source, 1993

Main income source	I_0	I_1	I_2	*Gini*
Farming	0.115	0.124	0.161	0.263
Household enterprise	0.186	0.199	0.267	0.336
Wage employment	0.185	0.192	0.236	0.337
Other income sources	0.269	0.284	0.401	0.401
Within group	0.154	0.176	0.271	n.a.
Between group	0.033	0.035	0.037	n.a.
Total	0.188	0.211	0.308	0.339

n.a. Not applicable.

Source: Author's calculations from the 1998 VLSS.

Table 3.23. Inequality Measures of Household Expenditure, Per Capita, by Main Income Source, 1998

Main income source	I_0	I_1	I_2	*Gini*
Farming	0.103	0.106	0.125	0.251
Household enterprise	0.198	0.213	0.286	0.349
Wage employment	0.250	0.267	0.375	0.390
Other income sources	0.220	0.234	0.308	0.367
Within group	0.158	0.186	0.297	n.a.
Between group	0.048	0.048	0.049	n.a.
Total	0.207	0.235	0.347	0.357

n.a. Not applicable.

Source: Author's calculations from the 1998 VLSS.

The consistent estimates of the contribution of each income source to total income inequality show that wage employment contributes almost one-third of income equality—about on par with household enterprise income and other income, even though it contributes only about 20 percent of total income. Farm income, instead of being a substantial contributor to inequality as the uncorrected estimates make it appear, actually reduces household income inequality. The decomposition of household expenditure inequality by predominant income source also shows that predominantly wage employment households, household enterprise households, and other income households have similar levels of inequality, while farm households are substantially more equal.

Projections of Future Inequality

The previous section showed that predominantly wage income households are roughly similar to predominantly household enterprise and to "other income" households, both in terms of inequality and in terms of income

levels. Farming households, however, are quite distinct. They have much less within-sector inequality, and they have a much lower average income level.

One of the clearest historical patterns of economic development is the shrinking role of the agricultural sector as the economy grows, both as an employer of labor and as a share of output. Farms now make up one-half of all households in Vietnam. Farm households are very different from other households, they are a large part of the economy, and their relative number will diminish as the economy grows. This means that inequality can be expected to change in the near future. Inequality in Vietnam will rise over time as the proportion of equally distributed farming households falls in the economy.

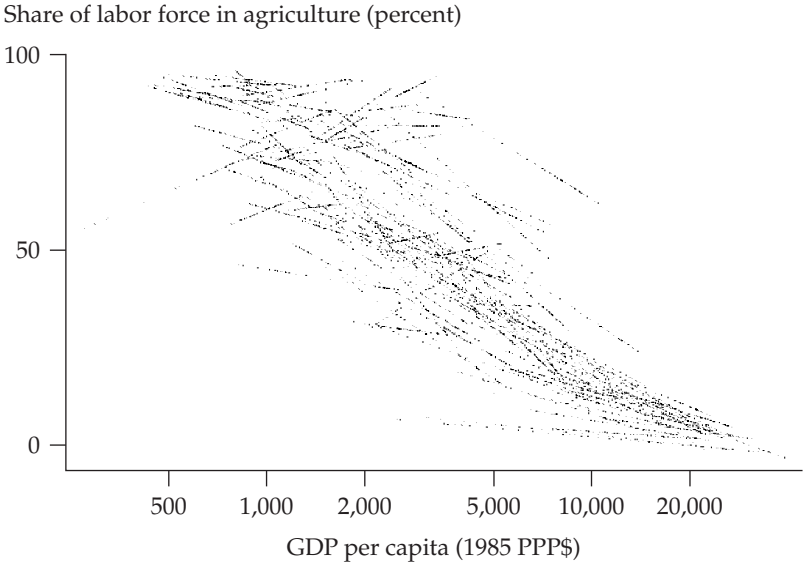
Empirical predictions of how fast inequality will change can be made as the Vietnamese economy develops by examining the relationship between the decline of agriculture and economic development in other countries around the world. The relationship between income growth and the share of labor in agriculture and the relationship between income growth and the ratio of agricultural income to total income are both well-established international patterns. By estimating these relationships from historical data—and assuming that inequality *within* the farming and nonfarming sectors remains unchanged—the future course of inequality can be predicted as a function of economic growth.

The predictions of future changes in inequality in this section have a mechanical quality to them, but they result from a mechanism from which Vietnam will find it very difficult to escape. As long as agriculture grows more slowly than the rest of the economy, overall income inequality will worsen unless inequality in the nonagricultural part of the economy declines sharply over time. Over the 1990s, in fact, inequality within households that earned income predominantly from household enterprise and wage employment *increased* (tables 3.22 and 3.23). There is no reason to be sanguine that inequality in nonagricultural households will decrease in the near future sufficiently to overcome the worsening inequality due to the gradual transition out of agriculture.

The predictions are predicated on a continuation of Vietnam's recent economic growth. If growth occurs more slowly, the worsening inequality due to the transition out of relatively equal agriculture will occur more slowly than shown in these predictions.

Statistics from the previous section confirm that farm households have more equally distributed income and lower income levels than nonfarm households, and that nonfarm households have similar income distributions and levels across sectors. The generalized entropy indexes of inequality in table 3.22 are one-half the level for farming than for other income sources. Predominantly farming households have 54 percent of the average income of nonfarming households (table 3.19). The inequality indexes for households whose main income sources are household enterprise, wage employment, or other income sources all have inequality indexes within 8 percent of each other (table 3.22) and average incomes within 30 percent of each other (table 3.19).

Figure 3.3. Agricultural Labor Force Compared with Income Level



Note: GDP = Gross domestic product. PPP = Purchasing power parity. Data points are country-specific least squares trend lines for 114 countries between 1960 and 1990.

Source: World Bank 2000b.

To estimate the relationship between income level (as measured by gross domestic product [GDP] per person) and share of labor force in agriculture, and between income level and agricultural output relative to total output, cross-country time-series data are used.[22] Figure 3.3 shows the cross-country relationship between GDP per capita and the share of labor force in agriculture. The data come from 111 countries with an average of 30 observations per country. To emphasize the patterns over time, the data shown for each country in figure 3.3 are actually points on country-specific log linear trend lines to highlight the relationship in each country. Only 4 percent of the countries had positive income growth and an increasing share of the labor force in agriculture. Of the 15 percent of countries with an upward sloping trend to the share of labor in agriculture, 11 percent were countries with shrinking incomes, so the share of labor force in agriculture fell even though the economy was getting poorer. This suggests that the share of agriculture falls over time independently of income growth due to technical change.

The estimated relationship between the share of labor force and GDP per capita using cross-country data shows a strong decline in the share of agricultural labor as the income level rises (table 3.24, second column). The regression includes country-specific constants and a time trend, which shows a clear but small decline in the share of agricultural labor over time of 0.5 percentage point per year. The simple regression is able to explain 73 percent of all the cross-country variation in the labor force share in agriculture.

Table 3.24. Agriculture, in Relation to Income, across Countries

Independent variables	*Agricultural labor share*[a]	*Agricultural output per capita ratio*[b]
GDP per capita (log of 1996 PPP, US$)	−0.056	−0.200
	(20.65)***	(26.33)***
Time (year 1960 = 1)	−0.0045	0.0042
	(57.59)***	(20.48)***
Constant	9.87	−6.18
	(69.67)***	(16.41)***
Observations	3,399	2,926
Number of countries	114	106
R^2	0.73	0.21

*** Significant at 1 percent level.

Note: PPP = purchasing power parity. Absolute value of *t* statistics in parentheses. Both regressions include country-specific constants.

a. Agricultural labor share is the fraction of agricultural workers in the total labor force.

b. Agricultural output per capita ratio is the ratio of agricultural value added per worker to GDP per capita.

Source: Author's calculations from data described in the text.

The ratio of agricultural income per person to average income per person is also strongly correlated with the level of income per person and time (table 3.24, third column). Agricultural incomes are lower relative to nonagricultural incomes at higher GDP per capita levels, but agricultural incomes become more similar to nonagricultural incomes over time, probably as a result of technical changes in agriculture. The net effect for a country growing at the rate of Vietnam in the 1990s is a decrease in agricultural incomes relative to nonagricultural incomes. The agriculture income–share regression explains 21 percent of the cross-country variation.

The inequality projection is based on the assumption that the Vietnamese economy continues to grow at the rate at which it has for the previous decade: GDP per capita grew 5.5 percent per year from 1988 to 1998. In other words, this is a projection of what would happen to income inequality if economic growth in Vietnam were to continue as it has in the recent past.

The inequality projections are shown in table 3.25. The first column shows the actual figures for 1998, and the second and third columns show the projections for 2003 and 2008, respectively. The projection of the proportion of labor in agriculture depends on the first regression estimates from table 3.24, and it shows a decline of 3.8 percent every five years. The projection of future agricultural GDP per worker depends on the second regression estimates in table 3.24, and this shows that agricultural GDP per worker as a fraction of overall GDP per capita declines by 3.4 percent every five years.

The within agriculture—and within nonagriculture—income inequalities are assumed to stay constant at the 1998 level and are measured by the I_0 inequality index. The total within-inequality measure depends on the

Table 3.25. Inequality Projections, 2003 and 2008

Indicator	*1998 (actual)*	*2003 (projected)*	*2008 (projected)*
GDP per capita[a]	325	428	563
GDP per capita growth[b] (percent)	5.5	5.5	5.5
Proportion of labor in agriculture[c] (percent)	54.1	50.3	46.5
Agricultural GDP per worker[d]	234	293	367
Nonagricultural GDP per worker[d]	432	564	734
Inequality of agricultural income (I_0)[e]	0.103	0.103	0.103
Inequality of nonagricultural income (I_0)[e]	0.223	0.223	0.223
Total within inequality (I_0)	0.158	0.163	0.167
Inequality between agriculture and nonagriculture (I_0)	0.047	0.052	0.058
Total income inequality (I_0)	0.205	0.215	0.225
Change in inequality (since five years before) (percent)	9.6	4.9	4.4

a. For 1998, this is the purchasing power parity (PPP) gross national product (GNP) per capita estimate for Vietnam (World Bank 2000b). The 1998 level of GNP per capita is not used in the projections.

b. The rate for Vietnam for 1988–98 is 5.5 percent real growth of GDP per capita (World Bank 2000b).

c. The 1998 value was estimated by proportion of working-age individuals in predominantly agricultural households in the 1998 VLSS (table 3.18).

d. The 1998 value was estimated from the ratio of average expenditures per person of predominantly agricultural and nonagricultural households (table 3.18).

e. All values are set to the 1998 value estimated from the VLSS (table 3.22).

Source: Author's calculations from data described in the text.

proportion of households in agriculture (which is taken to be equal to the proportion of labor in agriculture). As the proportion of the labor force in agriculture declines going forth to 2003 and 2008, total within-inequality increases because agricultural households have lower inequality and their share of households is shrinking.

Between-inequality also increases because average agricultural and nonagricultural incomes are diverging. Taking the sum of the within and between measures of inequality, total inequality increases by 4.9 percent from 1998 to 2003, and 4.4 percent from 2003 to 2008. This compares with an actual increase to I_0 of 9.6 percent from 1993 to 1998.

This projection shows with numbers that the secular decline in agriculture as the economy grows will increase inequality because of a shift in the composition of households, because Vietnamese agricultural households

have much less inequality than nonagricultural households. The second effect captured in the projections is that the relative incomes of the average agricultural household and the average nonagricultural household will continue to diverge as the economy grows, causing the between-sector inequality to grow. This second effect actually accounts for more than half of the change in inequality in the projections, as well as more than half of the actual change from 1993 to 1998.

The predicted future inequality increases for 1998 to 2008 are only half of the actual increase for 1993 to 1998. This is primarily because agricultural incomes have fallen behind nonagricultural incomes more rapidly from 1993 to 1998, compared with the change that had been predicted by the cross-country evidence. The regression estimates predict that the ratio of agricultural GDP per worker to overall GDP per capita will fall by 3.4 percent for the five-year periods 1998–2003 and 2003–08. The actual fall in expenditures per person of predominantly agricultural households relative to the average expenditures per person for all households fell by 5.3 percent for 1993–98. If the 1993–98 rate of decline in the ratio of agricultural incomes to total incomes were to be extended to the future periods, projected total income inequality would increase by 8.9 percent from 1998 to 2003 and 8.4 percent from 2003 to 2008, which is quite similar to the 9.6 percent rise in inequality for 1993–98.

The projected rise in inequality is not inevitable if nonagricultural income distribution equalizes in the future. During the 1993–98 period, however, the earnings of both predominantly wage-earning households and nonagricultural enterprise households became less equal, although the earnings of predominantly "other income" households became more equal (tables 3.22 and 3.23). A sharp improvement in the equality of nonagricultural earnings would be surprising.

If the divergence of agricultural and nonagricultural incomes is slower than predicted in table 3.25, but income distribution within agriculture and nonagriculture remains unchanged, then income distribution will worsen more slowly than predicted in table 3.25.

The rising inequality that looks likely for Vietnam is a consequence of the declining role of agriculture as the economy develops, and the unusually equal distribution of incomes among Vietnamese farm households. In low-income countries with unequally distributed agriculture, economic development improves overall income distribution as the share of agriculture declines.

The increase in inequality due to the decline of agriculture can probably be delayed only by deliberately slowing economic growth and higher incomes in Vietnam. A way out of rising inequality (other than a sharp improvement in the equality of nonagricultural incomes) would be the rapid growth of incomes within agriculture while the equality of income distribution among agricultural households is preserved. Sustained growth in agricultural incomes on par with income growth in the rest of the economy is a historical anomaly. The unfortunate consequence of Vietnam's escaping poverty will most likely be some increase in inequality, because, historically,

sustained development has almost always meant a shrinking role for agriculture. The inequality in the nonagricultural sector in Vietnam is not particularly high by international standards, however, and, if unchanged, it provides the upper limit for the effect of the declining share of agriculture on inequality.

Conclusion

The labor market in Vietnam saw very rapid change in the 1990s. Average real hourly wages grew by 10.5 percent per year between 1993 and 1998, faster than income per capita in the economy. At the same time, there was a substantial increase in hours worked, especially in rural areas, and a gradual increase in the share of the labor force in wage employment.

SOE employment showed a marked rise of 20 percent from 1993 to 1998 at a time when the government was planning to restructure state firms, which are generally perceived to be overstaffed (Belser and Rama 2001). SOE employees also fully shared in the rapid wage increases of the mid-1990s.

The rate of return to schooling is very low in Vietnam, although it increased from 2 percent in 1993 to 4–5 percent in 1998. The lowest rates of return to schooling are in the regions with the lowest education levels, and the highest rates of return are in the regions with the highest levels of schooling. Women face significant wage discrimination after controlling for their schooling and work experience, but the estimated wage gap fell by half over the period.

After controlling for worker characteristics, workers in Hanoi and Ho Chi Minh City receive a very large wage premium over the rest of the country, with average wages 50–80 percent higher than the other regions in the country. The primary-city wage premium suggests that the residency permit restrictions contribute to inequality between the two largest cities and the rest of the country. Qualitative evidence also suggests that residency permits contributed to a worsening of inequality within Ho Chi Minh City. Although households without residency permits are excluded from the VLSS sample design, participatory poverty assessment interviews indicate that poor, unregistered residents of Ho Chi Minh City perceived no improvement in their standard of living in the 1990s, unlike poor residents of other parts of the country (World Bank and Department for International Development 1999). This suggests that the residency permit requirement for formal sector jobs has kept all the benefits of rapidly rising wage levels from unregistered residents of Vietnam's largest city. In China, higher wages due to restrictions on urban residency have been a source of the sharp rise in income inequality between rural and urban areas (Yang 1999). Even though within-region income differences in China, as in Vietnam, are larger than differences across regions, Chinese rural-urban income disparities have been an important source of rural discontent.

Inequality of wages fell modestly in the 1990s despite the rapid growth of wages. However, households with high wage income were more likely to

have high incomes from other sources, so in this sense, wage employment has contributed to inequality. Agricultural households, for instance, are less likely to be engaged in wage employment. This effect will diminish as higher proportions of the population are engaged in wage employment.

A new method for consistent decomposition of inequality by income source shows that, contrary to the results of uncorrected methods, wage employment contributes a roughly similar amount to overall income inequality as other nonagricultural income sources (primarily household enterprise and remittances). Agricultural income actually reduces overall income inequality because inequality between agricultural households is much lower than inequality between nonagricultural households, and agricultural income has a low correlation with other income sources.

The much lower inequality and income level in agriculture allows us to predict future inequality change in Vietnam. A declining share of agriculture as the economy grows in Vietnam will raise income inequality unless within-sector inequality in the nonagricultural sectors falls substantially. From 1993 to 1998, the within-sector nonagricultural income inequality rose somewhat. If within-sector inequality does not change, the declining share of agriculture will increase inequality by 5–10 percent each five years for the next decade, after an increase of 9.4 percent from 1993 to 1998.

This rising inequality due to the shrinking share of agriculture will be difficult to avoid without giving up economic growth and rapid poverty reduction in Vietnam. Keeping a large proportion of the Vietnamese population on household farms would keep inequality from continuing to rise over time, but it would also keep the majority of Vietnamese at very low incomes because there are not good prospects for substantial rises in farm self-employment income without a major movement of labor out of farming. Improvement of off-farm employment was a particular priority of the poor in a recent participatory poverty assessment in Vietnam (World Bank and Department for International Development 1999), indicating that the poor themselves would not be happy with efforts to keep them on the farm.

The most notable results of this overview of the Vietnamese labor market in the 1990s are that Hanoi and Ho Chi Minh City have very large wage premia; SOE employment rose substantially; labor market rates of return to education are very low, especially in the regions with the lowest education levels; and inequality will continue to rise modestly as a result of the compositional shift of the economy away from agriculture.

Appendix 3A Inequality Measures

The Gini coefficient can be defined as a multiple of the covariance of individual income and the rank of individual income divided by average income (Pyatt, Chen, and Fei 1980):

$$G = \frac{2\,\mathrm{cov}(y, r)}{N\bar{y}}$$

where y is a vector of individual incomes, y_i, r is a vector of the ranks of individuals i when the population is ordered by increasing income, cov(·) is the sample covariance, and $\bar{y}$ is average income.

The generalized entropy measures of inequality have the form (Sen 1997, p. 140):

$$I_\alpha = \frac{1}{\alpha(1-\alpha)} \frac{1}{N} \sum_{i=1}^{N} \left[1 - \left(\frac{y_i}{\bar{y}} \right)^\alpha \right], \quad \alpha \neq 0, \alpha \neq 1$$

with limit cases

$$I_1 = \frac{1}{N} \sum_{i=1}^{N} \frac{y_i}{\bar{y}} \ln \left(\frac{y_i}{\bar{y}} \right)$$

and

$$I_0 = \frac{1}{N} \sum_{i=1}^{N} \ln \left(\frac{\bar{y}}{y_i} \right).$$

The I_2 index simplifies to

$$I_2 = \frac{\text{var}(y)}{2\bar{y}^2}$$

which is one-half the squared coefficient of variation.

For mutually exclusive groups, the overall generalized entropy indexes decompose into a weighted sum of the inequality indexes of the groups that make up the whole. Assume there are several groups k with population N_k, average group income $\bar{y}_k$, and within-group inequality index $I_{\alpha k}$. Then a generalized entropy index I_α can be written as the sum $I_\alpha = I_{\alpha W} + I_{\alpha B}$ of the total within-group inequality $I_{\alpha W}$ and between-group inequality $I_{\alpha B}$ (Shorrocks 1984).

$$I_{\alpha W} = \sum_k \frac{N_k}{N} \left(\frac{\bar{y}_k}{\bar{y}} \right)^\alpha I_{\alpha k}$$

is a weighted sum of the within-group indices. Between-group inequality $I_{\alpha B}$ has the form of I_α with $\bar{y}_k$ substituted for y_i.

Appendix 3B Inconsistency of Inequality Shares in the Presence of Income Measurement Error

For simplicity, take the case where income comes from only two possible sources: wage employment (w) and self-employment (s). Self-employment income is observed with measurement error, and wages are observed without error (relaxed below). Total income for person i is $y_i = y_{wi} + y_{si}$, where y_{wi} is wage income and y_{si} is income from self-employment. Observed

income for person i is $y_i^* = y_{wi} + y_{si}^*$, where y_{si}^* is measured income from self-employment. $y_{si}^* = y_{si} + \theta_i$ where θ_i is the measurement error. Actual incomes have a constant mean and variance and may be correlated across source:

$$E(y_{wi}) = \mu_w;\ E(y_{si}) = \mu_s$$

$$\sigma^2(y_{wi}) = \sigma_w^2;\ \sigma^2(y_{si}) = \sigma_s^2$$

$$\sigma(y_{wi}\, y_{si}) = \sigma_{ws}.$$

Self-employment measurement error has a zero mean, constant variance, and is uncorrelated with incomes or across time:

$$E(\theta_i) = 0;\ \sigma^2(\theta_i) = \sigma_\theta^2$$

$$\sigma(\theta_i\, y_{si}) = \sigma(\theta_i\, y_{wi}) = 0$$

$$\sigma(\theta_i \theta_j) = 0\ \forall i \neq j\,.$$

The estimated contribution of wage employment income to inequality relative to self-employment income from Shorrocks' equation 3.1 in the text is:

$$\gamma^* \equiv \frac{\mathrm{cov}(y_w,\, y^*)}{\mathrm{var}(y^*)} \Big/ \frac{\mathrm{cov}(y_s^*,\, y^*)}{\mathrm{var}(y^*)} = \frac{\mathrm{cov}(y_w,\, y^*)}{\mathrm{cov}(y_s^*,\, y^*)}\,.$$

γ^* does not provide a consistent estimate of the ratio of income source contributions to inequality, γ:

$$\text{(3.B1)}\quad \mathrm{plim}\,\gamma^* = \mathrm{plim}\left(\frac{\mathrm{cov}(y_w,\, y^*)}{\mathrm{cov}(y_s^*,\, y^*)}\right) = \frac{\sigma_w^2 + \sigma_{sw}}{\sigma_s^2 + \sigma_{sw} + \sigma_\theta^2} < \frac{\sigma_w^2 + \sigma_{sw}}{\sigma_s^2 + \sigma_{sw}}$$

$$= \mathrm{plim}\left(\frac{\mathrm{cov}(y_w,\, y)}{\mathrm{cov}(y_s,\, y)}\right) = \mathrm{plim}\,\gamma.$$

Wage Income Also Measured with Error

In real life, of course, wage income will also be measured with some error, though usually much less than the errors in imputed self-employment income. Wage income certainly has "errors" if the target is the inequality of permanent income, so that annual income would be viewed as an estimate of permanent income containing substantial error, even if annual income itself were measured perfectly accurately. This section shows that, as long as the variance of self-employment income is large enough relative to wage income, then the same result as in equation 3.B1 still holds.

Let $y_i^* = y_{wi}^* + y_{si}^*$, where y_{wi}^* is measured income from wages. $y_{wi}^* = y_{wi} + \phi_i$, where ϕ_i is the measurement error. All other variables are the

same as above, and

$$\begin{aligned} E(\phi_i) = 0;\, \sigma^2(\phi_i) &= \sigma_\phi^2 \\ \sigma(\phi_i y_{si}) = \sigma(\phi_i y_{wi}) &= 0 \\ \sigma(\phi_i \phi_j) &= 0 \;\forall i \neq j \\ \sigma(\theta_i \phi_i) &= 0. \end{aligned}$$

Then the estimated contribution of wages relative to self-employment for income inequality is biased:

$$\begin{aligned} \text{plim}\gamma^* &= \text{plim}\left(\frac{\text{cov}(y_w^*, y^*)}{\text{cov}(y_s^*, y^*)}\right) \\ &= \frac{\sigma_w^2 + \sigma_{sw} + \sigma_\phi^2}{\sigma_s^2 + \sigma_{sw} + \sigma_\theta^2} \neq \frac{\sigma_w^2 + \sigma_{sw}}{\sigma_s^2 + \sigma_{sw}} = \text{plim}\left(\frac{\text{cov}(y_w, y)}{\text{cov}(y_s, y)}\right) = \text{plim}\,\gamma. \end{aligned}$$

$$\text{plim}\,\gamma^* < \text{plim}\,\gamma \Leftrightarrow \sigma_\theta^2\left(\sigma_s^2 + \sigma_{sw}\right) > \sigma_\phi^2\left(\sigma_w^2 + \sigma_{sw}\right)$$

so $\text{plim}\,\gamma^* < \text{plim}\,\gamma$ if $\sigma_\theta^2 > \sigma_\phi^2$ and $\sigma_s^2 \geq \sigma_w^2$. That is, wages will appear to make a greater contribution to income inequality than they really do when measurement error is worse for self-employment income than wage income, and actual self-employment income is more variable than wage income, both of which are likely to be true.

Consistent Estimator

If a second estimate of income is observed whose measurement error is uncorrelated with the measurement error in y_i^*, then the contribution of each income source to total inequality can be estimated consistently. That is, $\alpha_j = \frac{\text{cov}(y_j, y)}{\text{var}(y)}$, and hence also the ratio of the contribution of two sources of income, γ, can be estimated consistently. Household consumption expenditure per capita, e_i, can be used as a second estimate of income. $e_i = y_i + \varepsilon_i$, where

$$\begin{aligned} E(\varepsilon_i) = 0;\, \sigma^2(\varepsilon_i) &= \sigma_\varepsilon^2 \\ \sigma(e_i y_i) &= 0 \\ \sigma(\varepsilon_i \varepsilon_j) &= 0 \;\forall i \neq j \\ \sigma(\phi_i \varepsilon_i) = \sigma(\theta_i \varepsilon_i) &= 0. \end{aligned}$$

The estimator of the contribution of wage income to total inequality used here is

$$\hat{\alpha}_w = \frac{\text{cov}(y_w^*, e)}{\text{cov}(y^*, e)}.$$

$$\begin{aligned} \text{cov}(y_w^*, e) &= \text{cov}(y_w + \phi, y + \varepsilon) \\ &= \text{cov}(y_w, y) + \text{cov}(\phi, y) + \text{cov}(y_w, \varepsilon) + \text{cov}(\phi, \varepsilon) \end{aligned}$$

$$\begin{aligned}\text{cov}(y^*, e) &= \text{cov}(y + \phi + \theta, y + \varepsilon) \\ &= \text{var}(y) + \text{cov}(\phi, y) + \text{cov}(\theta, y) + \text{cov}(y, \varepsilon).\end{aligned}$$

Because ϕ, θ, and ε are uncorrelated with y and y_w, and ϕ and ε are uncorrelated with each other:

$$\begin{aligned}\text{plim}[\text{cov}(\phi, y)] &= \sigma(\phi, y) = 0 \\ \text{plim}[\text{cov}(y_w, \varepsilon)] &= \sigma(y_w, \varepsilon) = 0 \\ \text{plim}[\text{cov}(\phi, \varepsilon)] &= \sigma(\phi, \varepsilon) = 0 \\ \text{plim}[\text{cov}(\theta, y)] &= \sigma(\theta, y) = 0 \\ \text{plim}[\text{cov}(y, \varepsilon)] &= \sigma(y, \varepsilon) = 0\end{aligned}$$

so

$$\text{plim}\,\hat{\alpha}_w = \frac{\text{plim}[\text{cov}(y_w, y)]}{\text{plim}[\text{var}(y)]} = \frac{\sigma_w^2 + \sigma_{sw}}{\sigma_w^2 + \sigma_s^2 + 2\sigma_{sw}} = \text{plim}\,\alpha_w.$$

For $\hat{\gamma} = \dfrac{\hat{\alpha}_w}{\hat{\alpha}_s}$, it follows that

$$\text{plim}\,\hat{\gamma} = \frac{\sigma_w^2 + \sigma_{sw}}{\sigma_s^2 + \sigma_{sw}} = \text{plim}\,\gamma.$$

So combining poorly measured, source-specific income data with total household expenditure allows us to obtain consistent estimates of the relative contribution of different income sources to total inequality.

Notes

1. Output per person is measured by real gross national product (GNP) per capita in 1995 U.S. dollars (World Bank 2000b).

2. The 1992–93 survey spanned a full year, starting in October 1992; the 1997–98 survey began in December 1997 and also lasted one year. For brevity's sake, reference is made to the surveys as the 1993 VLSS and 1998 VLSS, respectively. The survey includes the information to make a detailed calculation of household income as well as a full household expenditure survey. The 1993 survey sampled households proportionally to the population in each region, but the 1998 survey oversampled certain areas, requiring the use of sampling weights to calculate representative statistics. The VLSS is described in more detail in the appendix to chapter 1 of this volume and in World Bank (1995) and (2000a).

3. Labor force participation used in table 3.1 refers to the seven days before the survey interview. If people are included who were not working during the past week, but who worked at some time during the year, total participation rises to 89 percent in 1998.

4. The 1993 VLSS asked a single question about whether the household members were self-employed for their main work in the past seven days. Whether they were self-employed on the family farm or in the family business could be only inaccurately inferred from other questions. The 1998 VLSS asked separate questions about whether household members were self-employed on the farm or self-employed in a family business.

5. Household income per capita growth is calculated from the 1993 VLSS and the 1998 VLSS data. Output per capita growth is measured by real GNP per capita growth in 1995 U.S. dollars (World Bank 2000b).

6. Wages here are hourly total compensation from the main job in the past seven days (or from the main job in the past 12 months if there was no main job in the past seven days). This includes the value of compensation in kind, as well as money wages.

7. The urban population of Ho Chi Minh City was 4.4 million (5.6 percent of the population) and of Hanoi, 1.6 million (2.1 percent of the population), out of a total population of Vietnam in 2000 of 77.9 million (World Bank 2000b).

8. Some of the apparent regional changes in table 3.7 may be due to small sample sizes. In the worst case, there were only 20 skilled, private, nonagricultural wage observations for Hanoi in 1993. Averages in all other tables come from sample sizes of more than 200 observations, with the exception of Hanoi in 1993, for wage-related tables with a sample size of 136.

9. Fifty-four weeks is more than a year, so the workers must have been working more than five days a week or more than eight hours a day. At the time of the two surveys, the standard Vietnamese workweek was six days.

10. See Berndt (1991, chapter 5) for an accessible explanation of wage determinants and the regression specification used in this discussion.

11. About 86 percent of the population in Vietnam is ethnically Vietnamese (Kinh). Another 2 percent is Chinese, and the remaining 13 percent is spread across a wide variety of groups found mostly in remote rural areas.

12. The estimated effect of a dummy variable in the wage regression is $e^b - 1$, where b is the coefficient estimate.

13. An indicator for Chinese ethnicity was not included in the regional wage regressions in table 3.12 because a number of regions had no Chinese in the survey sample.

14. Deaton (1997, pp. 134–40) provides a good, short explanation of inequality measures.

15. The author thanks Paul Glewwe for pointing out that the weights used to decompose the generalized entropy measure I_2 do not sum to one (unlike the decomposition weights for I_0 and I_1), which makes the decomposition of I_2 hard to interpret.

16. This has interesting implications for cross-country inequality comparisons. Countries with income data that are measured less accurately (typically, poorer countries) will have a spuriously larger calculated inequality index.

17. This is certainly not a criticism of the collection of detailed household production data in the VLSS and similar surveys. As noted, the mean income estimates are still unbiased. These data are very valuable for studying important questions of household production per se, and it is often possible to use the imprecise income data to calculate consistent estimates of income inequality, as has been done in this chapter.

18. Consumption smoothing is harder in Vietnam because financial institutions are poorly developed and, over the years, have undermined their credibility with arbitrary behavior. However, this does not prevent consumption smoothing through the saving of commodities and durable goods, informal credit and debt arrangements within the village, and cash savings, which are often in the form of gold buried under the house.

19. Household rice harvests and certain other staple crop yields are probably common knowledge in rural Vietnam, to other villagers as well as to the village tax

authorities, but input costs are not, and much of the profit in household farming in Vietnam is in nonstaple agricultural production, which is difficult to observe. Nonfarm household enterprises are also very difficult for outsiders to observe.

20. As shown in chapter 15 by Glewwe and Nguyen, measured mobility is highly sensitive to errors, so part of the apparent high wage mobility could be due to measurement errors. Glewwe and Nguyen's critique does not apply to the other inequality measures used in this chapter. The general issue that income mismeasurement can bias inequality measures is addressed at length above.

21. The share of inequality of one income source compared with another depends on the ratio of the covariance of each income source with total income (see appendix 3B). For the case of wage income, its share of inequality is greater when the covariance of wage income with total income is greater. Since $\text{cov}(y_w, y) = \text{var}(y_w) + \text{cov}(y_w, y_s) = \text{var}(y_w) + \text{cov}(y_w, y_s)$ where y_w is wage income, y is total income, and y_s is income from other sources, the share of wage income in inequality depends on both the inequality of wage income itself ($\text{var}[y_w]$) and how correlated wage income is with other income sources. Because income is measured with error, the consistent estimates of inequality use total expenditure as an instrument for total income in the covariance calculations.

22. The cross-country data for share of labor force in agriculture and the ratio of agricultural value added to total output are from World Bank (2000b). The purchasing power parity GDP per capita data are from the Penn World Table 6.0 (2002).

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