

CHAPTER 6

Micro-determinants of Household Welfare, Social Welfare, and Inequality in Vietnam

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Abstract

This paper adopts the methodology of Wodon (1999) and applies it to the data from the Vietnam (Household) Living Standard Surveys in order to identify the micro-determinants of household welfare, social welfare, and inequality in Vietnam during the period 1993–2002. We find that, on average, Vietnamese people enjoyed an absolutely improved standard of living during the study period. At the same time, social welfare was also improved remarkably from 1993 to 2002 in absolute terms. However, the increase in income was accompanied by a rapid rise of inequality during 1993–1998, and a slight decrease in inequality during 1998–2002. The study reconfirms the determinants of the Vietnamese household welfare that were found in previous studies, in which occupation, educational level of the household head, and the geographical location where the households reside are still important factors.

1. Introduction

The Vietnamese government has notched up substantial achievements in economic growth as well as in the reduction of poverty. Those results have been achieved by the reform of a number of policies since the early of 1990s. Booming trade was marked by the deregulation in the trade regime in the early 1990s. The country actively joined free trade area and economic cooperation organizations such as the ASEAN Free Trade Area (AFTA) in 1995 and the Asia-Pacific Economic Cooperation (APEC) in 1998; Vietnam signed bilateral trade agreements with important partners like the European Union in 1992 and the United States in 2000. In addition, foreign direct investment also was legalized in 1987. The private sector was recognized as an important sector by the enactment of the Law on Enterprise in 2000. The privatization process of state-owned enterprises, though it has not proceeded as expected, has still contributed positively to the corporate sector. In the agricultural sector, land rights were granted to individuals and farmers were allowed to trade their products in the market without any restriction. In addition, the government adopted policies for budgetary reform and financial sector reform in an attempt to produce macroeconomic stability, which facilitates economic growth. With such reforms, Vietnam has achieved a remarkable average economic growth rate of 7.5 percent since 1990 (General Statistics Office [GSO], 2004). This growth has absolutely increased household welfare and reduced the poverty rate (Glewwe *et al.*, 2000).

The impact of economic growth and trade liberalization on poverty and inequality as well as household welfare in Vietnam has been a topic of interest for many researchers. Notable studies include Glewwe *et al.* (2000), Justino and Julie (2003), Niimi *et al.* (2003), and Seshan (2005). A common point in the studies that have been completed is that they only cover the period 1993–1998 because they are based on two Vietnam Living Standard Surveys (VLSS): VLSS9293 and VLSS9798. In these surveys the evidence of the positive impact of economic

growth on household welfare and equality was relatively clear to observe because in the early 1990s the country had just started its transition from a highly centrally planned economy, in which most Vietnamese people were living in poverty, to a socialist-oriented market economy. Starting in 1998, however, the impact of economic growth on household welfare and equality appears to be mixed and is more difficult to identify because from this time the government strongly deregulated a number of restrictive trade policies to implement its commitments for entry to the AFTA and to prepare to enter the World Trade Organization (WTO). Since 1998, in parallel with a more open trade regime, Vietnam has also had to deal with a number of trade claims from other countries, such as for an anti-dumping price of fish by the United States and for shrimp by the European Union. These claims are likely to have negative impacts on households.

No comprehensive academic analysis of this period is yet available. Furthermore, no study has yet been attempted to investigate the changes in social welfare induced by economic growth during the period 1993–2002. This is an important area for policy makers; analysis of the impact of economic policies at different points in time on households would provide a basis for policy adjustment.

Such an analysis is conducted in this paper using the most up-to-date household data from VLSS9293, VLSS9798, and the Vietnam Household Living Standard Survey 2002 (VHLSS2002). The next section of this paper describes these surveys in detail. The third section of the paper investigates the micro-determinants of Vietnamese household welfare in 1993–2002 and highlights the differences in welfare received among different households and socio-economic groups. The fourth section uses the dominance theories of Lorenz and Generalized Lorenz, as well as the social evaluation functions to examine the dynamics of social welfare and trace out the sources of changes in equality. Some concluding remarks are provided in the last section.

2. The Vietnam (Household) Living Standard Surveys (VLSS and VHLSS)

Three surveys were carried out by the General Statistics Office (GSO) of Vietnam in the past fifteen years. The first survey was carried out in 1992–93 (namely, VLSS9293) by the cooperation of the State Planning Committee and the GSO, with financial contributions from the United Nations Development Program (UNDP) and the Swedish International Development Agency (SIDA) and technical assistance from the World Bank. This survey covered 4,800 households nationwide and included a household survey, a community survey, and a market price survey. In the household survey, topics covered included household size and composition, health, anthropometric measures of nutrition, education, housing characteristics, migration, employment, non-farm enterprises, agriculture, other income, expenditure and food consumption, ownership of consumer durables, and savings and credit.

The second survey was conducted between December 1997 and December 1998 (namely, VLSS9798) by the GSO, with financial support from the UNDP and SIDA and technical assistance from the World Bank. Like VLSS9293, this survey included a household survey, a community survey, and a market price survey. Different from VLSS9293, in VLSS9798 a survey of health centers was added. The household questionnaire covered the same topics as the VLSS9293 and was administrated to 6,000 households. Interestingly, about 4,302 households which were interviewed in VLSS9293 again participated in VLSS9798, creating a panel data which is a good source for analysis.

The Vietnam Household Living Standards Survey was carried out in 2002 (VHLSS2002) by the GSO with financial support from the Japanese Bank for International Cooperation (JBIC) and technical assistance from the World Bank. The VHLSS2002 was divided into two parts. In

the first part, a small questionnaire (36 pages) was administered to about 60,000 households and a large questionnaire (43 pages) was administered to a smaller sample of about 15,000 households. The large questionnaire has an expenditure module, allowing calculation of more reliable expenditure-based estimates of living standards. The large VHLSS2002 questionnaire is similar to the VLSS questionnaire except that some modules are not included (anthropometrics, migration, and savings and credit) and most of the other modules are simplified. Moreover, the household questionnaire in VHLSS2002 is also simplified compared with the previous ones. However, the household questionnaire in VHLSS2002 has a significant advantage in that it combines the main sections of two surveys: the household economic survey and the household living standards survey. Thus, indicators in VHLSS2002 are still compatible with previous surveys.

3. Micro-determinants of Household Welfare and Welfare Growth

3.1. Expenditure data

The following paragraphs explain briefly how total household expenditure is computed, based on data collected from the surveys.

Total annual expenditure consists of five components:

- Consumption expenditure on food and nonfood (nondurable goods)
- Value of home-product food consumed
- Value of goods in-kind received (such as food and housing) beside wages
- Estimated used value of durable goods owned by the household
- Rental value of the dwelling occupied by the household.

To collect information, the interviewer asks household representatives for their household expenditure on 45 food items and the value of foodstuffs produced and consumed by the household. It is noted that the Tet holidays, the Vietnamese New Year, are a special event for every household, and people therefore tend to spend more on these days (approximately 2 weeks). Since some goods consumed on these days are different from usual days, additional questionnaires are given to obtain information of expenditure on Tet holidays and other holidays (mostly weekend days). Expenditure on 68 nonfood items as well as expenditure on health, education and utility expenditure are also collected. In some cases, employees may also receive goods and services from their employer in addition to their wages. Such payments were also considered as expenditure and are added to consumption expenditure.

Durable goods, once purchased, will certainly increase the well-being of a household for a certain period of time. Of course, the well-being cannot be completely utilized in the year of purchase. This purchase value of the well-being (consumption) therefore should be divided for the years following the year of purchase, using depreciation rates. The depreciation rates are computed based on current value and purchased value. These rates are used to calculate the value of 13 different kinds of durable goods. Finally, the annual rental value of housing also makes up a large portion of expenditure and is added to the expenditure of households. Since the number of households which rent dwellings at a market rate is relatively small, for the sake of simplicity the annual rental value is assumed to be 3 percent of the current estimated value of the dwelling. Summing up the above consumption expenditures yields a good measure of household welfare. Because the price of a good differs across the regions within the country, total consumption expenditure is adjusted using a regional prices table. Finally, the real total expenditure is then divided by household size to obtain real per capita household expenditure.

3.2. Methodology

The model used is adapted from Wodon (1999). The determinants of household welfare¹ can be established by a multiple regression as follows.

$$\log(y_i) = \beta_i X_i + u_i, \quad (1)$$

where $\log(y_i)$ is log of real expenditure per capita; and X_i are categorical variables presenting characteristics of households which likely affect the expenditure per capita².

According to Wodon (1999), due to the properties of the linear regressions, the expected consumption levels of households obtained by conditioning on the household's sample mean must equal the actual mean values observed in the sample. This then provides a good way to examine the impact of household characteristics and the return to these characteristics on growth. If X_M is denoted as the mean characteristics of all households, the growth in household per capita expenditure from time t to time $t+1$ can be decomposed as follows:

$$Growth \approx E^{t+1}[\log(Y_M)] - E^t[\log(Y_M)] = (\beta_M^{t+1} - \beta_M^t)X_M^t + \beta_M^t(X_M^{t+1} - X_M^t) + U. \quad (2)$$

In equation (2), $(\beta_M^{t+1} - \beta_M^t)X_M^t$ represents the impact of changes of returns to those characteristics; $\beta_M^t(X_M^{t+1} - X_M^t)$ represents the impact of changing characteristics of the household.

3.3. Utilizing cross-sectional data for analysis

The cross-sectional estimates using data from VLSS9293, VLSS9798, and VLHSS2002 are shown in Table 1. There were no difference in expenditure between the households with male heads and the ones with female heads; the fact that the coefficients of household heads are male in all three years shows no statistical significance. Yet, the ethnicity of household heads appears to be an important factor.

Table 1: Micro-determinants of welfare in Vietnamese households, 1993–2002

	1992–1993			1997–1998			2002		
	Coef.	St. Err.	Mean	Coef.	St. Err.	Mean	Coef.	St. Err.	Mean
<i>HH Head Gender</i>									
HH Head is Male	0.021	0.018	0.7312	0.022	0.0147	0.7293	-0.0094	0.0094	0.7638

¹ Expenditure is chosen as proxy for household welfare because expenditure is a good proxy for permanent income and thus also for long-term average well-being (Balisacan *et al.*, 2003). For example, a low-income household can withdraw its savings or borrow money to consume and maintain its relative living standard. In contrast, a high-income but highly indebted household has to cut down on part of its income to pay off the debt. Moreover, data on expenditure are less difficult to gather than those on income, especially for developing countries where self-employed individuals are reluctant to provide their earnings precisely. Thus, in this study, as notably used before, household expenditure per capita also is employed as an approximation for household welfare.

² In this paper, independent variables used include: (1) Sex of the household head (Male or Female); (2) Area in which household resides (Urban or Rural); (3) Regions (divided into 8 regions: Red River Delta, North East, North West, North Central Coast, South Central Coast, Central Highlands, South East, and Mekong River Delta); (4) Education level of household head (categorized in seven levels: Never, Primary School, Junior High School, High School, Technical Training, Vocational Training, and College or Higher); (5) Occupation of household head (categorized in seven kinds of jobs, including White Collar, Sales/Service, Agriculture, Skilled Worker, Unskilled Worker, and Other Not Working); (6) Ethnicity of household head (actually, there are 54 ethnic majorities in the country, but for the sake of simplicity, ethnicity is divided in three groups: Vietnamese, Chinese, and Others); (7) Religion of household head (like ethnicity, religion is classified into 3 main religious affiliations: Buddhist, None, and Others); and (8) Other variables such as age and age-square of household head as well as log of household size are also added.

<i>(HH Head is Female)</i>									
HH Head Ethnicity									
<i>(Vietnamese)</i>									
Chinese	0.2145**	0.0637	0.0185	0.1782**	0.047	0.0218	0.0008	0.0398	0.0071
Other	-0.2498**	0.0237	0.1177	-0.2862**	0.019	0.1165	-0.0303**	0.0117	0.138
Region									
Red River Delta	0.1176**	0.0205	0.24	0.0966**	0.0209	0.1958	0.1883**	0.0136	0.215
North East	0.0898**	0.0235	0.14	0.03124	0.024	0.1218	0.0321*	0.0143	0.1479
North West	0.1311**	0.0364	0.0267	-0.0741*	0.0375	0.0213	-0.2506**	0.0212	0.0351
<i>(North Central Coast)</i>									
South Central Coast	0.2197**	0.0296	0.0933	0.1068**	0.0244	0.1047	0.1225**	0.0166	0.0933
Central Highlands	0.3007**	0.0588	0.02	0.0637***	0.0365	0.046	-0.1004**	0.0208	0.0572
South East	0.4523**	0.0296	0.14	0.5041**	0.0232	0.2068	0.4055**	0.0166	0.1244
Mekong River Delta	0.4267**	0.0234	0.2067	0.2259**	0.0214	0.1853	0.2443**	0.0137	0.2132
Area									
Urban	0.3299**	0.022	0.2	0.3688**	0.0185	0.2883	0.6844**	0.0108	0.2339
<i>(Rural)</i>									
HH Head Education									
Never	-0.1815**	0.0257	0.3611	-0.1630**	0.0169	0.3962	0.0053	0.011	0.3207
<i>(Primary School)</i>									
Junior High School	0.0558**	0.0188	0.2338	0.0684**	0.0177	0.2052	0.0131	0.011	0.2429
High School	0.1919**	0.0336	0.0467	0.1834**	0.0283	0.055	0.0540**	0.0161	0.0779
Technical Training	0.1060**	0.032	0.0461	0.2128**	0.0305	0.067	0.0619*	0.0289	0.0237
Vocational Training	0.2811**	0.0334	0.0465	0.1466**	0.0294	0.0518	0.0041	0.0201	0.0393
University or Higher	0.4125**	0.0533	0.0216	0.4162**	0.0442	0.0338	0.0787**	0.0227	0.0368
HH Head Occupation									
White Collar	0.2158**	0.0256	0.1102	0.2285**	0.0275	0.0758	0.0029	0.016	0.0687
Sales/Service	0.1752**	0.0423	0.0304	0.2231**	0.0233	0.1057	0.0211	0.133	0.1047
<i>(Agriculture)</i>									
Skilled Worker	0.1615**	0.0452	0.0314	0.1219**	0.0235	0.1008	0.0119	0.0142	0.0979
Unskilled Worker	0.0707**	0.0271	0.0767	-0.0950**	0.0247	0.062	-0.0119	0.0161	0.0808
Other not working	0.0906**	0.0284	0.1067	0.0550***	0.024	0.1204	0.0051	0.0121	0.1329
Log HHsize	-0.2585	0.0175	1.501	-0.364**	0.0171	1.46	-0.2720**	0.0102	1.4106
HH Head age	0.0211**	0.0034	45.3438	0.0236**	0.0034	48.0128	-0.0042*	0.0019	47.55
HH Head age square	-0.00015**	3.6E-05	2271.64	-0.00018**	3.5E-05	2494.82	0.000037*	1.8E-05	2465.1
Constant	6.53**	0.0758		7.36**	0.0813		8.05**	0.0534	
Obs: 4999, R-squared=0.46			Obs: 5999, R-squared=0.52			Obs: 29532, R-squared=0.36			

Note: Dependent variable is log of total expenditure per capita

** denotes significant level at 1%; * denotes significant level at 5%; *** denotes significant level at 10%

- Regressions with robust standard errors.

Source: Author's calculations

The Chinese account for only a small portion of the population (1.85 percent in VLSS9293) but had higher living standards than did the Vietnamese. Specifically, households with heads who are Chinese spent 24 percent³ more in 1993 and about 19.5 percent more in 1998 than households headed by Vietnamese. Households headed by minorities other than the Chinese had lower standards of living when compared to Vietnamese households.

It is unsurprising that we found higher spending in households located in the urban areas than those of the rural areas. Table 1 also highlights that people living in regions other than the

³ Since the dependent variable is in the form of a logarithm, the difference is $\text{Exp}(\text{coefficient})$. Here, $\text{exp}(0.2145) = 1.239$, so that the difference is nearly 24 percent. Other comparisons are made in the same way.

North Central Coast, with the exception of the North West region and the Central Highlands region in 2002, enjoyed a higher well-being than those of the North Central Coast region; however, the degree of benefit diminished during the period 1993–1998 except for in the South East region. In detail, in 1993, expenditure per capita of households in the South East was 57 percent higher than those of the base region—the North Central Coast; in 1998, the difference was up to around 66 percent and about 50 percent in 2002. For the Mekong River Delta region, the expenditure of households in 1998 was still higher than that of the North Central Coast region but it decreased at its sharpest rate from 53 percent in 1993 to 25 percent in 1998. This decrease was probably due to the severe typhoon in late 1997, although the difference had recovered only slightly to 28 percent by 2002.

The results show the returns of education in a trend as expected: higher education levels correlate with higher standards of living. For example, in 1993, households with the heads completing a university or higher degree spent 51 percent more than those in which the heads only finished primary school. The same difference also was found in 1998. Less improvement was seen in households with the heads having a high school degree. They only spent 21 and 19 percent in 1993 and 1998, respectively—spending which was higher than those households with heads who only finished primary school. In 2002, these differences were still evident but the magnitudes were much smaller.

Usually, it is expected that people involved in white collar jobs or business work as well as skilled laborers have a higher standard of living compared with those engaged in agricultural and blue collar jobs. The findings of Vietnamese households during this period, without exception, support this expectation. As shown in Table 1, individuals living in households with a head who had a white collar job or a job related to sales/services had a higher expenditure per capita compared to those of the reference occupation—agriculture—and also benefited more than those living in households with a head working in other job categories. However, in 2002 the differences in spending between households with the head being farmers or working in the agricultural sector and other jobs were not evident. It is possibly the case that in 2002, households headed by farmers and other agricultural employees were gradually catching up with the expenditure levels of households of other occupational categories. However, in order to come to a precise conclusion, this finding should be further investigated by using panel data as well as incorporating data of the three surveys, which are estimated in the following sections.

It is worth noting that the “other not working” category in the regression includes not only the unemployed but also those who were retired and not working for any reason (e.g., illness, leave) at the time of interviewing. Hence, one may find that the households headed by individuals adhering to this group had higher living standards than those of the base category.

The age of the household head also affected the expenditure of that household, with higher spending for older household heads, but negative coefficients of *age_square* of the household head in the regressions imply that this disparity will actually decrease at a certain age, which is what we expected.

Importantly, one should be careful when interpreting negative coefficients of the variable *LogHHsize* without taking account of the estimate of equivalence scales as suggested by Deaton (1997). This does not mean that households with more members tend to have lower expenditure per capita than do those with fewer members: if we substitute total expenditure per capita with another welfare indicator and divide total household expenditure by “adult-scale equivalents,” the result is likely to change (Wodon, 1999; Glewwe *et al.*, 2000).

3.4. Micro-determinants of expenditure growth

Table 2 presents micro-determinants of expenditure growth of the two periods 1993–1998 and 1998–2002 using (2) in the methodology based on the results of Table 1.

Table 2: Micro-determinants of expenditure growth

	<i>Change 1993–1998</i>		<i>Change 1998–2002</i>	
	<i>Return</i>	<i>Characteristics</i>	<i>Return</i>	<i>Characteristics</i>
HH Head Gender	0.0007	-0.00004	-0.0229	0.00076
HH Head is Male	0.0007	-0.00004	-0.0229	0.00076
(HH Head is Female)				
HH Head Ethnicity	-0.005	0.001	0.0259	-0.00877
(Vietnamese)				
Chinese	-0.0007	0.00071	-0.0039	-0.00262
Other	-0.0043	0.0003	0.0298	-0.00615
Region	-0.0682	0.0239	-0.0086	-0.03409
Red River Delta	-0.005	-0.0052	0.018	0.00185
North East	-0.0082	-0.00163	0.0001	0.00082
North West	-0.0055	-0.00071	-0.0038	-0.00102
(North Central Coast)				
South Central Coast	-0.0105	0.0025	0.0016	-0.00122
Central Highlands	-0.0047	0.00782	-0.0075	0.00071
South East	0.0073	0.03021	-0.0204	-0.04154
Mekong River Delta	-0.0415	-0.00913	0.0034	0.0063
Area	0.0078	0.0291	0.091	-0.0201
Urban	0.0078	0.02913	0.091	-0.02006
(Rural)				
HH Head Education	0.008	0.0024	0.0193	0.0093
Never	0.0067	-0.00637	0.0667	0.01231
(Primary School)				
Junior High School	0.0029	-0.0016	-0.0113	0.00258
High School	-0.0004	0.00159	-0.0071	0.0042
Technical Training	0.0049	0.00222	-0.0101	-0.00921
Vocational Training	-0.0063	0.00149	-0.0074	-0.00183
University or Higher	0.0001	0.00503	-0.0114	0.00125
HH Head Occupation	-0.0149	0.0172	-0.0504	-0.0033
White Collar	0.0014	-0.00742	-0.0171	-0.00162
Sales/Service	0.0015	0.01319	-0.0214	-0.00022
(Agriculture)				
Skilled Worker	-0.0012	0.01121	-0.0111	-0.00035
Unskilled Worker	-0.0127	-0.00104	0.0052	-0.00179
Other not working	-0.0038	0.00124	-0.006	0.00069
Log HHsize	-0.1584	0.0106	0.1343	0.01798
HH Head age	0.1134	0.05632	-1.3348	-0.01092
HH Head age square	-0.0681	-0.03348	0.5414	0.00535

Note: Total sum may not be equal due to rounding

Source: Author's calculations

According to the approximation in (2), change of return to characteristics equals to $(\beta_M^{t+1} - \beta_M^t) X_M^t$, and thus change of return to a characteristic during period 1993-1998 equals to the coefficient of that characteristic in 1998 minus the coefficient of that characteristic in 1993 and multiplied by the mean of that characteristic in 1993 (as shown in Table 1). Moreover, based on (2) we can see that the change due to change in characteristic equals to $\beta_M^t (X_M^{t+1} - X_M^t)$, and thus change in characteristic of a characteristic during the period 1993-1998 equals to the mean of that characteristic in 1998 minus the mean of that characteristic in 1993 multiplied by the

coefficient of that characteristic in 1993. Calculations for other characteristics of period 1998-2002 are made in the same way.

From Table 2, some important things are noted. Most changes in expenditure per capita in eight regions were due to changes in the returns to living in different regions in both periods.

The same story held for education and occupation. Most changes in expenditure per capita associated with education and occupation of the household head were attributed to the change in returns to these characteristics rather than the changing of those characteristics. The results are understandable since over time more household heads completing a higher degree of schooling will put pressure on the wage market.

Similarly, the change in expenditure attributed to gender and ethnicity also came mostly from changes in the returns to those characteristics

3.5. Pooling data for analysis

From the regressions of cross-sectional data, we can only examine the determinants of household expenditure in a single year. By pooling samples collected from the same population at different periods, we can earn more accurate estimators and test statistics with more power when compared to samples of single cross-sectional data because we can take advantage of the large sample size at different points in time. The VLSS9293, VLSS9798, and VHLSS2002 covered 4,799, 5,999, and 29,532 households, respectively, so that the pooled sample covers 40,330 households in three years, which is a large sample for deriving more precise estimators.

Table 3: Results of regression using the pooled data of VLSS9293, VLSS9798, and VHLSS2002

	<i>Combined data 1993–2002</i>		
	Coefficient	Robust Std. Err	t-value
<i>HH Head Gender</i>			
HH Head is Male	-0.0215**	0.0062	-3.46
<i>(HH Head is Female)</i>			
<i>HH Head Ethnicity</i>			
<i>(Vietnamese)</i>			
Chinese	0.0168	0.0263	0.64
Other	-0.0673**	0.0078	-8.57
<i>Region</i>			
Red River Delta	0.1477**	0.009	16.39
North East	0.0075	0.0094	0.8
North West	-0.1935**	0.0145	-13.29
<i>(North Central Coast)</i>			
South Central Coast	0.1089**	0.0112	9.72
Central Highlands	-0.0412*	0.0139	-2.96
South East	0.3787**	0.0105	35.98
Mekong River Delta	0.2322**	0.0089	25.83
<i>Area</i>			
Urban	0.6359**	0.0069	91.18
<i>(Rural)</i>			
<i>HH Head Education</i>			
Never	-0.0593**	0.0071	-8.3
<i>(Primary School)</i>			
Junior High School	0.0082	0.0072	1.14
High School	0.0836**	0.011	7.61
Technical Training	0.0421**	0.0148	2.84

Vocational Training	0.0406**	0.0129	3.15
University or Higher	0.1359**	0.0158	8.58
<i>HH Head Occupation</i>			
White Collar	0.0856**	0.0103	8.27
Sales/Service (Agriculture)	0.0848**	0.009	9.41
Skilled Worker	0.0709**	0.0092	7.96
Unskilled Worker	0.0047	0.01	0.47
Other not working	0.0259**	0.0081	3.19
Log HHsize	-0.2949**	0.0063	-46.57
HH Head age	0.0073**	0.0012	6.04
HH Head age square	-0.00005**	0.000012	-4.68
Constant	7.73**	0.0313	246.32
R-squared = 0.35; No of Obs: 40330			

Note: Dependent variable is total consumption per capita

*: denotes significant at 5%; **: denotes significant at 1%; ***: denotes significant at 10%

- Regressions with robust standard errors

Source: Author's calculations

As can be seen in Table 3, which reports the results of the regressions, the findings are consistent with those obtained in cross-sectional regressions in terms of the sign as well as the magnitude of each categorical variable: occupation, education of the household heads, and geographical locations were important determinants of expenditure deriving from economic growth. The type of occupation and level of education of the head defined the degree to which the household gained benefits from economic growth.

There is only difference in that households headed by males had lower standards of living compared to those headed by females. This result differs from the finding in the cross-sectional regressions with no statistical significance for this variable, suggesting that the returns to this category fluctuated over time.

3.6. Which characteristics determine the consumption of households in different socio-economic groups?

By using an econometric method, we are able to find out which characteristics determine the differences of expenditure between the poor and the rich households, or in other words, among socio-economic groups during the period.

Since VLSS9293 contains communal characteristics of the rural areas only, there is no such data on the urban areas and thus we cannot take advantage of the panel data. In the VLSS9798 commune data were collected in both rural and urban areas, so in this section only data from the VLSS9798 are used to investigate the determinants of household welfare of different socio-economic households. The regression results with the addition of communal characteristics⁴ are put in the same table for analysis.

⁴ Commune near a factory (apply value 1 for a commune which has at least one factory nearby; 0 if there no factory near the commune); Commune having traditional handicraft (apply value 1 for a commune which has traditional handicraft; 0 if there is no traditional handicraft); Road passable by cars (apply value 1 for a commune if there is a road that cars can use; 0 if there is a road but cars cannot use it); Electricity (apply value 1 if commune has electricity; 0 if electricity is not supplied in the commune); Market (apply value 1 if there is at least one market in the commune; 0 if there is no market in the commune); and Water-way transportation (apply value 1 if the commune has water-way transportation; 0 if there is no water-way transportation).

Table 4: Results of regressions for different quintiles of expenditure

Category	Quintile 1 (Poorest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (Richest)
HH Head Gender					
HH Head is Male (HH Head is Female)	0.0141	-0.0062	0.0016	-0.0146	-0.0099
HH Head Ethnicity					
(Vietnamese)					
Chinese	-0.1233	0.0473	0.0177	0.0260	0.1072
Other	-0.0552**	-0.0019	-0.0361**	-0.0125	-0.1085**
HH Head Religion					
Buddhist (None)	-0.0185	0.0049	0.0137	0.0105	-0.0371
Other	0.01	-0.0055	-0.0096	0.0098	0.0059
Region					
Northern Uplands	-0.0095	-0.0151	-0.0044	0.0098	-0.1318*
Red River Delta (North Central)	-0.0088	0.011	0.0236*	0.0179	-0.0644
Central Coast	-0.0721*	-0.0035	-0.0115	0.0131	0.0127
Central Highlands	-0.1441**	0.0124	0.0226***	0.0242	0.014
South East	0.0592	-0.0179	0.0147	0.0340*	0.0646
Mekong River Delta	0.0686***	-0.0247***	0.0294*	0.0282***	0.086
Area					
Urban (Rural)	0.0084	-0.0154	0.0022	0.0044	0.0438
HH Head Education					
Never (Primary School)	-0.060**	-0.0139	-0.0151***	-0.0234*	-0.035
Junior High School	0.0158	0.0023	0.0004	0.0077	-0.0108
High School	0.0683*	0.0169	-0.0004	0.0174	0.0850***
Technical Training	0.0444	0.0076	0.0207	0.0226	0.0849***
Vocational Training	0.0408	0.0269***	0.0045	0.0024	0.067
University or Higher	-0.1116*	0.0456	0.0652*	0.0375	0.1149*
HH Head Occupation					
White Collar	0.0241	0.0162	0.0163	0.0287*	0.0398
Sales/Service (Agriculture)	0.0425	0.0272*	0.0164	0.0116	0.0718*
Skilled Worker	0.0384	-0.0057	-0.0015	0.0294*	0.0439
Unskilled Worker	-0.0124	0.011	-0.0202	-0.0178	-0.0065
Other not working	0.0304	0.0209***	0.0006	0.0078	0.0592
Log HHsize	-0.0846**	-0.0206*	-0.0163*	-0.031	-0.1328*
HH Head age	0.0059	0.0002	0.0035**	0.003	0.0088
HH Head age square	-0.00004	-2.64E-06	-0.00003**	-0.00003	-0.00009***
Commune characteristics					
Factory nearby commune (No Factory)	-0.0154	0.0203**	0.0130*	0.0027	-0.0262
Traditional handicraft (No traditional handicraft in commune)	-0.0398*	0.0022	-0.0033	0.005	-0.0347
Car passable asphalt road (No car passable road)	0.0145	-0.0009	0.0067	-0.0018	-0.0219
Market (No market)	0.0449**	0.0096	0.0123***	0.0049	0.0008
Electricity	0.0783**	0.0104	0.029*	0.0131	0.0426

<i>(No electricity)</i>					
Water-way transportation	0.0335	0.0243*	-0.0182**	-0.015	-0.1144
<i>(No water way)</i>					
Constant	6.95**	7.4**	7.5**	7.9**	8.4**
R-square	0.2	0.08	0.11	0.08	0.14

Note: Dependent variable is log of total consumption per capita

*: denotes significant at 5%; **: denotes significant at 1%; ***: denotes significant at 10%

- Regression with robust standard-error

Source: Author's calculations

Table 4 reports the results of the regressions of each quintile. One important finding is that for poor households (households belonging to the 1st and 2nd quintiles) and the middle class (the 3rd quintile), factors, such as the level of education of the head and the region where the household resides, as well as communal facilities, such as market and electricity, are important for determining its living standard. For rich households (households belonging to the 4th and 5th quintiles) the level of education and type of job of the head are more important in defining their living standards. Communal characteristics, such as the availability of a market or electricity, play no role in affecting their expenditure because most of the rich are living in urban areas, so facilities, such as electricity and market, are common, while in rural area those facilities are important. For example, in the poorest quintile, households headed by an individual who has completed high school spent 7 percent more than households with the head completing only primary school. Interestingly, in the poorest quintile households headed by someone having a university or higher degree had a lower standard of living compared to those of households headed by someone having only a primary school degree. Similarly, households living in areas where there was a market and electricity spent 4.6 percent and 8.1 percent more, respectively, than households residing in areas without such facilities.

Regarding ethnicity, most quintiles show that households with the head being of an ethnic minority had lower standards of living when compared to those headed by Vietnamese. For all quintiles, gender and religion of the head show no impact on the expenditure of the households.

Importantly, when one looks at the results, one may notice that in some cases, the R-squared values are somewhat small. Statistically, the value of R-squared represents how much variance of the dependent variable can be collectively explained by the independent variables. Since the number of households included in VLSS9798 is 5,999 households, but only 4,818 households qualified for the test, these households were divided into 5 small samples based on expenditure quintiles and then the regressions were done with each sample. This way of regression further lowered the number of households involved in each regression, which then obviously affected the precision of the regressions. This suggests that a more adequate answer about the determinants of expenditure per capita of each expenditure quintile can only be obtained from much larger datasets, which we can obtain in the cross-sectional regressions (Vijverberg, 1998 and Tran, 2000).

3.7. Who benefits from economic growth?

For a poor country like Vietnam where the disparity of development between rural and urban areas is huge, it is expected that some determinants of expenditure in rural areas will differ from those of urban areas. For example, in urban areas, facilities like electricity, roads and telecommunications are common, but for rural areas, especially for mountainous areas, accessing those kinds of facilities is not easy, not only because of their limited financial capacity but also because of the shortage of those facilities, which is likely affected by the policies of the government. Therefore, it is essential to find out which characteristics determine the consumption of the rural areas (in which most of the poor reside), which then will help us to draw up policy suggestions. Moreover, in previous sections, we can only indicate the

determinants of consumption of households or in other words, we could only state that the living standard of households attached to certain characteristics of the heads was higher or lower when compared to other households. One thing we have not still investigated is what kind of households gained more benefit from economic growth (or in other words, enjoyed improved consumption) when compared to other households during the period. Since 4,302 households were interviewed in both VLSS9293 and VLSS9798, this question can be answered by regressing the change of real expenditure per capita between two years 1993 and 1998 on the pre-determined characteristics of households in 1993. In order to have a more insightful image, some different variables from the previous sections are added into regressions including:

- Number of HH members working in exporting industry is total number of members of each household working in exporting industry⁵
- Number of HH members working in importing industry is total number of members of each household working in importing industry⁶
- Number of HH members working in service industry is total number of members of each household working in service industry⁷.

Table 5: Results of panel data regression for rural and urban areas

	<i>Rural areas</i>		<i>Urban areas</i>		<i>All sample</i>
	<i>Coefficient</i>	<i>Coefficient</i>	<i>Coefficient</i>	<i>Coefficient</i>	<i>Coefficient</i>
	<i>(Model 1)</i>	<i>(Model 2)</i>	<i>(Model 1)</i>	<i>(Model 2)</i>	
<i>HH Head Gender</i>					
HH Head is Male	-0.0546**	-0.015	-0.0322	-0.0193	-0.0399**
<i>(HH Head is Female)</i>					
<i>HH Head Ethnicity</i>					
<i>(Vietnamese)</i>					
Chinese	-0.1211	-0.1001	-0.0541	-0.0062	0.0025
Other	-0.0571*	-0.04987*	-0.0206	-0.0605	-0.0814**
<i>HH Head Religion</i>					
Buddhist	0.0594**	0.0566**	-0.1149**	-0.1279	0.0203
<i>(None)</i>					
Other	-0.0545***	-0.0594*	-0.1111	-0.1093	-0.0543*
<i>Region</i>					
Northern Uplands	-0.0739	-0.0724*	-0.0618	-0.0351	-0.0366
Red River Delta	0.0306	0.0049	-0.1887**	-0.1487*	0.0005
<i>(North Central)</i>					
Central Coast	-0.0925**	-0.0863**	-0.1361*	-0.0659	-0.0412
Central Highlands	0.0386	0.0699	(dropped)	(dropped)	0.061
South East	0.1281**	0.1486**	-0.0276	0.0639	0.134**
Mekong River Delta	-0.1431**	-0.1291**	-0.1848*	0.1220***	-0.1573**
<i>HH Head Education</i>					
Never	0.0068	0.0049	0.0168	0.0149	-0.0031
<i>(Primary School)</i>					
Junior High School	0.0572**	0.0591**	0.1177*	0.1246*	0.0786**
High School	0.0871*	0.0643***	0.1429*	0.1309***	0.0930**

⁵ Export industry includes agriculture, fishing, food processing, garments and textiles, shoes and leather, wood products and furniture, and electrical and electronic products.

⁶ Import industry includes tobacco, paper, coke, petroleum products, chemicals and chemical products, rubber and plastics products, other non-metallic mineral products, basic metals, fabricated metal products, machinery and equipment, and transportation vehicles.

⁷ Service industry includes forestry, mining, printing, and other services.

Technical Training	0.0878**	0.0896**	0.0741	0.0689	0.0990**
Vocational Training	-0.01	-0.0097	0.0298	0.0151	0.035
University or Higher	0.3529**	0.3760**	0.1862**	0.1776**	0.274**
HH Head Occupation					
White Collar	-0.0508***	-	0.0602	-	-
Sales/Service (Agriculture)	-0.1199***	-	0.0801	-	-
Skilled Worker	-0.1427**	-	0.0987	-	-
Unskilled Worker	-0.0037	-	0.006	-	-
Other not working	-0.0212	-	0.1046***	-	-
Log HHsize	0.1397**	-	0.1519**	-	-
HH Head age	0.0036	0.0097*	-0.0045	-0.0031	0.0078*
HH Head age square	-0.00003	-0.0001**	0.00003	0.000028	-0.00008*
Commune characteristics					
Factory nearby commune (No Factory)	-0.0257	-0.0301	-	-	-
Traditional handicraft in commune (No traditional handicraft)	0.0138	0.0106	-	-	-
Car passable road (No car passable road)	0.1205**	0.1120**	-	-	-
Market (No market)	-0.0064	-0.0114	-	-	-
Electricity (No electricity)	0.0078	0.0195	-	-	-
Cultivated land per capita	-0.00004**	-0.00004**	-	-	-
Trade variables					
Number of HH members working in export industry	-	0.0275**	-	0.0197	0.0223**
Number of HH members working in import industry	-	-0.0036	-	-0.0089	0.004
Number of HH members working in service industry	-	-0.011	-	0.0111	0.0185***
Constant	-0.0118	0.0082	0.4159*	0.5358**	0.1347*
No. of Obs.	3494	3389	808	779	4168
R-squared	0.1052	0.096	0.095	0.065	0.063

Note: Dependent variable is log of change of real total consumption per capita

*: denotes significant at 5%; **: denotes significant at 1%; ***: denotes significant at 10%

- Since there are no urban data on Central Highlands in VLSS9293, it is dropped from the regression in the urban areas.

- Regressions with robust standard error

Source: Author's calculations

3.7.1. In the rural areas

As can be seen in Table 5, in the rural areas households with the head having a higher level education improved their living standard by a greater margin from 1993 to 1998 than those where the household head had a lower level of education. For example, households headed by individuals having a university or higher degree improved their expenditure 42 percentage points⁸ *ceteris paribus* higher than those headed by someone having a primary school degree.

⁸ $\text{Exp}(0.3529)=1.423$. Since the dependent variable is log of the change in expenditure between two years, the improvement is about 42 percentage points. Other comparisons are done in the same way.

Regarding region, households situated in the South East regions experienced improvement in consumption 13 percentage points more than households in the reference region—the North Central region. Those households in the Mekong River Delta improved their standard of living 15.4 percentage points less than households in the North Central region, which is consistent with what we found in the previous sections.

Turning to occupation of the household head, we find that households with the head having a job such as white collar, skilled worker, or work in the sales/service sector and being skilled workers improved their standards of living less than those involved in the agricultural sector in both years. In detail, households with the head involved in agricultural jobs improved their expenditure 5.2, 12.7, and 15.3 percentage points more than those with the head having a white collar, skilled and sales/services job, and being skilled laborers, respectively. This means that during period 1993–1998, economic growth rewarded more benefit for the farmer and those working in the agriculture sector. This still appears to be a good finding since most households involved in agriculture were poor.

Other findings are that households headed by a female improved their welfare more than those headed by a male. Households headed by ethnicities other than Chinese experienced a lower improvement in welfare when compared to those headed by the Vietnamese.

Regarding religious characteristics, those households headed by someone adhering to no religion improved their welfare 6.1 percentage points less than those with the head adhering to Buddhism, but 5.6 percentage points more than those with the head adhering to a religion other than Buddhism.

Turning to communal characteristics, only the coefficient of the *road passable by cars* variable shows a positive statistical significance, meaning that individuals residing in communes having at least one road passable by car improved their welfare 12.8 percentage points more than those living in communes without any road passable by car. This is understandable because communes with roads passing through have more chances to trade with other communes.

Interestingly, communes with more cultivated land per capita had a lower standard of living, which is contrary to the conventional thought that because households in rural areas given more cultivated land can diversify their crop as well as increase their output, they should improve their living standard more than those with less cultivated land. This finding is difficult to interpret on the face of the data.

3.7.2. In the urban areas

Regarding education and region characteristics, findings are consistent with those found in rural areas. However, there were differences in that in urban areas, occupation, ethnicity, and religion of the head of households showed no statistical significance in the period 1993–1998. The exception was households with the head adhering to Buddhism, which improved their welfare less than those with the head adhering to no religion.

Trade variables are presented in Model 2. Note that, in Model 2, some variables (i.e., *hhsiz* and *occupation of HH Head*) are dropped from the regression because they likely auto-correlate with the variable *number of household members*, which would lead to inconsistent results if included.

The results show that there was strong impact of trade liberalization on household welfare. As is evident, trade liberalization actually rewarded greater benefits to those working in the exporting industries as both coefficients of *Number of HH members working in the exporting industry* in the regression with rural area sample and all sample are statistically significant at 1 percent. On average, those working in the export industry increased 2.75 percentage points from 1993 to 1998. This result is expected because the export turnovers increased remarkably from

1993 to 1998, from US\$4 billion in 1994 to US\$9.4 billion in 1998 (GSO, 2001), which certainly brought positive effects to those people working in the industry. Also, there is evidence that those working in the service sector also improved their well-being from 1993 to 1998. Meanwhile, there is no evidence of the improvement for those people working in the importing sector.

4. Economic Growth, Social Welfare, and Equality

4.1. Income data and related issues

Household income in these surveys came from five main sources: wages, agriculture, non-farm self employment, remittances, and other incomes. Wage incomes include cash and in-kind revenues that household members received from both main and secondary jobs during the most recent 12 months. Agriculture income comes from farm and non-farm work, in which non-farm work includes producing fishery and other water products as well as processing crop products. Because in some cases, cost and revenue from agricultural work are calculated in quantity and not in cash as normally is the case, they were then converted into Vietnamese dong using the respective prices collected by the price questionnaires. Income from non-farm self employment was collected from data on non-farm self employment. Remittances were collected based on the questionnaires on assistance received by household members during the most recent 12 months. Finally, other income includes income from government subsidies, pensions, scholarships, insurance payments, and interest.

If income is to be used to compare social welfare at different points of time, the income used for analysis should be real income. To make income of different years comparable, household income from the three surveys first is divided by the monthly overall price index at January 1998 prices. Moreover, in one survey, the prices were different among regions, thus the income once again is deflated by the regional price indices, which were obtained in the price questionnaires, to derive real income. The real income of a household then is divided by its number of household members to obtain real income per capita.

In many studies because of the shortage of data, gross income at household level was adopted to examine the changes of inequality and well-being of households. However, this method may lead to incorrect estimates since households differ from one another in size as well as composition. Thus, it is difficult to identify whether a small household with lower income is poorer than a large household with higher income. The more accurate judgment should be based on real income per capita. Luckily, in these surveys, data are collected from each household member, and thus we can use real income per capita, which is calculated as discussed above, for the purpose of ranking the levels of household welfare.

Nevertheless, as pointed out by Deaton (1997), and Chatterijee *et al.* (2003), using real income per capita as a unit for welfare comparison, although appearing more advantageous when compared to unadjusted income (i.e., gross income), is still likely to provide inappropriate results since the needs of household members are distinctive from each other if one classifies them by characteristics such as sex or age. The problem is completely resolved if an equivalent-adult scale is used to adjust real income.

In practice, equivalent-adult scales were employed in many studies using various methods, such as the consumption pattern or nutrition requirements. Unfortunately, to my best knowledge, no equivalent-adult scale has been applied in Vietnamese studies, and constructing a new equivalent-adult scale is beyond the scope of this study. Thus, I assign the same weight to each household member or in other words, weight equal to 1 assigned for each household member. The income used for analysis is real income per capita and the deciles used in the analysis represent 10 percent of the population, not 10 percent of the households.

4.2. Methodology

In contrast to the previous section, income data of the surveys are taken advantage of to identify the changes of inequality among social economic groups and then an attempt is made to investigate the changes of level of social welfare by both ordinal and cardinal methods. The former method is based on the dominances of ordinary Lorenz and general Lorenz curves, while the latter follows the social evaluation function, which provides the complete welfare ordering of income distributions. Moreover, with the help of the cardinal method, the sources of the changes of level of social welfare which come from inequality and mean income effects are brought out. In this paper, social welfare is measured by income. Thus, strictly speaking, it refers to economic welfare.

The method for ranking a pair of income distributions with the same mean based on welfare grounds was introduced by Atkinson (1970). According to his study, of the two income distributions with the same mean income, the distribution of the dominating Lorenz curve has a higher level of per capita social welfare. It means that a Lorenz curve dominates the other Lorenz curve if its opposition is nearer the egalitarian curve. This expression can be described by the theorem below.

Theorem 1: Given $Z(y)$ and $Z'(y)$ are two income distributions with the same mean income⁹ μ and have density functions $z(y)$ and $z'(y)$ respectively, in the interval $0 \leq p \leq 1$, we have:

$$L_Z(p) \geq L_{Z'}(p) \Leftrightarrow \int_0^{\infty} u(y)z(y)dy \geq \int_0^{\infty} u(y)z'(y)dy \quad (3)$$

for all utility function satisfying $u'(y) > 0$ and $u''(y) < 0$ ¹⁰, where L_Z and $L_{Z'}$ are Lorenz curves constructed from distribution $Z(y)$ and $Z'(y)$, respectively.

However, in reality, the application of this theorem appears to be limited because we are usually more interested in comparing the social welfare of two societies at a given point in time, or investigating welfare changes of a society over time. The mean incomes are not likely to be the same in these situations. In addition, the ordinary Lorenz cannot accurately explain the welfare ordering of the two distributions if their Lorenz curves cross each other. The reason is simply that we may find two concave utilities which then bring about different orderings.

In order to rank distributions with different mean incomes, Theorem 1 was revised by Shorrocks (1983) based on the generalized Lorenz (GL) curve. If the Lorenz curve of a distribution with mean μ is $L(p)$ then the GL of that distribution is defined as $\mu L(p)$. Theorem 2 can be stated as follows.

Theorem 2: Given $Z(y)$ and $Z'(y)$ are two income distributions with the mean income μ and μ' and have density functions $z(y)$ and $z'(y)$ respectively, in the interval $0 \leq p \leq 1$, we have:

$$\mu L(p) \geq \mu' L'(p) \Leftrightarrow \int_0^{\infty} u(y)z(y)dy \geq \int_0^{\infty} u(y)z'(y)dy \quad (4)$$

for all strictly concave utility functions.

While the GL curve dominance can resolve the limitation of the ordinary Lorenz curve in comparing two distributions with different mean incomes, it still cannot completely resolve the remaining limitation of the ordinary Lorenz curve, i.e., the intersection of the two Lorenz curves,

⁹ It is noted that the theorem is true when the dominating Lorenz curve has a higher level of mean income.

¹⁰ In assumption of the view point of an income seeking and inequality adverse person.

because it is possible that GL curves may also cross each other at other points, thereby generating other different welfare rankings of the two distributions. Thus, one important point is worth noting that both the ordinary Lorenz and the generalized Lorenz curves provide only partial ordering of income distributions. However, there is a difference between the two curves in that the ordinary Lorenz curve provides the relative economic positions among population groups (the poorest to richest group), while the generalized Lorenz curve presents the absolute economic positions of the same population.

Because both the Lorenz and GL curves can provide only partial welfare ordering of income distributions, we must rely on a cardinal social evaluation function through assigning specific values to all possible income distributions in order to obtain a complete ranking based on welfare grounds. The abbreviated social evaluation function was introduced to help evaluate the social welfare with small arguments that summarize the complete income distribution. The function is formed as:

$$v = v(\bar{y}, \phi), \quad (5)$$

where \bar{y} is the average income of the society, and $\phi = \phi(y_1, y_2, \dots, y_n)$ is the measure of inequality. Equation (4) satisfies the following conditions:

$$\frac{\partial v}{\partial \bar{y}} > 0 \text{ and } \frac{\partial v}{\partial \phi} < 0. \quad (6)$$

The conditions provided in (6) imply that when the average income increases, social welfare increases holding inequality unchanged; and holding the average income unchanged, when inequality increases, social welfare decreases.

Sen (1976) introduced a social evaluation function (SEF) which shows the relationship between the average income of a society and its inequality indicator, which is represented by the Gini coefficient as follows.

$$v = \bar{y}(1-T), \quad (7)$$

where T is the Gini coefficient of the income distribution. Equation (7) also satisfies the conditions in (6).

Therefore, we can investigate the changes of the social welfare over time by differentiating equation (5) with respect to time t to get $\frac{dv}{dt} = \frac{\partial v}{\partial \bar{y}} \frac{d\bar{y}}{dt} + \frac{\partial v}{\partial \phi} \frac{d\phi}{dt}$.

If the same derivation is applied to equation (7), we obtain:

$$\frac{dv}{dt} = (1-T) \frac{d\bar{y}}{dt} - \bar{y} \frac{dT}{dt}. \quad (8)$$

For the changes between two discrete points in time, equation (8) can be approximated as follows.

$$\Delta v \approx (1-T) \Delta \bar{y} - \bar{y} \Delta T, \quad (9)$$

where $\Delta v = v_t - v_{t-1}$; $\Delta \bar{y} = \bar{y}_t - \bar{y}_{t-1}$, and $\Delta T = T_t - T_{t-1}$.

The former part of equation (9) denotes the changes of social welfare due to the changes of efficiency, and the latter part presents the changes due to changes of equity.

4.3. Empirical results and analysis

4.3.1. Ordinary Lorenz curve

First, it is necessary to reiterate that in this study, we constructed the Lorenz curve based on cumulative shares of income per capita in the various deciles of population instead of cumulative share of income as an ordinary Lorenz curve.

In order to build the Lorenz curve, we first calculate the sum of real income per capita of each decile. After having all the sums of the deciles, we obtain the total sum of cumulative income per capita by adding the sum of real income per capita of all quintiles.

The sum of real income per capita of each decile is then divided by the total sum of cumulative income per capita to obtain the real income per capita share of each decile. The share of each decile then is cumulatively added from the poorest to the richest decile to form Table 6. Based on Table 6, we can easily draw the ordinary Lorenz curve, which is described by Figure 1.

Table 6: Ordinates of ordinary Lorenz curves

<i>Decile</i>	<i>Cumulative income (%) per capita</i>		
	<i>1993</i>	<i>1998</i>	<i>2002</i>
Lowest	1.51	1.81	2.23
Second	4.94	4.97	5.97
Third	9.62	9.16	10.77
Fourth	15.39	14.31	16.55
Fifth	22.33	20.57	23.39
Sixth	30.61	28.15	31.38
Seventh	40.5	37.39	40.85
Eighth	52.58	49.08	52.53
Ninth	68.21	64.92	67.97
Top	100	100	100
<i>Gini</i>	<i>0.38</i>	<i>0.45</i>	<i>0.41</i>

Source: Author's calculations

From Table 6, if we look at the Gini coefficients of three years, we can see that inequality increased sharply from 1993 to 1998 but declined considerably from 1998 to 2002. This means that in 1993 and 2002, generally the relative position of the bottom 90 percent of the population was better off when compared to that of 1998 with the only exception being for the lowest decile, for which the income share was lower in 1993 when compared to that of 1998 (Table 7).

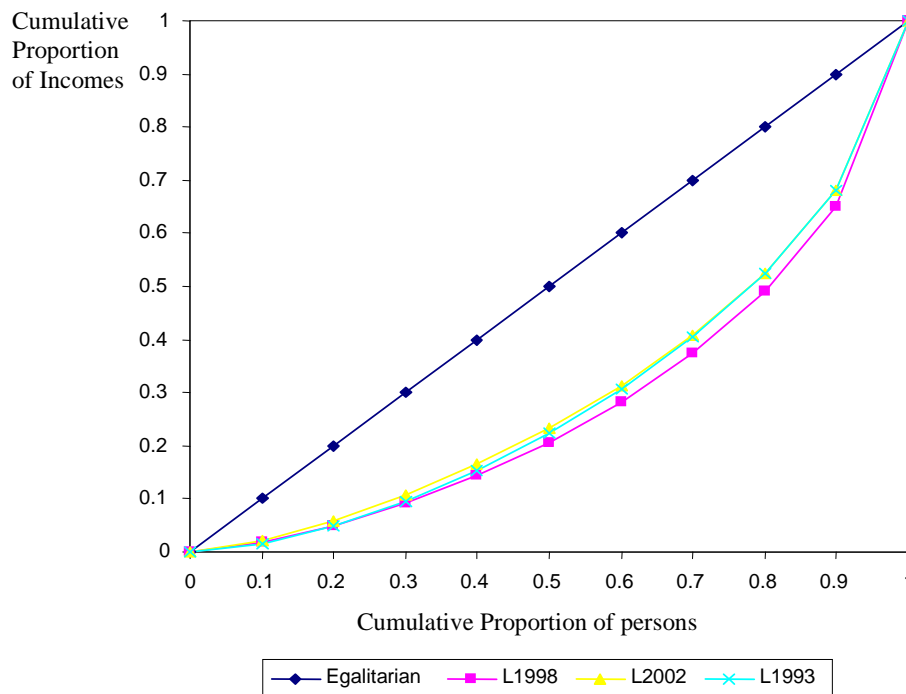
For social welfare ranking, because the mean income changed across the period, we are unable to make any judgment on the social welfare among these years if we only base this on the dominance of the ordinary Lorenz curves (Theorem 1). However, we can draw some general statements on inequality from the ordinary Lorenz curves.

Table 7: Relative income shares

<i>Decile</i>	<i>1993</i>	<i>1998</i>	<i>2002</i>
Lowest	1.51	1.81	2.23
Second	3.43	3.17	3.73
Third	4.69	4.19	4.8
Fourth	5.77	5.15	5.78
Fifth	6.94	6.26	6.84
Sixth	8.28	7.59	7.99
Seventh	9.89	9.23	9.47
Eighth	12.09	11.69	11.68
Ninth	15.63	15.84	15.44
Top	31.79	35.08	32.03

Source: Author's calculations

Figure 1: Ordinary Lorenz curve



Source: Author's calculations

Figure 1 shows that the Lorenz curves of the year 2002 absolutely dominated those of the year 1998. Thus, we can conclude that inequality in 2002 was greatly improved when compared to that of 1998 by any inequality measure which satisfies the Pigou-Dalton transfer condition. Note that, Pigou-Dalton transfer sensitivity implies that under this criterion, the transfer of income from the rich to the poor reduces the measured inequality. While the Lorenz curve of 1993 dominates that of 1998 from the 2nd to 10th deciles and only crosses at the bottom decile, there is also no doubt that inequality in 1993 was lower than that of 1998 by any inequality measure which satisfies the transfer condition. For the two years 1993 and 2002, since the Lorenz curve of 2002 dominates that of 1993 up to the 5th decile but is dominated by 1993 at the remaining deciles, the inequality comparison of the two curves can be judged only by looking at the size of their Gini coefficients.

For more details of the inequality comparison, we must look at Table 7, which presents the relative income share of different population deciles. For the top decile, the relative income share increased sharply from 31.79 percent in 1993 to 35.08 percent in 1998 but decreased to 32.03 percent in 2002, while the bottom decile experienced an increased though modest trend across the time. For the remaining deciles, the relative incomes decreased from 1993 to 1998, but then increased slightly.

Because the mean income changed during this period, we cannot compare the social welfare of these years using the ordinary Lorenz curve. Thereby, in order to evaluate social welfare we must rely on the GL curve discussed in Theorem 2.

4.3.2. Generalized Lorenz curve

Since $GL\left(\frac{i}{P}\right) = \frac{\sum_{i=1}^n y_i}{P}$ or $GL\left(\frac{i}{P}\right) = \frac{\sum_{i=1}^n y_i}{Y} * \frac{Y}{P} = L\left(\frac{i}{P}\right) * \bar{y}$, the GL ordinates belong to the range $(0; \bar{y})$, where \bar{y} is the mean income of the distribution; $i = 1, \dots, n$ is the position of each person in the income distribution; P is total number of individuals in the distribution; y_i is the income of i^{th} person in the distribution; and $\sum_{i=1}^n y_i$ is cumulated income up to the i^{th} person. In this paper, we will construct GL as follows. First, we calculate the mean income per capita of each year and then multiply these numbers with the cumulative income share in Table 6 to obtain Table 8. The real mean income per capita of 1993, 1998, and 2002 are 2,048,200; 3,121,600; and 3,881,600 Vietnamese Dong (VND), respectively.

Table 8: Ordinates of generalized Lorenz curves

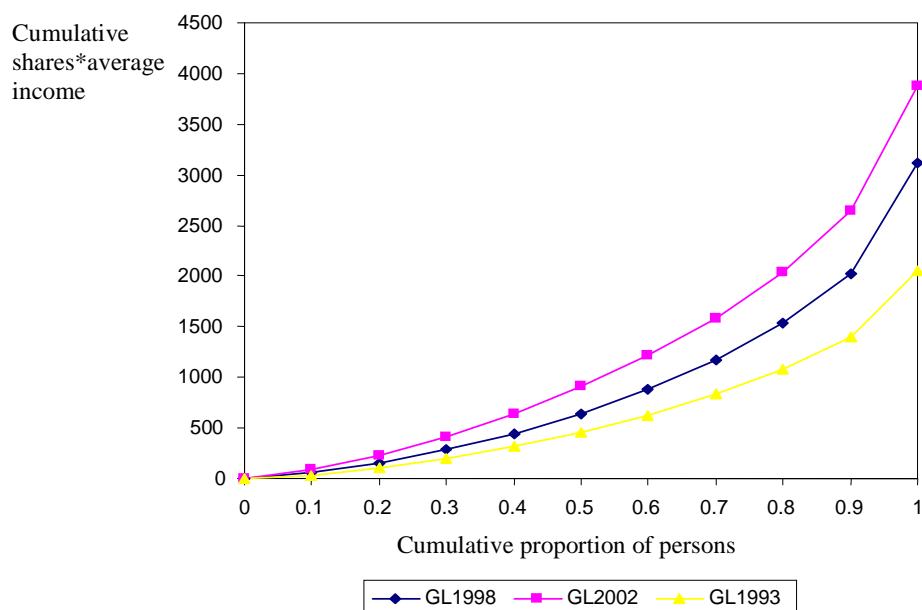
<i>Cumulative Real Income Per Unit Person (1000 VND)</i>			
Decile	1993	1998	2002
Lowest	30.92	56.35	86.59
Second	101.1	155.19	231.56
Third	197.12	285.94	417.98
Fourth	315.21	446.61	642.52
Fifth	457.41	641.98	907.87
Sixth	626.96	878.83	1218.01
Seventh	829.43	1167.06	1585.7
Eight	1077	1532.13	2039.18
Ninth	1397.09	2026.47	2638.39
Top	2048.2	3121.6	3881.6

Source: Author's calculations

It is important to note that the numbers presented in Table 8 are not the average income of the cumulative proportion of population. The GL curves for the three years, drawn based on Table 8, are presented in Figure 2. The figure shows that the curve of GL2002 absolutely dominates those of GL1998 and GL1993. Thus, according to Theorem 2, social welfare in 2002 was higher when compared to that of 1998 and that of 1993 for all strictly concave utility functions. In the case of 1998 and 1993, the curve of GL1998 also dominates GL1993, meaning that total social welfare of 1998 also improved against that of 1993. At this point, we can conclude that the economic growth increased social welfare from 1993 to 2002.

These judgments are reconfirmed in Table 8. The cumulative real incomes of all deciles in 2002 were higher when compared to those of 1998 and 1993. The same statement can be made for 1998 in comparison with 1993.

Figure 2: Generalized Lorenz curves



Source: Author's calculations

Table 9: Change in social welfare in Vietnam, 1993–2002

Year	Real Mean Income (1,000 VND)	Gini Coefficient	Social Welfare
1993	2048.2	0.38	1269.884
1998	3121.6	0.45	1716.88
2002	3881.6	0.41	2290.144

Source: Author's calculations

While the GL curve dominances in this paper provide complete¹¹ orderings of social welfare of the period, it is still essential to have concrete estimated values of the social welfare, which can be calculated based on equation (6). The estimated values are reported in Table 9 for comparison. Social welfare absolutely increased during the period, from 1269.8 (in 1993) to 1716.8 (in 1998) and then to 2290.1 (in 2002), despite the fact that inequality first increased in the period 1993–1998 but fell in the period 1998–2002.

The results also reveal that in the early period of trade liberalization (1993–1998), the income increase sharply outpaced that of the period 1998–2002, but the negative impact of higher inequality in 1993–1998 led to an increase in total social welfare only relatively the same as that in 1998–2002, which is examined in more detail in Table 10.

Table 10 presents compositions of the changes of social welfare during the periods, which are calculated by equation (8). For the first period 1993–1998, mean income increased with the rise in inequality. While the former had a positive impact on total social welfare, the latter had an affect in the opposite direction. However, the combination of the two effects still led to an increase in social welfare.

¹¹ Actually, Vietnam in this study is a special case because no GL curves cross each other. If the GL curves cross each other, we have to rely on a cardinal social evaluation function for complete ordering comparison.

Table 10: Sources of change in welfare

	<i>1993–1998</i>	<i>1998–2002</i>	<i>1993–2002</i>
Welfare Change	446.996	573.264	1020.26
Mean Income Change	1073.4	760	1833.4
Inequality Change	0.07	-0.04	0.03
Due to Mean $(1 - T)\Delta \bar{y}$	665.508	418	1081.706
Due to Inequality $(-\bar{y}\Delta \bar{T})$	-143.374	124.864	-116.448

Source: Author's calculations

Turning to the period 1998–2002, the combination of the two positive effects of the increase of real mean income, accompanied by a decline in inequality, increased total social welfare absolutely to levels well above those of the period 1993–1998.

Finally, for the whole period from 1993–2002, we find that mean income increased remarkably with a slight increase in inequality; the magnitude of the former was much bigger than that of the latter, which then led to an increase of total social welfare.

In short, using the dominance of Lorenz and generalized Lorenz curves, we find that economic growth—for which trade liberalization contributed the most—increased the real cumulative income per capita of all population deciles, which then led to increases in social welfare during the period 1993–2002. The estimates show that in the period 1993–1998, the increase in income was accompanied by a rapid rise in inequality, while in the latter period (1998–2002), income increased in parallel with greater equality in income. Moreover, with the help of the social evaluation function, we are able to have a complete welfare ranking of the income distributions of the three years in the period, showing an increasing trend from 1993 to 2002. Also, the sources of changes of social welfare were brought out in the paper.

5. Concluding Remarks

The decision of the government to adopt *Doi moi* (renovation) policies in 1986 appears to have been a good one which brought about big changes in the standard of living of the Vietnamese people. Social welfare also improved remarkably from 1993 to 2002 in absolute terms. However, the increase in income was also accompanied by a rapid rise of inequality from 1993 to 1998 while the inequality fell slightly in the latter part of the period 1998–2002. Thus, social welfare increased more in the period 1998–2002 in comparison to that of 1993–1998.

There was evidence that the benefits were not equally distributed among the Vietnamese households. An examination by expenditure data shows that those living in communes with facilities such as electricity, a market, and a road passable by cars were able to make the most of opportunities from economic growth and improve their standard of living more than those living in communes without such facilities were able to do. This finding emphasized the importance of such facilities in improving the living standard of the poor.

Economic growth provided greater benefits for those people with higher levels of education and those working in the export industry. Individuals involved in the service sector such as in white collar or sales/service jobs or those who had professional skills benefited from a higher absolute living standard than farmers and others engaged in agriculture. However, utilizing the panel data we also found the good news that there is evidence that the living standards of farmers improved more than those of people from other sectors from 1993–1998.

Geographical location appeared to play an important role in determining the welfare of households, with more benefits for those living in the South East and the Red River Delta regions while other regions like North Central, Northern Uplands, and Central Highlands, where most of the poor and ethnic minorities resided, received fewer benefits from economic growth.

The findings reveal the imbalance in development among regions and in different welfare received between the poor and the rich, and between rural and urban areas in the country, suggesting that the less developed regions and the poor deserve to be made a higher priority in the policies of the government.

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