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## **The Cost of Living Index for Poor Households: The Case of Vietnam**

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# The Cost of Living Index for Poor Households: The Case of Vietnam

Nguyen Viet Cuong<sup>1</sup>

## Abstract

The paper aims to estimate the Fisher index during the period 1994-1997 to explore how well the Laspeyres index can serve as the cost of living index. It is shown that the Laspeyres results in an upward substitution bias, and the bias appears to be higher for the ultra-poor and the poor. It means that for the very poor group the Laspeyres index overestimates their cost of living. With a limited budget the poor tends to have substitution to ensure a certain level of living standard. This suggests a remarkable point that if the basket weights are not revised frequently the Laspeyres index can present a significant bias from the cost of living, and this bias tends to be higher for the poor group. Since there is not a significant difference in the CPI between the poor and the non-poor and the whole population, CPI can be used as an approximate index of living cost of the poor as well as the non-poor for a period from one to three years.

JEL classification: I31, I32, O15

Keywords: Poverty measurement, living cost, CPI, household survey, Vietnam.

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## **1. INTRODUCTION**

Vietnam has set poverty reduction as a major development policy goal. Between 1993 and 1998, the ratio of the poor to the population declined strikingly by 20.7 percentage points from 58.1% to 37.4% (World Bank 2000). Poverty is an outcome of multidimensional processes, beyond the economic domain. One of important factors affecting the poor is the change in prices, which have impacts on not only their consumption but also their production pattern.

There are various models to explore the impacts of price changes on the household. The supply and demand models estimate the system of demand and supply functions, which can be used to understand how a change in the price of a commodity affects the level and distribution of consumption among the households. The partial equilibrium and general equilibrium models can be also utilized to estimate impacts of price changes on consumption and production pattern among various groups. Each model has different advantages, data and analytical requirements.

This paper aims to develop a method which is based on the approach of consumer price index (CPI) to estimate the effect of price changes on the poor's cost of living. The CPI is normally used to see how the price changes over time and, to some extent, how these changes affect the consumption of the people. This research will construct the CPI for only the poor. The rationale is that the pattern of consumption tends to differ increasingly largely between the poor and the non-poor in Vietnam because the inequality has been increased during the past. The Gini index went up from 0.33 to 0.35 between the year 1993 and 1998.

Poverty in Vietnam is rural and agricultural phenomenon. In the year 1998, ninety percents of the poor are located in the rural areas, and eighty percents of the poor are engaged in agricultural production (World Bank, 2000b). Most of the poor manage their own production which is also affected by the price changes. Thus, in addition to the CPI for the poor the income price index for the poor is built to examine the effects of price changes on their income.

The paper is organized in six parts. Part 2 will review the theoretical framework of the poverty analysis and poverty in Vietnam. Part 3 will lay down the CPI method that is used in the paper to examine the impacts of price changes on the poor. Next, the findings and discussion will be presented part 4. Finally, some policy implications and conclusions will be drawn in the conclusion part.

## **2. POVERTY MEASUREMENT IN VIETNAM**

## 2.1. Poverty: Definition and Measurement

World Bank (2000a) defines poverty as an unacceptable deprivation in human well-being that can comprise both physiological and social deprivation. Physiological deprivation involves the non-fulfillment of basic material or biological needs, including inadequate nutrition, health, education, and shelter. The concept of physiological deprivation thus is closely related to low income and consumption levels. Social deprivation widens the concept of deprivation to include risk, vulnerability, lack of autonomy, powerlessness, and lack of self-respect.

In practice, the definition of poverty is based on the physiological aspect. Poverty can be said to exist in a given society when one or more persons do not attain a level of material well-being or welfare deemed to constitute a reasonable minimum by the standard of that society (Ravallion, 1992).

### *Welfare Indicator*

There are many welfare indicators such as household consumption, per capita consumption, per capita income, per capita food consumption, food share, calorie intake, basic needs, and so on.<sup>2</sup> Consumption indicators are strongly favoured for measuring welfare in developing countries (Deaton, 1997). In comparison with other indicators, consumption is relatively easy to measure and compare. This variable summarizes many things that improve the quality of life, such as food consumption, payments for schooling, and purchases of medicines and medical services. In addition, the consumption measure can also include estimates of the annual "use value" of consumer durable goods as well as of owner-occupied housing. However, there is a drawback in using expenditure data to measure welfare. Expenditure data does not take into account saving and changes in assets. Thus, to some extent, it can overestimate or underestimate people's welfare.

An alternative to using consumption expenditure data would be to use income data. Yet there are three reasons to prefer expenditure data. First, income only raises living standards when it is used for consumption purposes, as opposed to being saved or used to pay debts. This implies that household consumption expenditures are more closely related to the quality of life of households than household income. Second, income data tends to be inaccurate, especially in developing countries where the vast majority of workers are self-employed. Finally income, especially agricultural income, can be extremely variable, and a farmer's income in any month is a poor indicator of living standard in that month. A better case can be made for annual income. But this makes the collection of data much more expensive. An income-based

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<sup>2</sup> For detailed information, see Glewwe (1989), Ravallion (1992).

measure requires multiple visits or the use of recall data, whereas a consumption measure can rely on consumption over the previous few weeks.

### *Poverty Lines*

Traditionally, there are three ways to specify a poverty line: the absolute, relative and subjective methods. The absolute method sets the poverty line as a minimum level of income or consumption expenditure necessary for a minimum living standard in a society at a point of time, and this line needs to be updated as prices change over time. The relative method specifies the poverty line as a point in the distribution of income or expenditure, hence the line can be updated automatically over time for changes in living standards. The subjective method derives the poverty line based on public opinion on minimum income or expenditure levels that can “get long” and “make ends meet”. Compared with the first two poverty lines this line is relatively less popular and has been rarely used. For the analysis of poverty in the developing countries and in most government statistics the absolute poverty line is most widely used.

### *Poverty Measures*

There exists a large amount of literature on aggregate measures of poverty.<sup>3</sup> In this study the focus is placed on the three most popular additive measures. Once a poverty line has been set, a number of summary statistics describing the incidence, depth and severity of poverty can be calculated. These include the headcount index H which measures the incidence of poverty, the poverty gap PG which measures the depth of poverty, and the squared poverty gap  $P_2$  which measures the severity of poverty. Foster, Greer and Thorbecke (1984) show that these three additive or FGT (Foster-Greer-Thorbecke) poverty measures can all be calculated using the following formula:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left[ \frac{z - x_i}{z} \right]^{\alpha}$$

where  $x_i$  is the welfare indicator such as income or consumption per capita, for poor person  $i$ ,  $z$  is the poverty line,  $n$  is the number of people in the sample population,  $q$  is the number of poor people, and  $\alpha$  can be interpreted as a measure of inequality aversion.

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<sup>3</sup> For reviews see Kakwani (1980), Atkinson (1987), Ravallion (1992).

When  $\alpha = 0$ , the above equation reduces to  $q/n$ , the number of poor people in the population divided by the number of people in the sample population. This very commonly and simply used measure of the incidence of poverty is called the headcount ratio  $H$  or, when turned into a percentage, the headcount index  $H$ . The ratio  $H$  varies from 0 when there are no poor in a society to 1 when a whole society is poor. When  $\alpha=1$ , the poverty gap index is produced, which shows the shortfall of the poor's expenditure from the poverty line expressed as an average of all people in the population. When  $\alpha = 2$ , the squared poverty gap index which is also called the FGT (Foster-Greer-Thorbecke) index  $P_2$  is produced. This index gives more weight to poorer individuals. The poorer the person, the greater the weight given to his or her shortfall from the poverty line.

## 2.2. Poverty Trend in Vietnam

Although Vietnam has been very successful in promoting economic growth and reducing poverty during the 1990s, widespread poverty and near poverty, especially in rural and remote areas, remain one of the most pressing human development challenges in Vietnam. In Vietnam, several methodologies have been used to date to measure and assess poverty.

*Approach by Ministry of Labour, Invalid and Social Affairs*

The poverty line used in the drawing up of the present government's policy of hunger eradication and poverty reduction is income per capita. The poverty line devised by the Ministry of Labour, Invalid and Social Affairs (MOLISA) in 1993 was based on the income equivalent to buy certain quantities of rice. The poverty line in 1993 and the ratio of poor households was presented in the following table:

Table 1: The poverty line and ratio of poor households in 1993

Degree of poverty	Quantity of Rice per capita in a month (Kg)	Ratio of Poor Households	
		Rural	Urban
Overall Poverty	15	30-35 %	8.1%
Food Poverty	12	16.3-20.1%	6.45%
Chronic Food Poverty	8	5.7-7.96%	4.42%

*Source: (Nguyen Van Thieu and Nguyen Thi Hang, 1993)*

The basic of taking 15 kg of rice as a standard to assess the absolute poverty in the rural population is as follows (Nguyen Van Thieu and Nguyen Thi Hang, 1993):

- ◆ Depending on the average living standard of the community, the world poverty is usually taken to be worth one third of its average income. In the Vietnamese conditions, the population's living standard is still low, the criterion taken for absolute poverty range is only one second the average income of the community. The average income per capita a month in the countryside in 1992 was about 60 thousand dong, equivalent to 30 kg of rice a month. so the poverty line is 30 thousand dong, equivalent to 15 kg of rice.
- ◆ The peasant's household expenditure structure is 70 percent for food and drink, 30 percent of other needs. With the income equivalent to 15 kg of rice a month, the expenditure for food costs 10.5 kg. At this level, the quality of the meal is not good. but calories are sufficiently supplied for living.

In the year 1996 MOLISA revised the poverty line on the basis of investigations of living standards conducted by many institutions, and reports made by many localities on poverty for the implementation of the hunger eradication and poverty. The poverty line was set for different location.

Table 2: The poverty line in 1996

Areas	1996	2002
Rural mountainous areas and islands	15	60000
Rural plain and midlands	20	80000
Urban	25	100000

Source: MOLISA (2000)

Based on this poverty line, the ratio of poverty household was estimated during the period 1995-2000 as follows.

Table 3: The percentage ratio of poor households in the three poorest regions

Region	1995	1996	1997	1998	1999	2000
Northern Uplands	28.16	27.24	25.42	22.36	16.93	15.00
Northern Central	32.52	30.08	27.84	24.62	20.25	17.00
Central highlands	30.88	29.45	27.84	25.65	14.57	13.00
All Vietnam	20.37	19.23	17.70	15.66	13.10	11.00

Source: MOLISA (2000)

By the end of the year 2000, due to changes in living conditions, the definition of poor households was revised upwards. The new standards will be applied between 2001 and 2005. Under the adjustment, poor households in mountainous and island areas are those with monthly incomes of below VND 80000 . In plain land rural areas, they are those with monthly incomes of below VND100000, and in urban areas, those with monthly incomes of below VND150000. With the new definitions of poverty, the country had around 2.8 million poor families by early 2001, accounting for 17.2 per cent of the country's households.

Table 4: The percentage ratio of poor households in the year 2001

Region	The number of poor households (thousands)	The percentage of poor households
North West Uplands	146	33.95
North East Uplands	511	22.35
Red River Delta	337	9.76
Northern Central	554	25.64
Central Coast	389	22.24
Central Highlands	190	24.90
South East	183	8.88
Mekong Delta	490	14.18
<b>All Vietnam</b>	<b>2800</b>	<b>17.18</b>

*Source: Government (2001)*

*Approach by General Statistical Office of Vietnam*

The food poverty line, used by the General Statistical Office (GSO), defines food poverty by the income needed to buy 2,100 calories per person per day. In 1996, the poverty threshold was set at 100,000 *dong* per person per month for rural households and at 130,000 *dong* for urban households. Following GSO's method, food poverty decreased from 20 per cent in 1993 to 15 per cent in 1997/98.

*Approach by the World Bank*

The analysis of poverty conducted by the World Bank in Vietnam relies heavily on the use of a household data set from the 1993 and 1998 Vietnam Living Standards Surveys (VLSS). These surveys were implemented by the General Statistical Office (GSO) of Vietnam with funding from SIDA (Sweden) and UNDP, and technical assistance from the World Bank. These surveys provide data on a wide range of topics, including expenditures and incomes; education; health, fertility and nutrition; employment; migration; housing; agricultural activities; small household businesses, credit and savings. In addition to the household questionnaires, the surveys also included commune questionnaires (for rural areas only), price questionnaires and, for 1998, modules on school and health facilities. The two survey samples were selected to be representative of the national as well as provincial levels.

The VLSS93 was undertaken between October 1992 and October 1993, with the sample covering 4800 households. The second survey VLSS 1998 was started in December 1997 and completed by November 1998. The sample size in VLSS98 was extended to 6000 households,



with 1200 additional ones obtained from the sample of the Multi-purpose Household Survey (MPHS) <sup>4</sup>.

The first step in measuring poverty is to choose an indicator of household welfare. As discussed above, the most common indicator is household consumption expenditures per capita, and this indicator is also used in this study.

For the analysis of poverty in developing countries and in most government statistics the absolute poverty line is most widely used. There are two absolute poverty lines which are calculated by the GSO and the World Bank: the food poverty line and the overall poverty line. Households on the lower poverty line – the food poverty line – have per capita expenditures which allow them to consume 2100 calories a day, but with no allowance for essential non-food expenditures. Thus any non-food expenditure made by households on or below this poverty line is at the expense of an adequate nutritional intake. The overall poverty line that is referred to most frequently in government statistics and international comparison has an allowance for essential non-food consumption such as clothing and housing. Households on or above the overall poverty line therefore have per capita expenditures which are sufficient to cover nutritional needs and basic non-food needs.

Table 5: Poverty Line in Vietnam 1993 and 1998

Degree of Poverty	Annual Per Capita Expenditure	
	1993 (January 1993; thousand VND)	1998 (January 1998; thousand VND)
Food Poverty	750	1287(\$92)
Overall Poverty	1160	1790(\$128)

*Source: World Bank (2000b)*

In this research, the above poverty line defined by the World Bank will be used to analyze the poverty.

Table 6 show that poverty declined in both rural and urban areas during the period 1993-1998. There were relatively striking decreases in all poverty indices for both areas. The incidence of poverty decreased from 24.9% to 9.2% in the urban areas and from 66.4% to 45.5% in the rural areas. Within each area, poverty is often much higher and more severe in agricultural groups than in non-agricultural groups. In the urban areas, the headcount index in the agricultural group is 17.6%, and other poverty indices are all higher than those in the non-agriculture group. The same story occurs within the rural areas. Although poverty in agricultural groups declined significantly from 70.9% to 49.4% during the period 1993-1998, it

<sup>4</sup> This survey has been conducted annually by GSO of Vietnam since 1994. MPHS covered a narrower range of topics (including household expenditure and incomes, education, health, housing and other assets, and the ownership of durable goods) than the two VLSS surveys but had a much larger sample size (45000 households in 1994 to 1997, and 25000 households after 1997) designed to produce provincially representative statistics. However, the large size of the MPHS sample has led to delays in the processing, analysis and dissemination of the data that it collected.

remains too high compared with the incidence of poverty of 32.3% in non-agricultural groups in the same rural areas.

In spite of the impressive poverty reductions in both urban and rural areas, poverty in Vietnam remains a predominantly rural problem. Nearly one half of rural people live in poverty, while in the urban areas only about one-tenth of the population suffers from poverty. With an 80% share of the whole population in 1993, the poor in rural areas accounted for 91.5% of the poor in the whole country. The higher poverty indices PG and  $P_2$  in rural area indicate that poverty is much deeper and more severe in the rural than in the urban areas.

By regions, the largest reduction in poverty occurred in the Red River Delta with a drop of 34 percentage points in the headcount index from 62.8% to 28.7%. In 1993, it ranked fourth out of the seven regions in terms of the incidence of poverty, but by 1998 it had moved to second in the rankings, following the Southeast where the incidence of poverty also dropped impressively from 32.7% to 7.6% during this period. In contrast, the Central Coast and the Mekong Delta saw only moderate declines in the poverty incidence, with a decline of 14.4 percentage points for the former and only 10.2 percentage points for the latter. The relatively poor performance of the Mekong delta may reflect the fact that Typhoon Linda struck the Mekong Delta in November 1997, which underscores the vulnerability of Vietnam households to risk (Glewwe et al., 2000).

Of seven regions, the three regions Northern Uplands, North Central, and the Central Highlands suffered from the highest and most severe poverty during the period 1993-1998. Although the poverty reductions were striking, the Northern Uplands still showed a high poverty incidence of 58.6%, the Central Highlands 52% and the North Central 48.1%. The depth of poverty measured by poverty indices PG and  $P_2$  remained much more serious than in other regions. The persistence of severe poverty in the Northern Uplands and Central Highlands results from many constraints which these regions face in participating in the growth process. One inherent constraint is a harsh natural environment which limits agricultural development and hinders access to infrastructure for people in these regions.

Table 6: Poverty Indices by Socioeconomic Groups, 1993-1998

	Headcount Index (H) (percent)		Poverty Gap Index (PG)		Squared Gap Index ( $P_2$ )	
	1993	1998	1993	1998	1993	1998
All Vietnam	58.1	37.4	0.185	0.095	0.079	0.036
Urban/Rural						
Urban	24.9	9.2	0.064	0.017	0.024	0.005
<i>Agriculture</i>	43.0	17.6	0.120	0.031	0.046	0.008
<i>Non-Agriculture</i>	21.1	8.2	0.052	0.016	0.019	0.005
Rural	66.4	45.5	0.215	0.118	0.092	0.044

	Headcount Index (H) (percent)		Poverty Gap Index (PG)		Squared Gap Index (P <sub>2</sub> )	
	1993	1998	1993	1998	1993	1998
<i>Agriculture</i>	70.9	49.4	0.234	0.131	0.102	0.050
<i>Non-Agriculture</i>	42.9	32.3	0.117	0.075	0.044	0.026
<b>Regions</b>						
Northern Uplands	78.6	58.6	0.268	0.168	0.118	0.065
Red River Delta	62.8	28.7	0.188	0.057	0.073	0.018
North Central	74.5	48.1	0.247	0.118	0.105	0.041
Central Coast	49.6	35.2	0.168	0.106	0.079	0.047
Central Highlands	69.9	52.4	0.263	0.191	0.139	0.096
Southeast	32.7	7.6	0.092	0.013	0.037	0.004
Mekong Delta	47.1	36.9	0.138	0.082	0.056	0.027
<b>Ethnic Groups</b>						
Kinh Majority	53.9	31.1	0.160	0.071	0.064	0.024
Ethnic Minorities	86.4	75.2	0.347	0.242	0.176	0.106

*Source: Author's Estimate from VLSS 1993 and 1998*

There are 54 ethnic groups in Vietnam, of which the lowland ethnic Vietnamese, known as Kinh, are the dominant group and make up about 85% of the population. Excluding the Chinese, who largely live in urban areas, another 52 ethnic groups constitute the category “ethnic minorities”. These are mostly located in upland areas which are related to the problems of remoteness, inadequate infrastructure and physical and social isolation. People in these areas are very lowly educated and extremely poor.

Between 1993-1998, poverty among the Kinh majority as well as ethnic minorities was reduced. The poverty rate for the Kinh majority fell sharply from 53.9% to 31.1%, and for ethnic minorities declined from 86.4% to 75.2%. The poverty depth in 1998 indicated by the poverty indices PG and P<sub>2</sub> was smaller than that in 1993 for both the Kinh majority and ethnic minorities.

However, poverty remains prevalent and persistent among the ethnic minority population. Seven out of every ten persons in this group was still living in poverty. Poverty was substantially more severe in ethnic minorities than in the Kinh majority. The squared poverty gap P<sub>2</sub> for ethnic minorities in 1998 is equal to 0.106, which is more than four times as much as its value of 0.024 for the Kinh majority.

### 3. METHODOLOGY OF THE CPI ANALYSIS

The changes in prices have substantial effects on households' living standard. They can alter real income and expenditure across people groups. In general the poor tend to spend almost their income on consumption to ensure a certain minimum living standard. So if there is an upsurge in the price of goods that is unfavorable for the poor, the poor might be hurt heavily.

As a result poverty might be increased. This part will present the using of CPI as a cost of living index to analyze the effects of prices changes on the poor.

### **3.1. Consumer Price Index**

The Consumer Price Index (CPI) is an index that measures the rate at which the prices of consumer goods and services are changing from month to month (or from quarter to quarter in a few countries). Such price changes affect the real purchasing power of consumers' incomes and their welfare. The prices are collected from shops or other retail outlets. The month to month price changes for different goods and services are averaged taking into account the amounts that a typical household spends on them. CPIs are official statistics that are usually produced by national statistical offices, ministries of labour or central banks.

The Consumer Price Index (CPI) continues to play an important role in national policy making, both in the economic and in the social sphere. It is used for a wide variety of purposes. Traditionally, one of the main reasons for compiling a CPI was to compensate wage earners and pensioner for inflation by adjusting their wage rates in proportion to the percentage change in the CPI, a procedure known as 'indexation'. It is popularly used as an indicator of inflation. It serves as the barometer of the performance of the economy and a key indicator in evaluating the results of the monetary and fiscal policy in a country. CPI is also important for formulation of social policy measures and in the area of social security and welfare allowances. Beside these, CPI is used as a deflator in national account estimates for converting values at current prices to values at constant prices.

It should be noted that the CPI has three important characteristics (ILO, 2002). They are published frequently, usually every month but sometimes every quarter. They are available quickly, usually about two weeks after the end of the month or quarter. They are also usually not revised. CPIs tend to be closely monitored and attract a lot of publicity.

### **3.2. The CPI Formulas**

There is a very large literature on the subject of CPI . Many different kinds of mathematical formulas have been proposed over the last two centuries. This section will put the focus on three approaches to CPI. The first is the pure price indices those are widely used in official statistics of prices in countries in the world. The second is the symmetric indices which are proposed to correct limitations of the first approach. The third is the economic approach that leads to the construction of a cost of living index (COLI).

### Pure price indices

One of the simplest approaches to the determination of the price index formula was described in great detail by Lowe (1823). His approach to measuring the price change between periods 0 and 1 was to specify an approximate representative commodity basket <sup>5</sup>, which is a quantity vector  $q^0(q_1, \dots, q_n)$ , and then calculate the level of prices in period 1 relative to period 0 as the ratio:

$$P = \frac{\sum_{i=1}^n p_i^1 q_i}{\sum_{i=1}^n p_i^0 q_i}$$

where  $p_i^1$  is the price of item (good or service)  $i$  in the period 1, and  $p_i^0$  is the price of the item  $i$  in the period 0. For simplicity, let's call period 0 the base period and period 1 the current period.

This fixed basket approach to the determination of the price index leaves open the question as to how exactly is the fixed basket vector  $q$  to be chosen?

As time passed, economists and price statisticians demanded a bit more precision with respect to the specification of the basket vector  $q$ . There are two natural choices for the reference basket: the base period 0 commodity vector  $q^0$  or the current period 1 commodity vector  $q^1$ . These two choices lead to the *Laspeyres* (1871) price index and the *Paasche* (1874) price index.

The Laspeyres is defined by the following equation:

$$P_L(p^0, p^1, q^0, q^1) = \frac{\sum_{i=1}^n p_i^1 q_i^0}{\sum_{i=1}^n p_i^0 q_i^0} \quad (3.1)$$

where  $q_i^0$  is the quantity of the item  $i$  in the base period.

And the Paasche index is given by:

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<sup>5</sup> Lowe (1823) suggested that the commodity basket vector  $q$  should be updated every five years.

$$P_p(p^0, p^1, q^0, q^1) = \frac{\sum_{i=1}^n p_i^1 q_i^1}{\sum_{i=1}^n p_i^0 q_i^1} \quad (3.2)$$

where  $q_i^1$  is the quantity of the item  $i$  in the current period.

The above formulas can be rewritten in an alternative manner that is very useful for statistical agencies. Define the period  $t$  expenditure share on item  $i$  as follows:

$$s_i^t = \frac{p_i^t q_i^t}{\sum_{j=1}^n p_j^t q_j^t} \quad \text{for } i = 1, \dots, n \text{ and } t = 0, 1 \quad (3.3)$$

The expenditure share of the item  $i$  can be also called the weight of the item  $i$ .

Using this definition, the Laspayres index can be written as follows:

$$\begin{aligned} P_L(p^0, p^1, q^0, q^1) &= \frac{\sum_{i=1}^n p_i^1 q_i^0}{\sum_{i=1}^n p_i^0 q_i^0} \\ &= \frac{\sum_{i=1}^n \frac{p_i^1}{p_i^0} p_i^0 q_i^0}{\sum_{j=1}^n p_j^0 q_j^0} \\ &= \sum_{i=1}^n \frac{p_i^1}{p_i^0} s_i^0 \end{aligned} \quad (3.4)$$

Thus the Laspeyres price index PL can be written as a base period expenditure share weighted arithmetic average of the  $n$  price ratios,  $p_i^1 / p_i^0$ . The Laspeyres formula has been most widely used to estimate Consumer Price Indices around the world. To implement it, a statistical agency need only collect information on expenditure shares  $s_i^0$  for the index domain of definition for the base period 0 and then collect information on item *prices* alone on an ongoing basis. Thus the Laspeyres CPI can be produced on a timely basis without having to know current period quantity information.

The Paasche index can also be written in expenditure share and price ratio form as follows:

$$\begin{aligned}
P_p(p^0, p^1, q^0, q^1) &= \frac{\sum_{i=1}^n p_i^1 q_i^1}{\sum_{i=1}^n p_i^0 q_i^1} \\
&= \frac{1}{\left[ \frac{\sum_{i=1}^n p_i^0 q_i^1}{\sum_{j=1}^n p_j^1 q_j^1} \right]} = \frac{1}{\left[ \frac{\sum_{i=1}^n \frac{p_i^0}{p_i^1} p_i^1 q_i^1}{\sum_{j=1}^n p_j^1 q_j^1} \right]} \\
&= \frac{1}{\sum_{i=1}^n \frac{p_i^0}{p_i^1} s_i^1}
\end{aligned} \tag{3.5}$$

The main difference between these two above indices is that the expenditure share in the Laspeyres is estimated for the base period, while the Paasche uses the share at the current period. The Paasche index is less useful for official measures because the time needed to estimate these shares from survey data creates a lag in publishing the current value of the index. It also requires more resources costs, because one must estimate a new set of expenditure shares for each successive period in the index series. Thus all most all the countries in the world use the Laspeyres formular to calculate their CPI index.

The problem with the Laspeyres and Paasche index number formulae is that they are equally plausible but in general, they will give different answers. It is shown that if the price and quantity changes (weighted by values) are negatively correlated, then the Laspeyres index exceeds the Paasche. Conversely, if the weighted price and quantity changes are positively correlated, then the Paasche index exceeds the Laspeyres.<sup>6</sup> As consumers are usually price takers, they typically react to price changes by substituting goods or services that have become relatively cheaper for those that have become relatively dearer. This is known as the substitution effect, which implies a negative correlation between the price and quantity relatives. Thus the Laspeyre CPI is normally greater than the Paasche CPI, and the gap between them tending to widen over time. This fact suggests that we need single estimate for the price change between the two periods.

### *Symmetric Indices*

As mentioned above the spread between the Laspeyre CPI and the Paasche CPI is a matter of concern to users, and conceptually, there is no good reason to prefer the weights of one period

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<sup>6</sup> For the mathematical manipulation, see ILO (2002).

to those of the other. In these circumstances, it seems reasonable to take some kind of symmetric average of the two indices. More generally, it seems intuitively reasonable to prefer indices that treat both the periods symmetrically instead of relying exclusively on the weights of only one or other of the periods. According to Diewert (1992), it is very desirable for a price index formula that depends on the price and quantity vectors pertaining to the two periods under consideration to satisfy the time reversal test. The index number formula  $P(p^1, p^0, q^1, q^0)$  satisfies this test if:

$$P(p^1, p^0, q^1, q^0) = \frac{I}{P(p^0, p^1, q^0, q^1)} \quad (3.6)$$

If we interchange the period 0 and period 1 price and quantity data and evaluate the index, then this new index  $P(p^1, p^0, q^1, q^0)$  is equal to the inverse of the original index  $P(p^0, p^1, q^0, q^1)$ . This is a property that is satisfied by a single price ratio and if a measure of aggregate price change satisfies this property, it does not matter which period is chosen as the base period. Put another way, the index number comparison between any two points of time should not depend on the choice of which period we regard as the base period: if we choose the other period as the base period, then our new index number should simply equal the reciprocal of the original index. It should be noted that the Laspeyres and Paasche price indices do not satisfy this time reversal property.

There are many possible symmetric indices which satisfy the time reversal property, but there are three in particular that command a lot of support and are widely used. The first is the Fisher price index  $P_F$ , defined as the geometric average of the Laspeyres and Paasche indices as follows:

$$P_D = (P_L)^{\frac{1}{2}} (P_P)^{\frac{1}{2}} \quad (3.7)$$

The second is the Walsh price index  $P_W$  in which the quantity weights are geometric averages of quantities in the two periods, that is:

$$P_W = \frac{\sum_{i=1}^n p_i^t \sqrt{q_i^t q_i^0}}{\sum_{i=1}^n p_i^0 \sqrt{q_i^t q_i^0}} \quad (3.8)$$

The average of the quantities need to be geometric rather than arithmetic for the relative quantities in both periods to be given equal weight.

The third index is the Törnqvist price index  $P_T$ , defined as a geometric average of the price relatives weighted by the average expenditure shares in the two periods. It is given by the



following equation:

$$P_T = \prod_{i=1}^n \left( \frac{p_i^t}{p_i^0} \right)^{\sigma_i} \quad (3.9)$$

Where  $\sigma_i$  is the arithmetic average of the share of expenditure on commodity  $i$  in the two periods.

$$\sigma_i = \frac{s_i^t + s_i^0}{2} \quad (3.10)$$

where  $s_i$  is the expenditure share of the item  $i$  that is defined in the equation (3.3).

Since the Paasche and Laspeyres price indices are equally plausible but can give different estimates of the amount of aggregate price change between periods 0 and 1, it is useful to consider taking an evenly weighted average of these fixed basket price indices as a single estimator of price change between the two periods.

#### *Cost of Living Index*

The theory of the cost of living index (COLI) was first developed by Konus (1924). It rests on the assumption of optimization behavior of a rational consumer. The COLI for such a consumer has been defined succinctly as the ratio of the minimum expenditures needed to attain the given level of utility, or welfare, under two different price regimes (Pollak, 1989). Whereas a pure price index such as a Laspeyres measures the change in the cost of purchasing a fixed basket of goods and services resulting from changes in their prices, a COLI measures the change in the *minimum* cost of maintaining a given level of utility, or welfare, that results *purely* from changes in the prices of the goods and services consumed.

Let's assume that a consumer minimizes the cost of achieving the period  $t$  utility level  $u^t$  that is defined by a continuous, non-decreasing and concave utility function  $u^t = f(q^t)$ . In the observed period  $t$ , the bundle of consumer goods and service  $q_t$  is the solution to the following cost minimization problem:

$$C(u^t, p^t) = \min_q \left\{ \sum_{i=1}^n p_i^t q_i : u^t = f(q^t) \right\} = \sum_{i=1}^n p_i^t q_i^t; \text{ for } t = 0, 1 \quad (3.11)$$

The solution  $q_t$  to above problem for a general utility level  $u$  and general vector of commodity

prices  $p$  defines the consumer's cost function  $C(u, p)$ .

Then the cost of living index between the period 0 and the period 1 is defined as the ratio of the minimum costs of achieving the same utility level  $u = f(q)$  (Konüs, 1924):

$$P_K(p^0, p^1, q) = \frac{C\{f(q), p^1\}}{C\{f(q), p^0\}} \quad (3.12)$$

Where  $p^0$  and  $p^1$  are the positive price vectors in periods 0 and 1, respectively. The quantity vector  $q = (q_1, \dots, q_n)$  is a reference quantity vector.

Because of the problem in defining the utility function, the COLI is not an operational index that can be calculated directly. The challenge is therefore to see whether it is possible to find methods of estimating a COLI indirectly or at least to find upper and lower bounds for the index.

It follows from the definition of a Laspeyres index that, if the consumer's income were to change by the same proportion as the change in the Laspeyres index, the consumer must have the possibility of purchasing the same basket of products as in the base period. The consumer cannot be worse off. However, if relative prices have changed, a utility maximising consumer would not continue to purchase the same quantities as before. The consumer would be able to achieve a higher level of utility by substituting, at least marginally, products that have become relatively cheaper for those that have become dearer. As a COLI measures the change in the minimum expenditures needed to maintain a constant level of utility, the COLI based on the first period will increase by less than the Laspeyres index.

By a similar line of reasoning, when relative prices change, the COLI based on the second period must increase by more than the Paasche index. The Laspeyres index provides an upper bound to the COLI based on the first period and the Paasche a lower bound to the COLI based on the second period. Suppose that the preferred objective would be to estimate a COLI, but that, for practical reasons, the CPI has to use the Laspeyres formula instead. One important conclusion to be drawn from this preliminary analysis is that the CPI may be expected to have an upward bias. This point has had a profound influence on attitudes towards Laspeyres type CPIs in some countries. As the bias result from the fact that the Laspeyres index does not permit any substitution between products in response to changes in relative prices, it is usually described as 'substitution bias'. A Paasche index would be expected to have a downward substitution bias.

Diewert (1976) shows that that if the preferences can be represented by a homogeneous quadratic utility function, the Fisher index is exactly equal to the COLI. This is one of the more famous results in index number theory (ILO, 2002). Although it is generally agreed that it is not plausible to assume that a consumer's preferences would have this particular functional form, this result does at least suggest that, in general, the Fisher index is likely to

provide a close approximation to the underlying unknown COLI and certainly a much closer approximation than either of the Laspeyres or the Paasche indices on their own.

If the elasticity of substitution between products is available, it is possible to estimate the COLI that allows for substitution by the Lloyd-Moulton index as follows:

$$P_{LM} = \left\{ \sum_{i=1}^n s_i^0 \left( \frac{P_i^t}{P_i^0} \right)^{1-\sigma} \right\}^{\frac{1}{1-\sigma}} \quad \text{with } \sigma \neq 1 \quad (3.13)$$

The parameter  $\sigma$ , which must be non-negative, is the elasticity of substitution between the products covered. It reflects the extent to which, on average, the various products are believed to be substitutes for each other. The advantage of this index is that it may be expected to be free of substitution bias to a reasonable degree of approximation, while requiring no more data than the Laspeyres index. It is therefore a practical possibility for CPI calculation, even for the most recent periods. However, it is likely to be difficult to obtain a satisfactory, acceptable estimate of the numerical value of the ‘elasticity of substitution’, the parameter used in the formula.

### 3.3. The Construction of CPI in Vietnam

The compilation of price statistics has been conducted in Vietnam by the General Statistical Office since 1956. Up to 1989 this was done according to the socialist system with two markets. One was the government sector with the fixed prices, and the other was the free market where the prices were determined by demand and supply. Price indices were then calculated using the Paasche formula. In the context of limited data, this method did not ensure the reliability of the CPI index. Because the Paasche method requires the weights of the good basket to be updated annually.

In 1989 the market economy was introduced in Vietnam. Almost all prices are determined in the free market. The Retail Price Index (RPI) of consumer goods and services is compiled by the Department of Trade and Price of GSO. The Laspeyres formula is used to estimate the RPI.

At the beginning of the year 1998, the consumer price index (CPI) was first calculated and issued in Vietnam. The weights are estimated from data of the Multi-Purpose Household Survey (MPHS) which was done in 1994 and 1995. The weight and price reference periods are both for the whole year of 1995. The Laspeyres formula is applied in the CPI calculation.

Because of changes in the people’s living standard, the weights were revised in the year 2001. The year 2000 is used as the base year, and the weights are constructed from data of the Vietnam Living Standard Survey in 1997-1998 and Expenditure Survey in 10 provinces in

1999.

The CPI is constructed at three levels: provincial level (61 provinces), regional level (8 regions) and the whole country. At each level, the CPI index is estimated for rural and urban areas.

### *The Structure of Items*

In the consumption basket of the year 1995, there are 86 groups of level 3, 34 groups of level 2 and 10 groups of level 1 and around 296 representative items. Goods and services are represented by 236 and 64 items, respectively. The items in the level 3 consist of: Food and foodstuff, Beverage and cigarette, Garment, hat and footwear, Housing and building materials, Household equipment and appliances, Health and personal care, Transport and communication, Education, Culture, sport and entertainment, Goods and other service.

The new basket of the year 2000 is built based on the previous basket. The number of good and service items is up to 400. The items are classified into 138 groups of level 4, 86 groups of level 3, 35 groups of level 2, and 10 groups of level 1. The items in the level 1 are the same as the basket of the year 1995. Appendix 1 presents the structure of the consumption basket in the year 2000.

The good and service items are selected on the following basis:

- Accounting for a high expenditure share among similar items.
- Being popular consumed in the market.
- Their prices have great effects on other items of the same groups.

### *Weights*

In the year 1998 the GSO estimates the weight based on data from of the Multi-Purpose Household Survey (MPHS) that was conducted in the year 1995. The weights then was revised in the year 2001. The date used for the estimation of weights comes from two sources:

- Vietnam living standards survey (VLSS) implemented in 1997-1998.
- Expenditure household survey in 10 provinces and cities that are representative for 8 economic regions in Vietnam. This survey was conducted in the year 2000.

There are two types of weights: the vertical weights that are the expenditures share of items  $i$

in the consumption basket to estimate the price index, and the horizontal weights that are the geographical weights to estimate the retail price of each item.

- The vertical weights: are estimated for the groups from level 1 to level 4. In the weights of the year 1995, the weights are calculated for the groups from level 1 to level 3.

Table 7: Differences in the 1995 Weights and 2000 Weights

1995 Weights		2000 Weights	
Name of Items	Code	Name of Items	Code
VI. Transport means and post services	6	VI. Transport means and post services	6
(1) Transport means	61	(1) Transport means	61
63/ Bike and bike parts	6163	59/ Bike	6159
64/ Motorbike and motorbike parts	6164	60/ Bike parts	6160
- Motorbike	61641	- Bike tyres and tubes	61601
- Motorbike tyres	61642	- Other parts	61602
- Motorbike tubes	61643	61/ Motorbike	6161
- Motor bike chain	61644	62/ Motorbike parts	6162
		- Motorbike tyres and tubes	61621
		- Other parts	61622
		.....	

Source: GSO's Document

The above table shows that in the 1995 weights, the "level 2" item "Transport means and post services" (code of 61) consists of two "level 3" items with the codes of 6163 and 6164. The "level 3" item "Motorbike and motorbike parts" (code of 6164) includes four sub-items with the codes of 61641, 61642, 61643, and 61644. These four items have an equal weight of 25 percents. This is not reasonable because the price of motorbike has dominant effects on the price of the item "Motorbike and motorbike parts". It should have a greater weight. The 2000 weights correct this drawback by dividing the "level 3" items into 138 "level 4" sub-items. Thus items which account for a larger share in people's consumption will have a higher weight in the CPI basket.

Table 8: The 1995 weights and 2000 weights at the level 1

Name of Items	Code	1995 Weights	2000 Weights
Food and foodstuff	0	60.86	47.90
Beverage and cigarette	1	4.09	4.50
Garment, hat and footwear	2	6.63	7.63
Housing and building materials	3	2.90	8.23
Household equipment and appliances	4	4.60	9.20
Health and personal care	5	3.53	2.41
Transport and communication	6	7.23	10.07
Education	7	2.51	2.89
Culture, sport and entertainment	8	3.79	3.81
Goods and other service	9	3.86	3.36
Total		100	100

Source: GSO's Document

At the level 1, the weights are also adjusted to fit the current expenditure structure of the

people. The share of item “Food and foodstuff” in the basket is reduced from 60.86% to 47.9% (Table 8). This decrease is explained by Engel's law stating that the expenditure share on food declines as the economy grows. In contrast, the weights of items related to housing construction and equipment increase during the time 1995-2000.

- The horizontal weights: these weights are based on the expenditure level between the urban and rural areas, and between provinces. The horizontal weights are used to calculate the CPI index of “level 4” items for a province, a region or the whole country. E.g. to calculate the CPI of level 4 for the whole country, the following formula is used:

$$P_i = \frac{\sum_{x=1}^m P_i^x D_t^x}{\sum_{x=1}^m D_t^x} \quad (3.14)$$

where:  $P_i$  is the price index of item  $i$  for the whole country

$P_i^x$  is the price index of item  $i$  for the province  $x$

$D_t^x$  is the horizontal weight of the province  $x$  at the period  $t$

Table 9 shows an example to calculate the price index of item “Paddy” as follows:

$$P_{Paddy} = \frac{(103.9 * 2.0) + (102.5 * 2.7) + (105.5 * 2.6) + \dots + (101.8 * 1.8)}{2.0 + 2.7 + 2.6 + \dots + 1.8} = 103.5$$

Table 9: An Example of the Horizontal Weights

Items	Code	Provincial Weights				
		Hanoi	HCM City	Hai-Phong	.....	Ca-Mau
I. Food and Foodstuff	0					
(1) Foods	01					
1/ Paddy, rice	0101					
Paddy	01011	2.0	2.7	2.6	-	1.8
Normal Ordinary rice	01012					
.....						

Source: GSO's Document

At higher levels, the vertical weights are used to calculate the price indices.

### Data Collection

The collection of price data is undertaken by the General Statistical Office (GSO). Vietnam consists of 61 provinces, and in each province there is a statistical agency belonging to GSO.

The statistical agencies arrange a team including from 2 to 4 persons who conduct the collection of price data. In each province there are from 2 to 7 surveyed areas to collect price data. The number and location of surveyed areas depends on the population and square of the province. The surveyed areas need to be located in both urban and rural areas. Each surveyed area includes a number of representative surveyed spots to collect data on all items in the CPI basket. Surveyed spots, for example are shops and stalls in markets, service shops, transport-administration office, schools, hospitals, tourism companies, sport shops, entertainment centers, etc. The average price of an item of good or service is simple arithmetic mean of the item prices at various surveyed spots.

The price data of each good and service item are collected at surveyed spots three times a month:

- First time is on day 28 of the previous month.
- Second time is on day 8 of the current month.
- Third time is on day 18 of the current month.

The average price of an item in the current month is a simple arithmetic mean of the item prices that are collected three times.

### **3.4. CPI in Analysis of the Poor's Living Cost**

In the research, the CPI will be estimated separately for the poor and the non-poor. There are two reasons to construct an experimental CPI for the poor. The first is to use the CPI as the COLI to explore how price changes affect the living cost of the poor and the non-poor. The second is to determine whether there is a difference in the magnitude between the CPI among various groups. If a significant difference results, this could raise some important implications for funding and eligibility requirements for poverty programs, as well as for the government budgeting and decision-making in general. The rationale for a separate CPI for the poor and the non-poor stems from the fact that the poor are likely to have expenditure pattern different from the non-poor. Kenneth (1958) states that there should be a separate cost of living index number for each income group.

The expenditure inequality in Vietnam is not high as in some developing countries such as Thai Land, China, India. The Gini coefficient is estimated at 0.35 in the year 1998. There is a difference in the expenditure shares between the poor and the non-poor. To identify the poor the research use the poverty line defined by the World Bank. That is, if a person has the expenditure per capita less than 1790 thousands VND (the 1998 price), he/she will be considered as the poor. Table 10 shows that in the year 1998, 61% of the consumption

expenditure of the poor is spent on the items of food and foodstuff, while consumption on food and foodstuff of the non-poor accounts for 45.8% their consumption basket. In contrast the non-poor have a larger basket share of the non-food items than the poor.

Table 10: Composition of Consumption Expenditure by Poverty

Name of Items	1993			1998		
	Vietnam	Poor	Non-Poor	Vietnam	Poor	Non-Poor
<i>Food and Foodstuff</i>	55.24	63.77	44.02	50.58	60.96	45.75
Food	29.37	37.89	18.16	22.07	33.63	16.69
Foodstuff	25.87	25.88	25.86	28.51	27.32	29.06
<i>Non-food and non-foodstuff</i>	44.76	36.23	55.98	49.42	39.04	54.25
Beverage and cigarette	2.69	2.67	2.72	3.49	3.76	3.36
Garment, hat and footwear	6.92	7.52	6.14	5.89	6.82	5.46
Housing and building materials	9.48	8.00	11.41	10.44	9.06	11.08
Household equipment and appliance	3.16	2.66	3.82	7.71	5.91	8.55
Health and personal care	6.37	6.45	6.25	4.96	4.88	5.00
Transport and Communication	9.84	4.37	17.03	6.03	2.05	7.89
Education	2.16	1.83	2.59	4.57	3.36	5.13
Culture, sport and entertainment	1.02	0.61	1.56	2.33	1.00	2.96
Goods and other service	3.12	2.11	4.45	4.00	2.21	4.83
Total	100	100	100	100	100	100

Source: Author's Estimate from VLSS93 and VLSS98

In order to use CPI as a COLI, some assumptions should be made. As defined, a COLI measures the change in the minimum cost of maintaining a given level of utility, or welfare, that results *purely from changes in the prices* of the goods and services consumed. However households' welfare depends on a variety of physical and social factors that have no connection with prices. When events that impinge directly on welfare, such as natural or man made disasters occur, households may need to increase their consumption of goods and services in order to compensate for the loss of welfare caused by those events. Changes in the costs of consumption triggered by events other than changes in prices are irrelevant for a CPI that is not merely defined as measuring changes in the prices of consumer goods and services but is generally interpreted by users as measuring price changes, and only price changes. In order to qualify as a CPI, a COLI must therefore hold constant not only the consumer's preferences but all the non-price factors that affect the consumer's welfare and standard of living. In contrast if a CPI is intended to be a COLI it must be conditional on (ILO, 2002):

- ◆ A particular level of utility or welfare.
- ◆ A particular set of consumer preferences.
- ◆ A particular state of the physical and social environment.

In this paper we define the poor as those who do not have expenditure per capita that allows for allow a consumption level of 2100 calories a day and some essential non-food such as housing and clothing. So a cost of living index for the poor implies the relative change in



the minimum cost that is enough to attain the utility level equivalent to around 2100 calories. This assumption can be reasonable because the average expenditure of the poor does not change substantially in Vietnam. Between 1993-1998, the average expenditure per capita increased from 1240 to 1333 thousands VND<sup>7</sup>. The food poverty line is set up at 1287 thousands VND.

Almost all of the poor in Vietnam are located in the rural areas and engaged in agricultural production. They have share some commons in the household characteristics such as large household size, low accessibility to education and health-care services, and their poor infrastructure location. They a have higher expenditure share on food and foodstuff. To some extent, the poor in Vietnam can be said quite homogenous in consumer preferences and living environment.

To estimate a monthly COLI for the poor, the Laspeyres CPI is used. It is ideal if the Fisher price index  $P_f$  can be estimated to measure the cost of living. This calculation requires the weights of expenditure basket to be updated monthly, and this is not possible in practice. The Laspeyres formula can be said to give a upward substitution bias. However table 10 shows that the consumption basket of the poor have not changed substantially during the year 1990s. Changes in relative prices do not affect the consumption basket of the poor. The substitution effect of the poor can be assumed negligible. Most of expenditure budget of the poor is spent on the food and foodstuff.

To examine how the Fisher and Laspeyres indices differ, the Fisher formula will be used to estimate the change in the cost of living between the year 1993 and 1998. The estimation is based on the Vietnam living standard survey that was conducted in the year 1993 and 1998.

To estimate the consumption basket of the poor and the non-poor, the study relies heavily on the use of a household data set from the 1993 and 1998 Vietnam Living Standards Surveys (VLSS). As for the data on the price of good and service items, the research uses the monthly price of 10 items in “level 1” group. For some groups which account for a large share in the basket, the data on prices of more detailed items such as rice and meat are used. These data are collected by the GSO.

## **4. EMPIRICAL RESULTS**

### **4.1. Laspeyres Formula in CPI Estimation**

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<sup>7</sup> These values are estimated from VLSS93 and VLSS98, and given in the January 1998 price.

The table 11 presents the weights of the consumption basket that are classified into ten commodity and service groups. These represents the average expenditures shares for the year 1998. The weights are estimated for four groups: the whole population, the ultra-poor, the poor and the non-poor.

Table 11: The Consumption Basket in 1998

Code	Name of Items	Total	Ultra-Poor	Poor	Non-Poor
0	<i>Food and foodstuff</i>	50.53	64.38	60.95	45.68
1	Food	22.05	39.54	33.63	16.67
2	Foodstuff	28.47	24.85	27.32	29.01
	<i>Non-Food and foodstuff</i>	49.47	35.62	39.05	54.32
1	Beverage and cigarette	3.48	4.11	3.76	3.35
2	Garment, hat and footwear	5.89	6.71	6.82	5.45
3	Housing and building materials	10.42	8.71	9.05	11.05
4	Household equipment and appliance	7.70	5.00	5.91	8.53
5	Health and personal care	4.96	4.41	4.88	4.99
6	Transport and Communication	6.02	1.43	2.05	7.86
7	Education	4.70	2.89	3.37	5.32
8	Culture, sport and entertainment	2.33	0.68	1.00	2.95
9	Goods and other service	3.99	1.69	2.21	4.82
	Total	100.00	100.00	100.00	100.00

*Source: Author's Estimate from VLSS 1998*

It should be noted that there is a little difference between the weights in table 11 and the weights in table 10. This is because VLSS93 and VLSS98 differ in some expenditure items. The weights in table 11 are calculated from full expenditure items of VLSS98, while the weights in table 10 are estimated based on VLSS93 and the data of VLSS98 which is adjusted to be comparable with the data of VLSS93.

The ultra-poor are those who have expenditure per capita lower than food poverty line defined by the World Bank (Table 5). It is shown that the very poor consume a relatively larger budget share on the food items. They spend 40% of the budget on the food items, while the non-poor spend only 16.7% on the food items. In contrast the share of the non-food and non-food stuff in the basket of the poor is lower than that of the non-poor. With low budget, the poor have to spend almost their money on subsistence items. The limited budget does not allow for relevant expenditure on education and health-care. Especially, the expenditure on culture, sport and entertainment is really luxuries for the poor.

Using the Laspeyres formula, the CPIs are estimated for the poor, the very poor and the non-poor. This CPI can be used to give an approximate estimation of COLI. Table 12 presents the yearly CPI for difference groups of population. The GSO-CPI is the official CPI calculated by the General Statistical Office of Vietnam, while the total is the CPI of the whole population that is estimated by this research using the price index of 11 aggregate items of goods and services and the VLSS 1998. Figure 1 and table 12 show that during the period 1994-1997, there is not a significant difference in the CPI between the poor and the non-poor. In the three

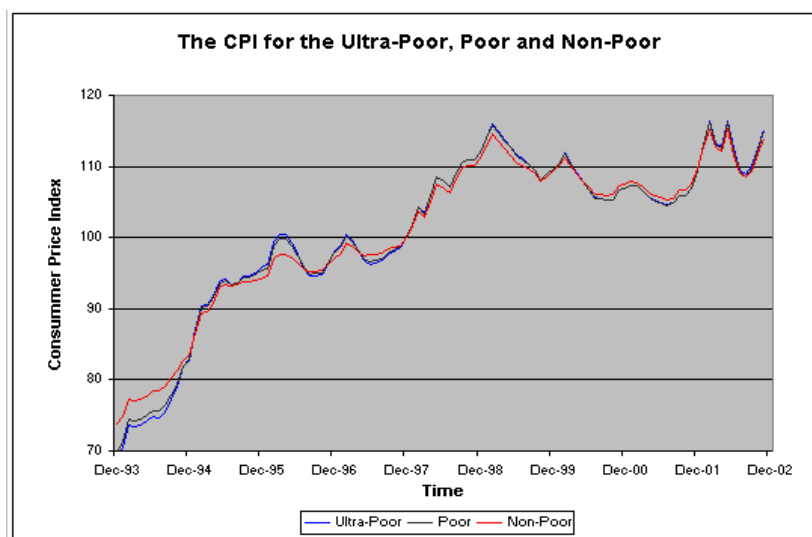
following years 1997-1999, the CPI for the poor is slightly higher than for the non-poor. Then the CPI is higher for the non-poor than for the poor during the period 1999-2001.

Table 12: CPI by Different Population Groups (December 1997 = 100)

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>GSO-CPI</i>	77.34	90.48	95.29	98.96	105.90	110.57	108.77	108.39	112.54
<i>Total</i>	78.30	92.26	96.50	98.32	107.17	111.10	107.78	106.64	112.22
<i>CPI by Poor and Non-Poor</i>									
Ultra-Poor	75.92	92.88	97.32	98.15	107.74	111.74	107.64	106.22	112.81
Poor	76.63	92.68	97.10	98.26	107.68	111.61	107.60	106.21	112.59
Non-Poor	78.99	92.08	96.25	98.35	106.93	110.86	107.86	106.84	112.06
<i>CPI by Expenditure Quintiles</i>									
1	76.51	92.71	97.13	98.24	107.70	111.65	107.61	106.20	112.64
2	77.60	92.39	96.76	98.38	107.54	111.39	107.58	106.24	112.29
3	78.37	92.11	96.43	98.43	107.29	111.14	107.66	106.45	112.11
4	79.47	91.91	96.04	98.35	106.72	110.65	107.88	106.97	111.90
5	80.88	91.90	95.68	98.21	106.02	110.14	108.38	107.86	111.92

Source: Author's Estimate from VLSS98 and GSO's Data on Price

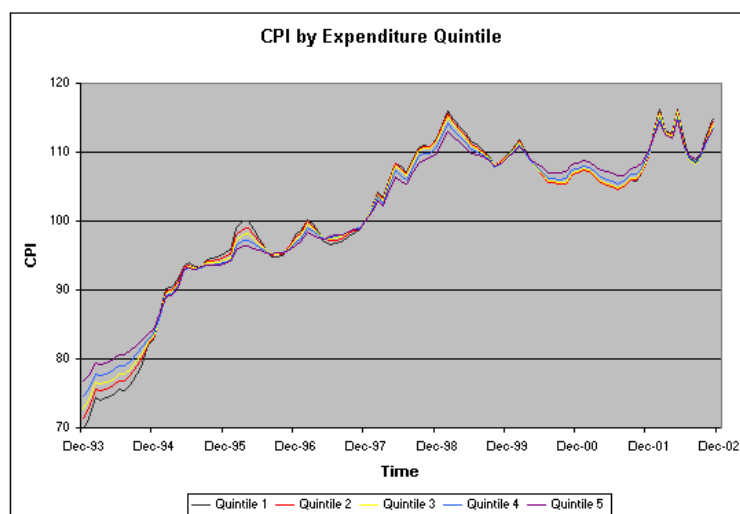
Figure 1: The Monthly CPI for the Poor and the Non-Poor



Source: Author's Estimate from VLSS98 and GSO's Data on Price

Figure 2 shows the CPIs of the expenditure quintiles. It is shown that the CPI of the lowest expenditure quintile went up and was higher than that of the highest expenditure quintile during the period 1997-1999. Then the CPI experienced a decrease in the next two years, and the CPI for the low expenditure group decreased faster than for the high expenditure group. However there is not a large difference between the CPIs of expenditure quintiles. Table 12 shows that the yearly value of the CPI of quintile do not very significantly for different quintiles.

Figure 2: The Monthly CPI by Expenditure Quintiles



Source: Author's Estimate from VLSS 1993

The weights in the basket by the expenditure quintiles are given in the table 13. The very low expenditure quintile have a very high share of food items and low share of non-food items. The poorest group spend about 62% of their budget on the food and foodstuff items, while the richest spend only 33% of their budget on the food and foodstuff item. The limited budget of the poor group does not allow for a large expenditure on the non-food item. Especially the expenditure share of education in the poorest group's consumption basket is just 3.25%. In the absolute value, the educational expenditure of the poorest group must be very small. However it is interesting that the poor consume a relatively large amount of beverage and cigarette. Their budget share on this item reaches 3.73%, while the corresponding share of the richest group is 2.94%.

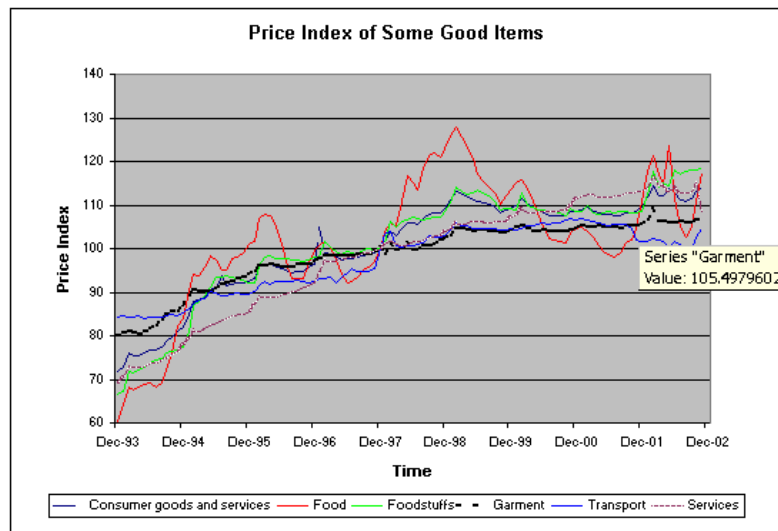
Table 13: The Consumption Basket by Expenditure Quintile in 1998

Code	Name of Items	1	2	3	4	5
0	Food and foodstuff	61.94	55.62	50.58	42.42	32.58
1	Food	35.13	25.46	19.81	13.63	7.18
2	Foodstuff	26.81	30.15	30.77	28.78	25.40
	Non-food and non-foodstuff	38.06	44.38	49.42	57.58	67.42
1	Beverage and cigarette	3.73	3.73	3.47	3.28	2.94
2	Garment, hat and footwear	6.86	6.55	6.09	5.14	3.84
3	Housing and building materials	9.03	9.40	10.11	11.39	13.60
4	Household equipment and appliances	5.61	7.28	8.12	8.64	10.26
5	Health and personal care	4.71	5.15	5.15	5.38	4.35
6	Transport and Communication	1.87	3.20	5.05	8.83	15.37
7	Education	3.25	4.09	4.65	5.71	7.01
8	Culture, sport and entertainment	0.96	1.56	2.31	3.37	4.65
9	Goods and other service	2.04	3.43	4.47	5.85	5.41
	Total	100.00	100.00	100.00	100.00	100.00

Source: Author's Estimate from VLSS 1993

The difference in the CPI between the poor and the non-poor can be explained by the fluctuation in the price of rice and meat over time. This fact is common in the developing countries, in which the expenditure in food and foodstuff accounts for a very large share in the consumption basket. Figures 3 shows that the price of food fluctuates with a large magnitude during the period 1994-2002. It went up to the peak in the early 1999, and decreased in the next year, then increased in the late 2002. When the price of rice rises, the CPI for the very poor increases more rapidly for the non-poor. Thus the difference in the CPI between the poor and non-poor tends to be larger. However the price of other aggregate good items change in a similar direction over time, which explains why the CPI do not varies significantly from the ultra-poor to the non-poor groups.

Figure 3: The Price Index of Some Goods



Source: Author's Estimate from VLSS98 and GSO's Data on Price

#### 4.2. Fisher Index Estimation and Substitution Bias

As discussed in section 3 it is ideal to use the Fisher index to measure the price changes as well as cost of living changes. Table 14 presents the estimates of the Laspeyres, Paasche and Fisher indices over the period 1994-1997. The expenditure shares estimated from VLSS 1993 and VLSS 1998 are used as the base weights in the year 1994 and current weights in the year 1997, respectively. It is shown that there is not a significant difference between the values of various indices. The value of the indices is highest for the ultra-poor and lowest for the non-poor.

Table 14: Price Indices and Substitution Bias in Laspeyres Index, 1994 and 1997

	1994	1997			
		Laspeyres	Paasche	Fisher	Laspeyres Bias
Total	100	126.30	125.58	125.94	1.40
Ultra-Poor	100	132.24	129.31	130.77	4.79
Poor	100	129.51	128.01	128.76	2.61
Non-Poor	100	124.91	124.49	124.70	0.85

The Laspeyres index is upper bound on the true cost of living index. It is said to have an upward substitution bias. According to Thesia et al. (1996), the percentage difference between the Fisher's ideal index and the corresponding Laspeyres index can represent the degree of substitution bias of the Laspeyres index. The substitution bias is given by the following equation:

$$B_s = \frac{P_L - P_F}{P_F - 100} * 100$$

It is shown that the bias appears to be higher for the ultra-poor and the poor. It means that for the very poor group the Laspeyres index overestimates their cost of living. With a limited budget the poor tends to have good substitution to ensure a certain level of living standard. This suggests a remarkable point that if the basket weights are not revised frequently the Laspeyres index can present a significant bias from the cost of living, and this bias tends to be higher for the poor group.

## 5. CONCLUSION

The paper aims to use the Laspeyres CPI to examine the change in the cost of living of the poor during the period 1990s. The poor, especially the ultra-poor, have a very large expenditure share of the food and foodstuff. In the year 1998 the poor and the ultra-poor spend 61% and 64% of their expenditure budget on the food and foodstuff, respectively. As a result the CPI of the poor that indicates their cost of living will increase faster for the non-poor when the price of food and foodstuff increase, and vice versa. However the difference in the CPI between the poor and the non-poor is not significant, especially during the period 1997-2002. This is because the non-poor also have a relatively large expenditure share of food and foodstuff (46%). In addition the price of other non-food and non-foodstuff items such as garments, transportation, services and education changes in a similar direction.

The research tries to estimate the Fisher index during the period 1994-1997 to explore how well the Laspeyres index can serve as the cost of living index. It is shown that the Laspeyres results in an upward substitution bias, and the bias appears to be higher for the ultra-poor and the poor. It means that for the very poor group the Laspeyres index overestimates their cost of living. With a limited budget the poor tends to have substitution to ensure a

certain level of living standard. This suggests a remarkable point that if the basket weights are not revised frequently the Laspeyres index can present a significant bias from the cost of living, and this bias tends to be higher for the poor group.

Finally because there is not a significant difference in the CPI between the poor and the non-poor and the whole population, it is concluded that the official CPI can be used as an approximate index of living cost of the poor as well as the non-poor for a medium- time from one to three years.

## REFERENCES

- Atkinson, A. B. (1987), *On the Measurement of Poverty*, *Econometrica* Vol. 55, 1987, page: 749-764.
- Bowley, A.L. (1901), *Elements of Statistics*, Westminster: Orchard House.
- Deaton, A. (1997), *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*, Policy Research Department of the World Bank, Washington, DC, World Bank.
- Diewert, W.E. (1992), "Fisher Ideal Output, Input and Productivity Indices Revisited", *Journal of Productivity Analysis* 3, 211-248.
- Fisher, I. (1911), *The Purchasing Power of Money*, London: Macmillan.
- Fisher, I. (1921), "The Best Form of Index Number", *Journal of the American Statistical Association* 17, 533-537.
- Fisher, I. (1922), *The Making of Index Numbers*, Houghton-Mifflin, Boston.
- Fisher, W.C. (1913), "The Tabular Standard in Massachusetts History," *Quarterly Journal of Economics* 27, 417-451.
- Glewwe, P., Gragnolati, M., and Zaman, H. (2000), "Who Gained from Vietnam's Boom in the 1990s? An Analysis of Poverty and Inequality Trends", *Poverty and Human Resources*, Development Research Group, World Bank.
- Government (2001). National Target Program "Hunger Eradication and Poverty Reduction, and Employment in the Period 2001-2005", Issued in line with the Decision No. 143/2001QD-TTg of the Prime Minister.
- Kakwani, N. C. (1980), *Income Inequality and Poverty: Methods of Estimation and Policy Applications*, World Bank Research Publication, Oxford University Press.
- Kenneth J. Arrow, "The Measurement of Price Changes" in *The Relationship of Prices to Economic Stability and Growth* (Joint Economic Committee, U.S. Congress, March, 31, 1958)
- Konus A. (1939), "The Problem of the True Index of the Cost-of-Living," (1924), *Econometrica* 7, 1939, pp. 10-29.
- MOLISA (2000), Drafted Strategy of Hunger Eradication and Poverty Reduction in the period 2001-2010, Documents for Conference in MOLISA, August 2000.
- Nguyen Thi Hang & Nguyen Van Thieu (1991). "Poverty in Vietnam: Performance. current



situation and assessments". In "Poverty in Vietnam" Conference. Hanoi.

Pollak, Robert A., (1989), *The Theory of the Cost-of-Living Index*, Oxford University Press, New York.

Ravallion, M. (1992), "Poverty Comparisons: A Guide to Concepts and Methods", *Living Standard Measurement Study*, Working Paper No. 88, World Bank.

Robert H. (1982), "The Variability of Inflation Rates across Household Types", *Journal of Money, Credit, and Banking*, November 1982.

Robert M. (1979), "Variation in across Households in the Rate of Inflation", *Journal of Money, Credit, and Banking*, February 1979.

Thesia I. Gamer, David S. Jonhson, and Mary F.Kokoski (1996), "An Experimental Consumer Price Index for the Poor", *Monthly Labor Review*, September 1996.

World Bank (2000a), *World Development Report*, New York and Washington: Oxford University Press and World Bank.

World Bank (2000b), *Vietnam Development Report 2000: Attacking Poverty*, Hanoi, Vietnam. Available via internet at: <http://worldbank.org.vn>