Decomposing Poverty Change into Growth and Distribution Effects Revisited

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ABSTRACT

This paper proposes a new method decomposing poverty change into growth and distribution effects (GE and DE) by employing the mode of expenditure to observe the sensitive movement of poor that is not captured by the mean-based decomposition, conventionally-used function. After deriving rigorous probability function of expenditure supposing lognormal distribution using maximum likelihood estimation, the new method decomposes the poverty change based on the mode of expenditure distribution. The empirical analysis employs the bottom 40 percent of the population in Vietnam by decile and area from 1993 to 2014, where significant poverty reduction has been taken place. The results show the expenditure increase has been largely induced by GE across areas and the deciles of the bottom 40 percent. DE for poverty change is small and even negative in the bottom 10 and 20 percent. The results support prioritizing growth-enhancing policies for speedy poverty reduction while reinforcing time-consuming redistribution system.

Keywords: Growth-Distribution Decompositions of Poverty Change, Poverty Measurement, Mode-based Decomposition, Expenditure Distribution, Patterns of Development

JEL: D31, O15, I320, O11

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1. INTRODUCTION

This paper decomposes the poverty change into growth and distribution effects by employing a new decomposition method based on the mode of expenditure distribution, given the left-skewed feature of expenditure distribution, rather than taking the mean of distribution to consider the sensitive movement of poor. To understand the mechanism of poverty change, especially in relation to growth and distribution, many economists have worked on decomposing poverty change into two components: growth effect (GE) and distribution effect (DE) (e.g. Kakwani and Subbarao, 1990; Jain and Tendulkar, 1990; Ravallion and Huppi, 1991; Datt and Ravallion, 1992; Kakwani, 1993, Kakwani, 2000; and Bourguignon, 2004). The conventional idea of growth–distribution decompositions (GDD) of poverty change is that the change of poverty can be decomposed into GE and DE, which is expressed as a function of growth in mean income/expenditure and change in distribution (equation 1)².

\[ \text{Mean poverty change} = F(\text{Growth, Distribution}) \] (1)

Kakwani (2000) showed poverty change is decomposed into growth and distribution components, too. Suppose a function of poverty that is explained by poverty line \( z \), mean income \( \mu \), which can be substituted by mode income or expenditure, and the Lorenz curve \( L(p), p = 0 \sim 1 \) given by

\[ \theta = \theta(z, \mu, L(p)). \] (2)

Change in poverty between period \( i \) and \( j \) is represented as

\[ \Delta \theta_{ij} = \theta(z, u_j, L_j(p)) - \theta(z, u_i, L_i(p)) \] (3)

where mean incomes \( \mu_i \) and \( \mu_j \) are adjusted for price changes between two periods and the poverty line does not change. Suppose the GE between year \( i \) and \( j \) by \( G_{ij} \) and DE by \( D_{ij} \), then the change in poverty between period \( i \) and \( j \) is described as

\[ \Delta \theta_{ij} = G_{ij} + D_{ij} \] (4)

where function form depends on axioms as follows.

If \( G_{ij} = 0 \), then \( \theta_{ij} = D_{ij} \) and if \( D_{ij} = 0 \), then \( \theta_{ij} = G_{ij} \)

\[ \therefore G_{ij} = D_{ij} = \theta_{ij} = 0, \text{ then } \theta_{ij} = \theta(z, u_j, L_j(p)) - \theta(z, u_i, L_i(p)) = 0 \]

(Axiom 1)

If \( G_{ij} = D_{ij} = 0 \), then \( \theta_{ij} = 0 \)

² Bourguignon (2004) visually shows the idea of growth-distribution decomposition of poverty change based on the mean of distribution. He clearly defines that GE is the percentage change in mean welfare level measured by income or expenditure (Bourguignon, 2004, p5).
\[ G_{ij} = D_{ij} = \theta_{ij} = 0, \text{then } \theta_{ij} = \theta(z, u_j, L_j(p)) - \theta(z, u_i, L_i(p)) = 0 \]

\text{(Axiom 2)}

If \( G_{ij} \leq 0 \) and \( D_{ij} \leq 0 \), then \( \theta_{ij} \leq 0 \), and if \( G_{ij} \geq 0 \) and \( D_{ij} \geq 0 \), then \( \theta_{ij} \geq 0 \)

\[ G_{ij} = -G_{ji} \text{ and } D_{ij} = -D_{ji} \]

\text{(Axiom 3)}

Therefore, the total change of poverty is decomposed into (i) GE without distributional change \( (G_{ij}) \) and (ii) DE without growth change \( (D_{ij}) \), which is given as

\[ G_{ij} = 1/2 \left\{ \theta[z, \mu_j, L_j(p)] - \theta[z, \mu_i, L_i(p)] \right\} + 1/2 \left\{ \theta[z, \mu_j, L_j(p)] - \theta[z, \mu_i, L_i(p)] \right\} \]

\[ D_{ij} = 1/2 \left\{ \theta[z, \mu_i, L_i(p)] - \theta[z, \mu_i, L_i(p)] \right\} + 1/2 \left\{ \theta[z, \mu_j, L_j(p)] - \theta[z, \mu_j, L_j(p)] \right\} \]

\text{(5)}

\text{(6)}

That is, the poverty change is expressed by the GE without distributional change and DE without growth change described as follows

\[ \Delta P_{ij} = G_{ij} + D_{ij} \]

\text{(7)}

In a normal distribution, the equality relationship holds among mode, median and mean. However, when it comes to personal wealth measured by income or expenditure, the distribution follows lognormal distribution according to Gibrat’s law (Gibrat, 1931) with the left-skewed shape, indicating that most of the population is relatively poor (e.g. less than the half of average income) and the small number of people is rich. In a general wealth distribution, including Vietnam, the following inequality relationship holds: \text{mode} < \text{median} < \text{mean}. This inequality relationship implies important implication that the summary statistics should consider the mode rather than income for the analysis focusing on the income or expenditure of poorer population.

Also, in the decomposition described in the function (7), there has been a debate regarding whether or not there should be residual in the poverty change function \( (l) \). Ravallion and Huppi (1991) and Datt and Ravallion (1992) insist that the residual exists in the function of poverty change whenever the poverty measure is not additively separable between mean income and Lorenz curve (inequality). Therefore, they argue the residual is thus allocated to either growth or distribution components in the function that omits the residual (Datt and

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\[ ^3 \text{Datt and Ravallion (1992) propose a variant decomposition with additional large residual term, but this residual does not have clear meaning because the change in poverty is precisely explained by growth and distribution effects in theory. Also, Jain and Tendulkar (1990) propose a similar decomposition that is without residual, but it does not satisfy Axiom 3. Therefore, the Kakwani and Pernia (2000) decomposition is deemed to be better theoretically.} \]
Ravallion, 1993). However, as in the argument of Kakwani (1993), the residual should not exist in the function in theory, because poverty change can be exactly separable into two components in growth or distribution. Hence, efforts to minimize the measurement error that can be expressed as the residual in the arguments by Ravallion and Huppi (1991) and Datt and Ravallion (1992) are required. To deal with this issue, firstly, I employ Maximum Likelihood Estimation (MLE) supposing lognormal distribution to estimate the expenditure distribution of the country, then decomposes poverty change into GE and DE.

**Vietnam as a country case study**

For the empirical analysis of GDD of poverty change, this paper chooses Vietnam—a good country case study for analyzing the relationships of poverty, growth and distribution. Vietnam has been one of the most successful countries in reducing absolute poverty along with promoting higher and more stable economic growth over the past 30 years. Vietnam launched the *DoiMoi* reforms in 1986, aimed at liberalization and integration into the international economy, with effects spanning the period between 1986 and the 1990s. Since the introduction of *DoiMoi*, the basis for the economic development has been strengthened, then the benefit of economic development leads to social development thereafter. The real GDP growth rate in Vietnam inched up from five percent (constant prices with 2010 base year) on average in the 1980s to 7.4 in the 1990s, and 6.6 on averages in the 2000s, according to my compilations using the World Development Indicators (WDI) of the World Bank. While the real GDP growth rate has decelerated to 5.9 percent on average over the past five years, 2011-2015, it still maintains robust growth compared to the averages of other countries in East Asia and the Pacific (4.4 percent), Lower–Middle Income Economies⁴ (4.9 percent) and the world (2.8 percent).

Economic reforms conducted between the 1980s and 1990s in Vietnam, particularly in the areas of macroeconomic stabilization, were the trade liberalization, introduction of positive real interest rates and initial property rights reform in agriculture, which contributed to the rapid economic growth of the 1990s (Dollar, 2002). Subsequent reforms induced the major steps for streamlining production in agriculture and facilitating foreign investments⁵. In addition, Vietnam has also strengthened the external partnerships that foster economic integration to the world⁶. Poverty in Vietnam was 2.4 percent of the poverty headcount ratio at 1.25 international

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⁴ Lower-Middle Income Economies are those with a GNI per capita between $1,026 and $4,035 defined by the World Bank.

⁵ The reforms include the de–collectivization of agriculture in 1988, the 1992 Law on Enterprises, the creation of tradable land–use rights under the 1993 Land Law, the 1996 Foreign Investment Law, and the liberalization of the trade regime (World Bank and Ministry of Planning and Investment (MPI) of Vietnam, 2016, p80).

⁶ Restarting Official Development Assistance (ODA) from Japan in 1992; diplomatic normalization with the U.S. in 1995; accession to the Association of Southeast Asian Nations (ASEAN) in 1995; becoming a member of Asia–Pacific Economic Cooperation Conference (APEC) in 1998; and accession to World Trade Organization (WTO) in 2007, among others.
dollars a day (2005 PPP) in 2012, a monumental improvement from 63.8 percent in 1993\(^7\) (Table 1). Similarly, the severity measurement of poverty index, poverty gap index and the squared poverty gap index show significant improvement—the poorest of the poor has increased their living standards as measured by expenditure. Inequality in Vietnam as measured by Gini index is in the lowest level in the world. In addition, the Gini index in Vietnam has maintained fairly stable movement on the average of 36.5 with standard deviation 1.3 during the period of 1992-2012, using 1.25 international dollars a day as the poverty threshold with 2005 PPP dollars from PovcalNet of the World Bank (Table 1).

**Table 1: Expenditure poverty and inequality index in Vietnam**

<table>
<thead>
<tr>
<th>Survey year</th>
<th>Poverty line</th>
<th>Poverty head count ratio (%)</th>
<th>Poverty gap ratio (%)</th>
<th>Poverty gap square ratio (%)</th>
<th>Gini index</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1.25</td>
<td>2.44</td>
<td>0.55</td>
<td>0.24</td>
<td>35.62</td>
</tr>
<tr>
<td>2010</td>
<td>1.25</td>
<td>3.93</td>
<td>0.84</td>
<td>0.33</td>
<td>39.25</td>
</tr>
<tr>
<td>2008</td>
<td>1.25</td>
<td>16.82</td>
<td>3.74</td>
<td>1.24</td>
<td>35.57</td>
</tr>
<tr>
<td>2006</td>
<td>1.25</td>
<td>21.44</td>
<td>5.31</td>
<td>1.87</td>
<td>35.75</td>
</tr>
<tr>
<td>2004</td>
<td>1.25</td>
<td>31.40</td>
<td>8.45</td>
<td>3.03</td>
<td>36.81</td>
</tr>
<tr>
<td>2002</td>
<td>1.25</td>
<td>40.07</td>
<td>11.21</td>
<td>4.10</td>
<td>37.55</td>
</tr>
<tr>
<td>1998</td>
<td>1.25</td>
<td>49.36</td>
<td>14.90</td>
<td>5.38</td>
<td>35.51</td>
</tr>
<tr>
<td>1992</td>
<td>1.25</td>
<td>63.76</td>
<td>23.59</td>
<td>11.02</td>
<td>35.68</td>
</tr>
</tbody>
</table>

Source: Author based on PovcalNet, the World Bank

Given the development of past studies and the country context of Vietnam as discussed above, this study contributes to the literature in several ways. First, this study proposes a new measurement approach using mode of expenditure distribution when I decompose expenditure change into GE and DE, rather than taking mean of expenditure distribution that is used by the previous studies. The mode is better to look closely at the change of the largest number of poorer segment compared to the mean. Second, this study follows the idea that welfare change is exactly decomposed into GE and DE without the residual. That is, to minimize the measurement errors in the residual term, I firstly employ Maximum Likelihood Estimation (MLE) supposing lognormal distribution to estimate the expenditure distribution of the country, then decomposes poverty change into GE and DE which is not explicitly materialized in the past studies such as Kakwani and Subbarao (1990), Kakwani (1993) and Kakwani (2000). Third, this study analyzes the dynamics of expenditure

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\(^7\) Source: PovcalNet, the World Bank. These data are adapted from the World Bank’s PovcalNet, based on the World Bank’s 1.25 international dollars a day using Purchasing Power Parity (PPP) exchange rates for household expenditure from the 2005 International Comparison Program, with data from more than 1,000 household surveys across 128 developing countries and 21 high-income countries. For reference purpose, I show the result of the poverty and inequality index using 1.90 international dollars a day poverty thresholds with 2011 PPP exchange rates for household expenditure from the 2011 International Comparison Program with data from more than one thousand household surveys across 138 countries in six regions, and 21 other high income countries.
change in each decile of the bottom 40 percent by area (whole of country, urban and rural) in each survey year rather than just looking at those who are below specific poverty lines, as in the former studies. By doing so, the sensitive changes of elasticity in GE and DE to poverty variation can be observed by decile and area. Fourth, this study considers two ways of measuring GE and DE by shifting either initial distribution or new distribution to calculate poverty change as described in Figure 1 and 2, although previous literatures seem to depend only on one measurement, which is induced by the shift of initial distribution to the new distribution. Fifth, this study employs two decades of surveys in Vietnam, VLSS/VHLSS, during the period of 1993–2014, to examine the change of GE and DE over the long time.

The structure of this paper is organized as follows. Section 2 argues the methodology and data description. Section 3 describes the analytical results of GDD of poverty change by decomposition method, area and survey year. Section 4 concludes.

2. METHODOLOGY AND DATA
2.1. METODOLOGY
2.1.1. ESTIMATION OF WELFARE DISTRIBUTION

To estimate the expenditure distribution of the country, I employ Maximum Likelihood Estimation (MLE) supposing lognormal distribution. MLE allows estimation of the parameters of a statistical model with the mean and standard deviation (SD) or variance calculated by some restricted samples given lognormal distribution. Suppose there are a random samples \(X_1, X_2, X_3, \ldots, X_n\), where probability distribution depends on the parameter \(\theta\). The name of maximum likelihood is derived from the idea that a good estimate of the unspecified \(\theta\) would be the \(\hat{\theta}\) that maximizes the likelihood of the obtained sample data. Given point estimate of \(\theta\) is \(x_1, x_2, x_3, \ldots, x_n\), the probability density function of each \(X_i\) is \(f(x_i; \theta)\). A random sample of probability density function \(X_1, X_2, X_3, \ldots, X_n\) can be expressed as the equation 8.

\[
L(\theta) = P(X_1 = x_1, X_2 = x_2, X_3 = x_3, \ldots, X_n = x_n) \\
= f(x_1; \theta) \cdot f(x_2; \theta) \cdot f(x_3; \theta) \cdot f(x_n; \theta) \\
= \prod_{i=1}^{n} f(x_i; \theta) \tag{8}
\]

Gibrat’s law (Gibrat, 1931) provides a foundation explaining that income distribution follows log normal distribution\(^8\). Thereafter, Friedman (1957) argues expenditure is approximately the same as income. Also, Battistin and Blundell (2009) show that expenditure has better fitting to lognormal distribution compared to income. By following to Gibrat (1931), Friedman (1957), and Battistin and Blundell (2009), I estimate the expenditure distribution using lognormal distribution in this paper\(^9\). Suppose \(x\) is a lognormal distributed random variable, and \(\mu\) and

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\(^8\) Pareto’s Law (1897) fits to the tail (very high income) of income distribution.

\(^9\) To check the fitting of expenditure data to logarithm normal distribution, Shapiro-Wilk test and Chi-Squared Goodness of Fit test can be employed.
σ are unknown mean and SD, respectively. Lognormal probability density function and its mean and SD are described as the equations 9, 10 and 11.

\[
F(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left(-\frac{[\ln(x) - \mu]^2}{2\sigma^2}\right), \quad x \in (0, \infty) \quad (9)
\]

Mean = \exp(\mu + \frac{\sigma^2}{2}) \quad (10)

SD = 2^{2\mu + \sigma^2}[\exp(\sigma^2 - 1)] \quad (11)

2.1.2. GROWTH–DISTRIBUTION DECOMPOSITIONS OF WELFARE CHANGE

Calculations of GE and DE

Following the ideas described in the equations from 1 to 7, the decompositions are conducted using the lines in each decile of the bottom 40 percent in each area and survey year based on the mode of distribution. There are two ways to calculate GE and DE depending on which distributions move first, either initial distribution to the right (IDTR, Figure 1) or new distribution to the left (NDTL, Figure 2). For the sake of comparing the difference between IDTR and NDTL, Section 3.2. shows configuration comparison of GE and DE by the two decomposition types—IDTR and NDTL. Also, I calculate GE and DE as an average of both ways in Section 3.3 to verify the mechanism of GDD of poverty change in the long-term.
Figure 1: Growth and distribution decompositions of poverty and distributional changes: Shift of IDTR

Source: Author
Figure 2: Growth and distribution decompositions of poverty and distributional changes: Shift of NDTL

Source: Author
2.2. DATA

This paper employs real per capita expenditure (RPCE) from the Vietnam Living Standard Surveys (VLSSs) 1993 and 1998; and the Vietnam Household Living Standards Surveys (VHLSSs) in 2004, 2006, 2008, 2010, 2012 and 2014 as a measurement of welfare. VLSS and VHLSS are nationally representative household surveys primarily conducted by the General Statistical Office (GSO) of Vietnam with technical assistance from the World Bank

<table>
<thead>
<tr>
<th>Survey Year</th>
<th>Urban</th>
<th>Rural</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>960</td>
<td>3,839</td>
<td>4,799</td>
</tr>
<tr>
<td>1998</td>
<td>1,730</td>
<td>4,269</td>
<td>5,999</td>
</tr>
<tr>
<td>2002</td>
<td>6,909</td>
<td>22,621</td>
<td>29,530</td>
</tr>
<tr>
<td>2004</td>
<td>2,250</td>
<td>6,939</td>
<td>9,189</td>
</tr>
<tr>
<td>2006</td>
<td>2,307</td>
<td>6,882</td>
<td>9,189</td>
</tr>
<tr>
<td>2008</td>
<td>2,352</td>
<td>6,837</td>
<td>9,189</td>
</tr>
<tr>
<td>2010</td>
<td>2,649</td>
<td>6,750</td>
<td>9,399</td>
</tr>
<tr>
<td>2012</td>
<td>2,703</td>
<td>6,696</td>
<td>9,399</td>
</tr>
<tr>
<td>2014</td>
<td>2,781</td>
<td>6,618</td>
<td>9,399</td>
</tr>
</tbody>
</table>


Nominal expenditure is adjusted by month and region, and then converted to real value by using time series deflators with the base year in 2005. Expenditure is a better proxy of welfare than income, especially in developing countries, because (i) income is derived largely from self–employment; (ii) seasonal fluctuations of income are larger than expenditure (Alderman and Paxson, 1994; Paxson, 1993) and (iii) while income is likely to be understated, households are often able to recall expenditure accurately (Donaldson, 1992; Lanjouw, 1996; Blundell and Preston, 1998; Haughton and Khandker, 2009, pp20–30).

3. ANALYSIS

3.1. ESTIMATION OF WELFARE DISTRIBUTION

As described in the methodology section, samples of RPCE from VLSS/VHLSSs are approximated by lognormal distribution to estimate population distribution by area in each survey year. As time goes by, the mode value increases and the shape of distribution flattens. Notably, the mode in each distribution is always closest to the 30th percentile (Q3: the bottom 30 percent of the total population in Vietnam) among the deciles during the period of 1993–2014 (Table 3)

10 The surveys aim at evaluating the living standards of people in Vietnam for the purpose of planning, monitoring, supervising and evaluating socio-economic policies such as Five-Year Plans and Ten-Year Plans.

11 Kakwani (1993) analyzes the GE and DE of poverty change using the Cote d’Ivoire Living Standards Survey conducted from 1985 to 1986. Unlike Vietnam’s survey, roughly the poorest 10 percent of the Cote d’Ivoire survey happens to be the mode of distribution.
Table 3: Amount of each decile of bottom 40 percent and mode by area and year (VND 1,000)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>1,650</td>
<td>2,550</td>
<td>2,700</td>
<td>3,050</td>
<td>3,600</td>
<td>3,500</td>
<td>5,200</td>
<td>5,900</td>
</tr>
<tr>
<td>Q3</td>
<td>1,450</td>
<td>2,200</td>
<td>2,300</td>
<td>2,600</td>
<td>3,050</td>
<td>3,000</td>
<td>4,400</td>
<td>5,050</td>
</tr>
<tr>
<td>Q2</td>
<td>1,250</td>
<td>1,850</td>
<td>1,950</td>
<td>2,150</td>
<td>2,550</td>
<td>2,500</td>
<td>3,650</td>
<td>4,150</td>
</tr>
<tr>
<td>Q1</td>
<td>1,050</td>
<td>1,450</td>
<td>1,500</td>
<td>1,650</td>
<td>1,950</td>
<td>1,950</td>
<td>2,800</td>
<td>3,200</td>
</tr>
<tr>
<td>Mode of New Dist.</td>
<td>2,200</td>
<td>2,300</td>
<td>2,550</td>
<td>2,950</td>
<td>2,950</td>
<td>4,200</td>
<td>5,050</td>
<td>6,550</td>
</tr>
<tr>
<td>Mode of Initial Dist.</td>
<td>1,500</td>
<td>2,200</td>
<td>2,300</td>
<td>2,550</td>
<td>2,950</td>
<td>2,950</td>
<td>4,200</td>
<td>4,850</td>
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<td><strong>Urban</strong></td>
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<tr>
<td>Q4</td>
<td>2,750</td>
<td>4,450</td>
<td>4,850</td>
<td>5,450</td>
<td>6,100</td>
<td>5,300</td>
<td>7,650</td>
<td>8,550</td>
</tr>
<tr>
<td>Q3</td>
<td>2,350</td>
<td>3,800</td>
<td>4,100</td>
<td>4,600</td>
<td>5,200</td>
<td>4,500</td>
<td>6,550</td>
<td>7,400</td>
</tr>
<tr>
<td>Q2</td>
<td>1,950</td>
<td>3,150</td>
<td>3,350</td>
<td>3,800</td>
<td>4,300</td>
<td>3,750</td>
<td>5,450</td>
<td>6,250</td>
</tr>
<tr>
<td>Q1</td>
<td>1,500</td>
<td>2,450</td>
<td>2,600</td>
<td>2,900</td>
<td>3,350</td>
<td>2,900</td>
<td>4,250</td>
<td>4,950</td>
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<tr>
<td>Mode of New Dist.</td>
<td>3,700</td>
<td>3,900</td>
<td>4,400</td>
<td>5,100</td>
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<td>6,400</td>
<td>7,400</td>
<td>9,600</td>
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<tr>
<td>Mode of Initial Dist.</td>
<td>2,250</td>
<td>3,700</td>
<td>3,900</td>
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<td>5,100</td>
<td>4,400</td>
<td>6,400</td>
<td>7,400</td>
</tr>
<tr>
<td><strong>Rural</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>1,550</td>
<td>2,250</td>
<td>2,400</td>
<td>2,750</td>
<td>3,200</td>
<td>3,100</td>
<td>4,600</td>
<td>5,250</td>
</tr>
<tr>
<td>Q3</td>
<td>1,350</td>
<td>2,000</td>
<td>2,150</td>
<td>2,400</td>
<td>2,750</td>
<td>2,700</td>
<td>3,900</td>
<td>4,500</td>
</tr>
<tr>
<td>Q2</td>
<td>1,200</td>
<td>1,700</td>
<td>1,850</td>
<td>2,000</td>
<td>2,350</td>
<td>2,300</td>
<td>3,250</td>
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<tr>
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<td>1,850</td>
<td>1,800</td>
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<td>2,200</td>
<td>2,400</td>
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<td>2,100</td>
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<td>2,700</td>
<td>3,850</td>
<td>4,450</td>
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Note: Unit of expenditure is VND 50,000
3.2. CONFIGURATION COMPARISON OF GE AND DE BY THE TWO DECOMPOSITION TYPES—IDTR and NDTL

This section describes the difference of IDTR and NDTL, two different types of decomposition methods, by GE and DE. Figure 3 shows summary configuration comparison of IDTR and NDTL by GE and DE during the period from 1993 to 2014. GE and DE differ by each way of decomposition—larger for GE and smaller for DE in general using IDTR decomposition compared to NDTL decomposition. More specifically, regarding the average magnitude of GE during the period of 1993-2014, the proportion of NDTL accounts for around 30–40 percent while the one of IDTR accounts for 60–70 percent. On the other hand, for DE, NDTL is larger in the higher deciles and smaller in the lower deciles (vice versa for IDTR), and the range of proportions varies depended on areas.

The disaggregated results are summarized in Table 4, 5 and 6 that shows detailed characteristics of GE and DE by the type of decomposition, decile and period. For whole of country, GE of IDTR and NDTL are both positive. The proportions of IDTR and NDTL are around 60–70 percent and 30–40 percent, respectively. During the period 2006–2008, GE of IDTR and NDTL were zero—no contribution to welfare improvement. The financial crisis in the late 2000s might affect this heterogeneous trend compared to other periods. No consistent trends are observed along the change of deciles in GE. For DE, IDTR and NDTL in overall area tend to be negative and positive, respectively. During the period 2006–2008, DE of IDTR and NDTL were both negative 50 percent. No consistent trends and proportion of DE are observed along the change of deciles and periods in GE. For urban and rural areas, the results of GE and DE by the decomposition method, decile and period are generally common to overall area, while the results were different in the period 2006–2008: GE of IDTR and NDTL in urban and rural area were both negative (except Q1 of IDTR in rural area).
Figure 3: Summary configuration comparison of GE and DE by IDTR and NDTL, 1993-2014

Note: Summary configuration comparison of GE and DE by IDTR and NDTL is the average of GE and DE during the period of 1993-2014. The bars follows 100 percent stacked column in absolute value.
Table 4: Configuration comparison of overall GE and DE by IDTR and NDTL, 1993–2014

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<td>NDTL</td>
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<tr>
<td>Q4</td>
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<td>29%</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
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<td>54%</td>
<td>46%</td>
</tr>
<tr>
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<td>62%</td>
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<tr>
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<td></td>
</tr>
<tr>
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<td>196%</td>
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<tr>
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<tr>
<td>Q1</td>
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<tr>
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<td>-50%</td>
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Note: Configuration comparison of GE and DE by IDTR and NDTL follows +/- 100 percent stacked column. If the denominator is negative, the configuration comparison follows ~100 percent stacked column, and vice versa. GE and DE during the period of 2006-2008 are zero for both IDTR and NDTL decompositions.
Table 5: Configuration comparison of urban GE and DE by IDTR and NDTL, 1993–2014

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<td>NDTL</td>
</tr>
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</tr>
<tr>
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</tr>
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<td>37%</td>
</tr>
<tr>
<td>Q2</td>
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<td>63%</td>
<td>37%</td>
</tr>
<tr>
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<td>35%</td>
</tr>
<tr>
<td>DE_urban</td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>31%</td>
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</tr>
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<td>-139%</td>
<td>39%</td>
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</tbody>
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Note: Configuration comparison of GE and DE by IDTR and NDTL follows +/-100 percent stacked column. If the denominator is negative, the configuration comparison follows -100 percent stacked column, and vice versa.
Table 6: Configuration comparison of rural GE and DE by IDTR and NDTL, 1993–2014

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</tr>
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<td>58%</td>
</tr>
<tr>
<td></td>
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<td>36%</td>
<td>58%</td>
</tr>
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<td></td>
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<td>58%</td>
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<td>NDTL</td>
</tr>
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<td>69%</td>
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<td>-96%</td>
<td>67%</td>
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<td>61%</td>
</tr>
<tr>
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</tr>
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<td>-52%</td>
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<tr>
<td></td>
<td>Q1</td>
<td>-50%</td>
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<td>-132%</td>
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</tbody>
</table>


Note: Configuration comparison of GE and DE by IDTR and NDTL follows +/−100 percent stacked column. If the denominator is negative, the configuration comparison follows −100 percent stacked column, and vice versa.
3.3. CONFIGURATION COMPARISON OF GE AND DE BY THE AREA AND DECILE

This section discusses the configuration comparison of GE and DE by the area and decile to empirically verify the mechanism of poverty change in Vietnam during the period of 1993-2014. I calculate GE and DE as an average of IDTR and NDTL. According to Figure 4 that shows the summary configuration comparison of GE and DE by the area and decile, 1993–2014, GE mostly accounts for the increase of RPCE (poverty reduction) across the deciles. Basically, the role of DE is small and even negative in the bottom 10 and 20 percent population across the areas (exceptionally, the bottom 30 percent in urban area is negatively affected by DE, too).

The results summarized in Table 7 and 8 suggest that the increase of RPCE has been largely induced by GE. Those who are located in the lower deciles are more elastic to GE and less elastic to DE in any year and any area of the surveys.12 Aside from the financial crisis in the late 2000s, consistent trends of GE and DE over time were observed despite ineligible events during the period 1993-2014, such as a financial crisis in the late 1990s, a surge in inflation rates, and the transition to an open market–oriented economy, among others. In the period 2006–2008, both GE and DE were mostly negative across the deciles and areas. GE was zero in overall area, and GE in urban and rural areas led to the decrease of RPCE (increase of poverty). Notably, GE in urban area negatively affected on those who are in lower deciles, suggesting the urban poor is susceptible to the negative GE channeled by financial shock compared to those who are better off. Contrary to this, no variation of GE was observed across the deciles in rural area.

12 One of the main findings of Kakwani (1993) is that the larger the difference of the poverty line from the mode of distribution, the smaller the absolute magnitude of the poverty elasticity to mean growth will be. In his study, Kakwani compared the results of two poverty lines that are roughly the poorest 10 percent which happens to be the mode of the distribution, and the poorest 30 percent of the total population of Cote d'Ivoire.
Figure 4: Summary configuration comparison of GE and DE by the area and decile, 1993-2014

Note: Summary configuration comparison of GE and DE by IDTR and NDTL is the average of GE and DE during the period of 1993-2014. Configuration comparison of GE and DE by IDTR and NDTL follows 100 percent stacked column.
Table 7: Configuration comparison of GE and DE by the area and decile, 1993–2006

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<tr>
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<tr>
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<tr>
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Note: Configuration comparison of GE and DE by IDTR and NDTL follows +/– 100 percent stacked column. If the denominator is negative, the configuration comparison follows -100 percent stacked column and vice versa.
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Note: Configuration comparison of GE and DE by IDTR and NDTL follows +/-100 percent stacked column. If the denominator is negative, the configuration comparison follows -100 percent stacked column and vice versa.
4. CONCLUSIONS

This study proposes a new method decomposing poverty change into GE and DE based on the mode of distribution rather than taking mean of distribution. For the empirical analysis verifying the mechanism of poverty change using the new decomposition, I choose Vietnam during the period of 1993-2014, where remarkable poverty reduction has been achieved from more than 60 percent to less than five percent of poverty head count ratio. I found the welfare improvement proxied by increase of expenditure has been largely induced by GE across areas and the deciles of bottom 40 percent in the population. The role of DE for poverty reduction is small and even negative in the bottom 10 and 20 percent population (in urban area the bottom 30 percent is negatively affected by DE as well). Those who situated in lower quantiles are more elastic to GE and less elastic to DE. Consistent trends of GE and DE over time were observed except the crisis affected period 2006-2008. In the period 2006-2008, both GE and DE were mostly negative (increase of poverty) across the deciles and areas. Compared to overall and rural areas, GE in urban area negatively affected on those who are in lower deciles in that period (vice versa for DE), suggesting the severe vulnerability of urban poor against negative GE through financial shock relative to those who are better off. Further, this paper shows how two different types of decompositions work that was not considered in the past literature. GE and DE differ by each way of decomposition—larger for GE and smaller for DE in general using IDTR decomposition compared to NDTL decomposition.

The results have important policy implications, notably for developing countries where redistribution system is still underdeveloped. The results that poverty reduction has been largely induced by GE across the deciles over the long time supports prioritizing growth-enhancing policies for rapid poverty reduction while reinforcing a time-consuming national redistribution system through tax administrations and social security systems. As many developing countries face difficulty to broaden fiscal space for social spending, the policy makers who aim at poverty reduction should prioritize growth enhancing policies.
REFERENCES


Appendix Figure 1: Estimated population distribution of expenditure by area, 1993–2002

Source: Author based on VLSSs 1993 and 1998, and VHLSSs 2002
Appendix Figure 2: Estimated population distribution of expenditure by area, 2004–2008

Source: Author based on VHLSSs 2004, 2006, and 2008
Appendix Figure 3: Estimated population distribution of expenditure by area, 2010–2014

Source: Author based on VHLSSs 2010, 2012, and 2014