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IFPRI Discussion Paper 00728

November 2007

**Urbanization, Educational Expansion, and Expenditures  
Inequality in Indonesia in 1996, 1999, and 2002**

Takahiro Akita, International University of Japan  
and  
Sachiko Miyata, The World Bank

Markets, Trade and Institutions Division

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## ABSTRACT

This paper considers urban-rural location and education as the main causes of expenditure inequality and attempts to examine inequality changes associated with urbanization and educational expansion in Indonesia from 1996 to 2002, using Indonesian monthly household consumption expenditure data. It introduces a hierarchical framework of inequality decomposition by population subgroups, which enables researchers to analyze inequality resulting from differences in educational attainment as well as inequality within each educational group, after the effects on inequality of urban-rural differences in the composition of educational attainments are removed. It finds that the urban sector's higher educational group contributes significantly to overall inequality. Inequality within the group increased significantly once Indonesia recovered from the financial crisis of 1998. This, together with educational expansion in urban areas, led to a conspicuous rise in urban inequality. Overall expenditure inequality has increased markedly, due not only to the rise in urban inequality but also a widening urban-rural disparity, accompanied by a population shift from the rural to the urban sector.

Since more people will obtain higher education as the economy continues to develop, and more jobs requiring specialized skills become available in urban areas, urban inequality is likely to remain high. In order to mitigate urban inequality and thus overall inequality, the government needs to introduce policies that could reduce inequality among households whose heads have a tertiary education.

**Keywords:** Expenditure Inequality, Urbanization, Educational Expansion, Indonesia, Theil Index, Two-stage Nested Inequality Decomposition Analysis

# 1. INTRODUCTION

In his seminal 1955 article, Kuznets illustrated, by using a simple numerical example, a process of inequality changes associated with the shift of population from the agricultural to the nonagricultural sector. He demonstrated, under a plausible set of assumptions, that inequality first increases, plateaus, and then decreases as the population share of the higher income nonagricultural sector rises; in other words, inequality follows an inverted-U pattern with respect to economic development. Following Kuznets (1955), Robinson (1976) and Knight (1976) described an inverted-U curve formally, with Robinson using the variance of log income and Knight the Gini coefficient as inequality measures. Anand and Kanbur (1993) broadened the analyses by employing other inequality measures, including the Theil indexes and the squared coefficient of variation. These studies employed additively decomposable inequality measures to examine the relationship between inequality and development for an economy in which the population shifts from a low-income, low-inequality traditional sector to a high-income, high-inequality modern sector. Anand and Kanbur termed this the Kuznets process, in which a population shift would generate an inverted-U pattern.

A number of empirical studies have attempted to analyze factors and forces influencing income or expenditure inequality in developing as well as developed countries by decomposing overall inequality by population subgroups.<sup>1</sup> Among the factors included in the decomposition analysis, educational differences and urban-rural location are found to account for a relatively large portion of inequality. Glewwe (1986) examined expenditure inequality in Sri Lanka for the years 1969/70 and 1980/81 by using the Theil indexes and the variance of log income; he found that differences in educational attainment account for a substantial proportion (around 20 percent) of the overall inequality in per capita household expenditure. Based on the decomposition of household income inequality as measured by the Theil indexes and the variance of log income, Estudillo (1997) found that for the years 1971, 1985, and 1991 in the Philippines, inequality between groups with different educational attainments constituted 20–30 percent of the overall inequality. Other studies also found significant levels of inequality between groups with different educational attainments: accounting for about 20 percent of overall expenditure inequality in Greece (Tsakloglou 1993), 30–40 percent in Singapore (Rao, Banerjee, and Mukhopadhyaya 2003), and about 20 percent in 2002 in Vietnam (Ha 2006).

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<sup>1</sup> See, for example, Fields (1979), Hughes and Islam (1981), Mookherjee and Shorrocks (1982), Anand (1983), Ikemoto (1985), Glewwe (1986), Ikemoto and Limskul (1987), Agrawal (1988), Ikemoto (1991), Mishra and Parikh (1992), Rahman and Huda (1992), Tsakloglou (1993), Jenkins (1995), Estudillo (1997), Akita, Lukman and Yamada (1999), Akita and Lukman (1999), Karunaratne (2000), Gray, Mills, and Zandvakili (2003), Rao, Nanerjee, and Mukhopadhyaya (2003), Balisacan and Fuwa (2004), Eastwood and Lipton (2004), Shorrocks and Wang (2005), Ha (2006), and Motonishi (2006).

The contribution of rural–urban inequality to overall inequality ranges from 10 to 25 percent, which appears to be smaller than that of inequality resulting from educational differences.<sup>2</sup> For example, rural–urban inequality amounts to 15 percent of overall income inequality in Thailand (Ikemoto 1991), 10–15 percent of overall household expenditure inequality in India (Mishra and Parikh 1992), 10 percent in Greece (Tsakloglou 1993), 13–15 percent in the Philippines (Balisacan and Fuwa 2004), and more than 20 percent in Vietnam (Ha 2006). Sri Lanka is an exception, as its rural–urban inequality accounts for only 5–6 percent of overall expenditure inequality (Glewwe 1986).

Akita, Lukman, and Yamada (1999) analyzed the distribution of household expenditure in Indonesia for the years 1987, 1990, and 1993, using the Theil decomposition method and found that inequality between groups with different educational attainment explains about 30 percent of the overall inequality in household expenditure. They also found a relatively high level of inequality between the rural and urban sectors, accounting for more than 20 percent of overall inequality. This study, which also deals with Indonesia, considers rural–urban location and educational differences to be the major factors of inequality. It examines inequality changes associated with urbanization and educational expansion in Indonesia during the 1996–2002 period, using Indonesian monthly household consumption expenditure data from the National Socio-Economic Survey (*Susenas*).<sup>3</sup>

This paper introduces a hierarchical framework of inequality decomposition by population subgroups based on the two-stage nested inequality decomposition method, which was developed by Akita (2003) in the context of regional income inequality.<sup>4</sup> In this framework, all households are first classified into rural and urban sectors, and then into lower and higher educational groups. By doing this, we can analyze expenditure inequality due to differences in educational attainment after removing the effects on inequality of urban–rural differences in the composition of educational attainments.

The framework thus allows us to examine not only inequality changes associated with the shift of population from rural to urban areas (that is, the Kuznets process for urbanization), but also inequality changes associated with the shift of population from lower to higher educational groups in each sector (that is, the Kuznets process for educational expansion in each sector). We should note that Robinson (1976), Knight (1976), and Anand and Kanbur (1993) employed the one-stage decomposition method and thus explored inequality changes associated with the shift of population from the low-income traditional sector to the high-income modern sector only.

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<sup>2</sup> Shorrocks and Wang (2005) provided a survey on rural–urban inequality and its contribution to overall inequality.

<sup>3</sup> There have been numerous studies on expenditure or income inequality in Indonesia, reflecting continued interest in how development benefits are distributed among different population subgroups. Among the studies using *Susenas* data are Sundrum (1979), Booth and Sundrum (1981), Hughes and Islam (1981), Yoneda (1985), Islam and Khan (1986), Asra (1989), Booth (1995), Akita and Lukman (1999), Asra (2000), Cameron (2000), and Friedman and Levinsohn (2001).

<sup>4</sup> Akita (2003) considered the hierarchical structure of a country to be region, province, and district; he decomposed overall regional income inequality, as measured by the Theil indexes based on district-level mean incomes, into three components: the between-region, between-province, and within-province inequality components.

Among the additively decomposable inequality measures, we employ the two Theil indexes, which are Lorenz-consistent, that is, they satisfy several desirable properties as a measure of inequality, such as anonymity, mean independence, population-size independence, and the Pigou-Dalton condition (Bourguignon 1979; Shorrocks 1980).<sup>5</sup> These two Theil indexes are usually termed the Theil indexes  $T$  and  $L$  (Anand 1983) and are among the generalized entropy class of inequality measures.<sup>6</sup>

This paper is organized as follows. Chapter 2 presents the two-stage nested decomposition method based on the Theil indexes  $T$  and  $L$ , which provides a hierarchical framework of inequality decomposition by population subgroups. Chapter 3 delineates the Kuznets processes for urbanization and educational expansion using the Theil indexes. Chapter 4 discusses the data used to conduct an empirical analysis of the distribution of household expenditure per capita in Indonesia for the years 1996, 1999, and 2002, while Chapter 5 presents the results of the empirical analysis. Chapter 6 provides a summary of findings and concluding remarks.

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<sup>5</sup> An inequality index is said to be additively decomposable if total inequality can be described as the sum of the between-group and within-group components. Mean independence implies that the index remains unchanged if everyone's expenditure is changed by the same proportion, while population-size independence means that the index remains unchanged if the number of households at each expenditure level is changed by the same proportion. Finally, the Pigou-Dalton principle of transfers implies that any expenditure transfer from a richer to a poorer household that does not reverse their relative ranks in expenditures reduces the value of the index.

<sup>6</sup> The Theil index  $L$  is also termed Theil's second measure or the mean logarithmic deviation.

## 2. TWO-STAGE NESTED THEIL DECOMPOSITION METHOD

Suppose that there are two sectors in an economy: the urban and rural sectors (sectors 1 and 2, respectively), and all households are classified into these sectors. Suppose further that households in each of these two sectors are classified into two educational groups: the lower and higher educational groups. Let  $y_{ijk}$  denote the per capita expenditure of household  $k$  in educational group  $j$  in sector  $i$ ,  $N_{ij}$  the total number of households in educational group  $j$  in sector  $i$ ,  $N$  the total number of all households, and  $Y$  the total per capita expenditure of all households. Then the Theil indexes  $T$  and  $L$  are defined, respectively, as

$$T = \sum_{i=1}^2 \sum_{j=1}^2 \sum_{k=1}^{N_{ij}} \left( \frac{y_{ijk}}{Y} \right) \log \left( \frac{y_{ijk}/Y}{I/N} \right) \text{ and} \quad (1)$$

$$L = \sum_{i=1}^2 \sum_{j=1}^2 \sum_{k=1}^{N_{ij}} \left( \frac{I}{N} \right) \log \left( \frac{I/N}{y_{ijk}/Y} \right). \quad (2)$$

Since  $I/N$  is the population share of each household and  $y_{ijk}/Y$  is the expenditure share of household  $k$  in educational group  $j$  in sector  $i$ , these indexes compare population shares and expenditure shares for each household and thereby measure the extent of inequality in the distribution of household expenditures per capita. It should be noted that the Theil index  $T$  uses expenditure shares as weights, while the Theil index  $L$  uses population shares as weights. Therefore, the former is sensitive to changes in the upper expenditure categories and the latter is sensitive to changes in the lower expenditure categories.

Let  $Y_i$  denote the total per capita expenditure of households in sector  $i$ ,  $Y_{ij}$  the total per capita expenditure of households in educational group  $j$  in sector  $i$ , and  $N_i$  the total number of households in sector  $i$ . We can then obtain the following two-stage nested Theil decomposition equation, where the overall inequality in per capita expenditure, as measured by equation (1), is decomposed into the within-educational group component ( $T_{WE}$ ), the between-educational group component ( $T_{BE}$ ), and the between-sector component ( $T_{BS}$ ).

$$\begin{aligned} T &= \sum_{i=1}^2 \left( \frac{Y_i}{Y} \right) T_i + T_{BS} \\ &= \sum_{i=1}^2 \sum_{j=1}^2 \left( \frac{Y_{ij}}{Y} \right) T_{ij} + \sum_{i=1}^2 \left( \frac{Y_i}{Y} \right) T_{Ei} + T_{BS} \\ &= T_{WE} + T_{BE} + T_{BS}, \end{aligned} \quad (3)$$

where  $T_i = \sum_{j=1}^2 \left( \frac{Y_{ij}}{Y_i} \right) T_{ij} + T_{Ei}$  measures inequality within sector  $i$ ,  $T_{ij} = \sum_{k=1}^{N_{ij}} \left( \frac{y_{ijk}}{Y_{ij}} \right) \log \left( \frac{y_{ijk}/Y_{ij}}{I/N_{ij}} \right)$

measures inequality within educational group  $j$  in sector  $i$ ,  $T_{Ei} = \sum_{j=1}^2 \left( \frac{Y_{ij}}{Y_i} \right) \log \left( \frac{Y_{ij}/Y_i}{N_{ij}/N_i} \right)$  measures

inequality between educational groups in sector  $i$ , and  $T_{BS} = \sum_{i=1}^2 \left( \frac{Y_i}{Y} \right) \log \left( \frac{Y_i/Y}{N_i/N} \right)$  measures inequality

between the urban and rural sectors. Similarly, the Theil index  $L$  in equation (2) can be decomposed into

$$\begin{aligned} L &= \sum_{i=1}^2 \sum_{j=1}^2 \left( \frac{N_{ij}}{N} \right) L_{ij} + \sum_{i=1}^2 \left( \frac{N_i}{N} \right) L_{Ei} + L_{BS} \\ &= L_{WE} + L_{BE} + L_{BS}. \end{aligned} \tag{4}$$

It should be noted that the Theil index  $T$  is weakly additively decomposable; that is the elimination of between-group inequality affects the value of the within-group component, since the expenditure shares used as weights in the index change. But the Theil index  $L$  is strictly additively decomposable: the elimination of between-group inequality does not affect the value of the within-group component, since the population shares used as weights do not change.

### 3. URBANIZATION, EDUCATIONAL EXPANSION, AND THE KUZNETS PROCESSES

Let  $\mu_i = \frac{Y_i}{N_i}$  be mean per capita expenditure for households in sector  $i$ ,  $\alpha = \frac{\mu_1}{\mu_2}$  the urban-to-rural ratio

of mean per capita expenditure, and  $x = \frac{N_1}{N}$  the share of urban households ( $0 \leq x \leq 1$ ); then the Theil

indexes,  $T$  and  $L$ , can be written, respectively, as

$$\begin{aligned} T &= T_{WS} + T_{BS} \\ &= \left( T_2 + (T_1 - T_2) \frac{\alpha x}{\alpha x + (1-x)} \right) + \left( \frac{(\alpha \log \alpha) x}{\alpha x + (1-x)} - \log(\alpha x + (1-x)) \right) \text{ and} \end{aligned} \quad (5)$$

$$\begin{aligned} L &= L_{WS} + L_{BS} \\ &= (L_2 + (L_1 - L_2)x) + (\log(\alpha x + (1-x)) - (\log \alpha)x), \end{aligned} \quad (6)$$

$$\text{where } T_{WS} = \sum_{i=1}^2 \left( \frac{Y_i}{Y} \right) T_i = T_{WE} + T_{BE} \text{ and } L_{WS} = \sum_{i=1}^2 \left( \frac{N_i}{N} \right) L_i = L_{WE} + L_{BE}.$$

These are the ordinary one-stage Theil decomposition equations, which have been employed by many researchers to explore factors and forces affecting inequality (see the studies listed in footnote 1). With constant  $\alpha, T_1, T_2, L_1$ , and  $L_2$ , the Theil indexes in equations (5) and (6) can be viewed as a function of the share of urban households  $x$ :  $T = f(x; \alpha, T_1, T_2)$  and  $L = g(x; \alpha, L_1, L_2)$ .

Based on past empirical evidence on inequality in most developing countries, we can safely assume that  $\alpha > 1$  and  $T_1 > T_2$  ( $L_1 > L_2$ ); in other words, mean per capita household expenditure and inequality are larger in the urban than in the rural sector. Under these assumptions, we can obtain the Kuznets process for urbanization; that is, an inverted-U relationship between urbanization and inequality, as delineated by the following proposition.

Theil Index T

If  $1 < \alpha \leq 3.5$  and  $T_1 > T_2$ , then the Theil index  $T$  is strictly concave over  $0 \leq x \leq 1$ .

Furthermore, if  $(\alpha - 1) - \log \alpha > T_1 - T_2 > 0$ , then the Theil index  $T$  has a global maximum at

$$x^* = \frac{\alpha(T_1 - T_2) + \alpha \log \alpha - (\alpha - 1)}{(\alpha - 1)^2}, \text{ where } 0 < x^* < 1.$$

Whereas if  $T_1 - T_2 \geq (\alpha - 1) - \log \alpha > 0$ , then the Theil index  $T$  has a global maximum at  $x^* = 1$ .

We should note that if  $\alpha$  is greater than 3.6, then there is a range of  $x$  close to  $x = 1$  in which the Theil  $T$  is strictly convex.

## Theil Index L

If  $\alpha > 1$  and  $L_1 > L_2$ , then the Theil index  $L$  is strictly concave over  $0 \leq x \leq 1$ . Furthermore, if

$\log\alpha - \frac{\alpha-1}{\alpha} > L_1 - L_2 > 0$ , then the Theil index  $L$  has a global maximum at

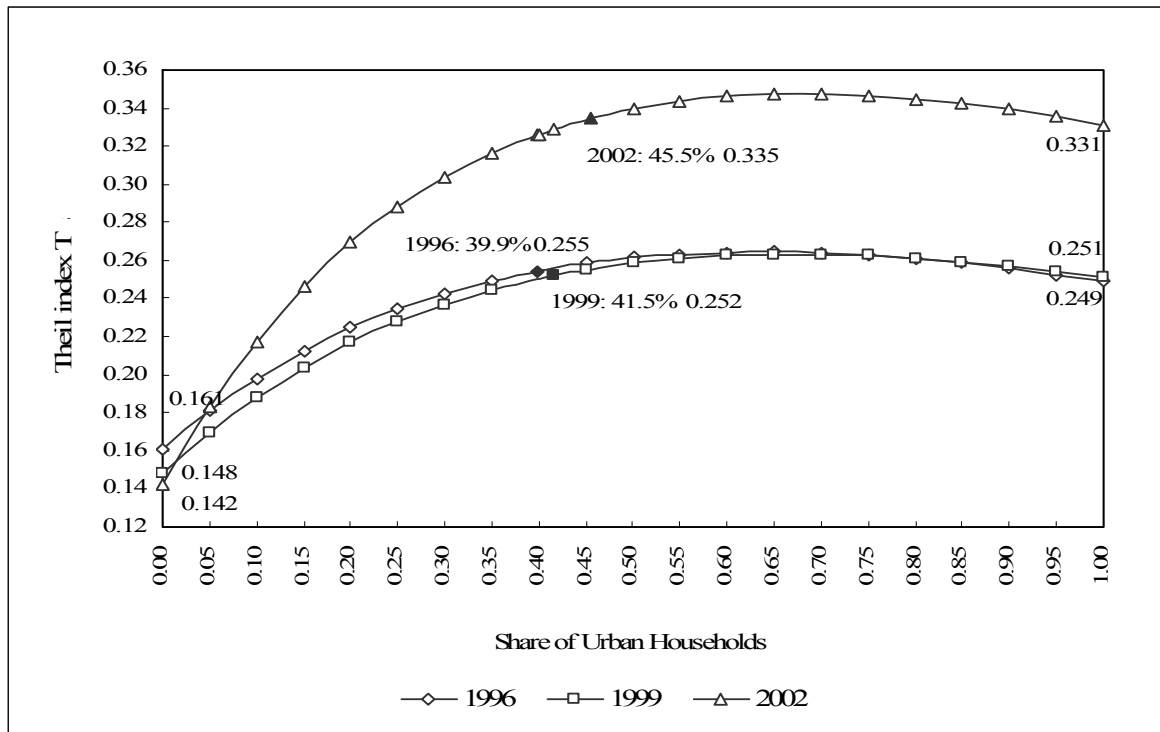
$$x^* = \frac{(L_1 - L_2) + (\alpha - 1) - \log\alpha}{(\alpha - 1)(\log\alpha - (L_1 - L_2))}, \text{ where } 0 < x^* < 1;$$

but if  $L_1 - L_2 \geq \log\alpha - \frac{\alpha-1}{\alpha} > 0$ , then the Theil index  $L$  has a global maximum at  $x^* = 1$ .

This proposition delineates the Kuznets process for urbanization, which is described as follows (see Figure 1). Suppose that mean per capita household expenditure and inequality are larger in the urban than in the rural sector. When all households live in the rural sector, overall inequality is equivalent to the inequality of the rural sector. But as more households move to the urban sector, overall inequality increases gradually. Under certain conditions, it reaches a peak at a point before all households live in the urban sector and then decreases as more households move to the urban sector. When all households are in the urban sector, overall inequality becomes the inequality of the urban sector.

A similar process can be described for educational expansion in each of the rural and urban sectors under the assumption that mean per capita household expenditure and inequality are larger in the higher educational group than in the lower. In the context of the two-stage nested Theil decomposition framework, the Kuznets process for educational expansion is embedded in each of the urban and rural sectors. Let  $\beta_i$  denote the ratio of mean per capita expenditure between the higher and lower educational groups in sector  $i$ , and  $z_i$  denote the share of households in the higher educational group in sector  $i$ . Then we have  $T_i = f_i(z_i; \beta_i, T_{i1}, T_{i2})$  and  $L_i = g_i(z_i; \beta_i, L_{i1}, L_{i2})$  where  $\beta_i > 1$  and  $T_{i1} > T_{i2}$  and  $L_{i1} > L_{i2}$ . Therefore, with constant  $\alpha, \beta_i, T_{i1}, T_{i2}, L_{i1}$ , and  $L_{i2}$ , the Theil indexes  $T$  and  $L$  can be viewed as a function of  $x, z_1$ , and  $z_2$ .

**Figure 1. Kuznets process for urbanization in Indonesia based on Theil index T**



Source: Constructed by the authors based on *Susenas* (1996, 1999, 2002).

We suppose that all households in a sector (either the rural or urban sector) are classified into either the higher or lower educational group, and mean household expenditure and inequality are larger in the higher educational group than in the lower. When all households in the sector are in the lower educational group, overall inequality in the sector is the same as the inequality of the lower educational group. But, as households start to attain higher education, inequality increases gradually. Under certain conditions, it reaches a peak before all households move to the higher educational group and then decreases as more households attain higher education.

## 4. DATA

In order to measure expenditure inequality and examine inequality changes associated with urbanization and educational expansion in Indonesia for 1996, 1999, and 2002, we use monthly household consumption expenditure data from the consumption expenditure module of the National Socio-Economic Survey (*Susenas*), which is conducted every three years by the Indonesian Central Bureau of Statistics (BPS). BPS has gradually increased the sample size of the consumption expenditure module over the years in an attempt to collect expenditure data for all expenditure groups. For the 1996 expenditure data, the sample size was 59,868 households, increasing to 60,591 in 1999 and 64,406 in 2002. This study employs raw *Susenas* data to measure inequality in the distribution of household expenditure per capita; it thus differs from Akita, Lukman, and Yamada (1999) and Akita and Lukman (1999), which relied on decile information, rather than raw *Susenas* data, and measured inequality in the distribution of household expenditure for 1987, 1990, and 1993.

The study period includes 1998, when the Indonesian economy contracted by 13 percent in real GDP, and living standards declined significantly as a result of the financial crisis that started in mid-1997. The inflation rate increased substantially due to a large depreciation in the rupiah against the US dollar. According to the consumer price index (CPI), the average annual inflation rate was 57 percent in 1998 and 20 percent in 1999. Although the inflation rate declined to 4 percent in 2000, it again increased to more than 10 percent in 2001 and 2002. Therefore, we deflated nominal household expenditures of *Susenas* food and nonfood items for 1999 and 2002, using the provincial CPI for 30 categories of goods and services.<sup>7</sup>

We should note that expenditure items covered by the *Susenas* consumption expenditure module are classified into food and nonfood categories. The food category consists of about 200 items, while the nonfood category includes about 100 items. However, BPS estimates the provincial CPIs for 30 categories of goods and services, based on the prices of 300 to 400 goods and services. Between 1996 and 2004, BPS provided the provincial CPIs, using 1996 as the base year. In order to deflate nominal household expenditures for 1999 and 2002, we first tried to aggregate *Susenas* expenditure items into 30 CPI categories. However, there are some nonfood *Susenas* expenditure items that cannot be placed in any of these 30 categories. Therefore, we created a separate category for these nonfood *Susenas* items and deflated the expenditures by using the overall provincial CPI.

To classify educational group by educational attainment into lower and higher groups, we used household head's educational attainment in *Susenas*. The higher group in the urban sector is defined as those households whose heads have at least a secondary education, while in the rural sector, it is defined

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<sup>7</sup> For detail, see Alit (2006).

as those whose heads have at least a primary schooling. The higher group in the urban sector encompasses seven levels of educational attainment: households whose heads attended junior high school, general senior high school, vocational senior high school, two-year junior college, three-year junior college, four-year university/college, and or graduate school. These two groups are used a basis in analyzing inequality changes.

## 5. EMPIRICAL RESULTS

This chapter presents the results of an empirical analysis on expenditure inequality in Indonesia for 1996, 1999, and 2002, using monthly household expenditure data from *Susenas*. Since the results do not differ very much qualitatively whether the Theil index  $T$  or  $L$  is used, we explain the results based on the Theil index  $T$ .

### Urbanization and Expenditure Inequality

Table 1 compares mean monthly expenditure per capita in rural and urban households, while Table 2 presents the results of an ordinary one-stage inequality decomposition analysis for all households. The share of urban households increased gradually from 40 percent in 1996 to 42 percent in 1999 and then to 46 percent in 2002 (Table 1). According to Akita, Lukman, and Yamada (1999), the share was merely 29 percent in 1990. Thus, Indonesia underwent rapid urbanization in the 1990s, though the urbanization rate of 46 percent is still low, compared with developed countries.

Overall inequality, as measured by the Theil  $T$ , was around 0.25–0.26 in 1996 and 1999. The Indonesian economy contracted by 13 percent in real GDP in 1998 due to the financial crisis. If the values in 1996 and 1999 represent, respectively, the inequality levels before and after the financial crisis, the crisis does not appear to have affected Indonesia's overall expenditure inequality very much. According to Table 1, the urban–rural ratio of mean expenditure per capita was stable at 1.83 in 1996 and 1999. This stable urban–rural ratio is one of the factors that kept overall inequality constant during the period 1996–99.

**Table 1. Mean monthly per capita expenditure for all households**

Sectors	Mean Expenditure (1,000 Rp)			No. of Households (% Share)		
	1996	1999	2002	1996	1999	2002
Rural (R)	56.92	52.52	60.32	60.1	58.5	54.5
Urban (U)	104.07	96.30	130.00	39.9	41.5	45.5
Total	75.75	70.71	92.00	100.00	100.00	100.00
Ratio (U/R)	1.83	1.83	2.16			

Source: Calculated by the authors based on *Susenas* (1996, 1999, 2002).

**Table 2. One-stage Theil decomposition by sector**

Sectors	Theil T			Theil L		
	1996	1999	2002	1996	1999	2002
Within-Sectors						
Rural Sector	0.161	0.148	0.142	0.137	0.130	0.124
(% Contrib.)	(28.5)	(25.4)	(15.2)	(38.8)	(35.7)	(26.3)
Urban Sector	0.249	0.251	0.331	0.213	0.220	0.258
(% Contrib.)	(53.6)	(56.3)	(63.4)	(40.1)	(42.9)	(45.4)
One-Stage Decomposition						
Within-Sectors	0.209	0.206	0.263	0.167	0.167	0.185
(% Contrib.)	(82.1)	(81.7)	(78.6)	(78.9)	(78.6)	(71.7)
Between-Sectors	0.046	0.046	0.072	0.045	0.046	0.073
(% Contrib.)	(17.9)	(18.3)	(21.4)	(21.1)	(21.4)	(28.3)
Total	0.255	0.252	0.335	0.212	0.213	0.258
(% Contrib.)						
Peak Value						
Urban Share (%)	63.5	67.2	68.0	68.9	73.7	71.2
Inequality	0.264	0.263	0.348	0.225	0.228	0.273

Source: Calculated by the authors based on *Susenas* (1996, 1999, 2002).

Note: % Contribution is the percentage contribution of each component to total inequality.

By 2000, Indonesia had recovered from the crisis fully, and its real GDP growth rates became positive after 2000. Though the rates were not as high as the ones before the financial crisis, the positive growth rates seem to have increased the urban–rural disparity significantly, as the urban–rural ratio of mean expenditure per capita rose to 2.16 in 2002.<sup>8</sup> Overall inequality, as measured by the Theil *T*, jumped to 0.34 in 2002 from 0.25 in 1999, due in part to the increased urban–rural disparity.

The urban sector had much larger expenditure inequality than the rural sector. While inequality in the urban sector increased conspicuously from 0.25 to 0.33 during the study period, inequality in the rural sector decreased from 0.16 to 0.14. Therefore the difference between urban and rural inequalities widened from 0.09 to 0.19. The financial crisis seems to have had a favorable impact on the rural distribution of household expenditure per capita, as rural inequality decreased from 0.16 in 1996 to less than 0.15 in 1999. Even after Indonesia recovered from the crisis and achieved a positive GDP growth rate in 2000, this tendency seems to have continued, with rural inequality declining further to 0.14 in 2002. On the other hand, positive GDP growth after 2000 caused urban inequality to rise significantly. This contributed to an increase in overall inequality in 2002, together with a widening urban–rural disparity.

According to the Theil index *T*, between-sector inequality accounted for about 18 percent of overall inequality in 1996 and 1999, but its contribution rose to 21 percent in 2002, corresponding to an increase in the urban–rural ratio of mean expenditure per capita. Urban inequality played a more important role in the determination of overall expenditure inequality during the study period: its

<sup>8</sup> According to Eastwood and Lipton (2004), the urban–rural ratio of mean income or expenditure per capita ranges from 1.2 to 2.8 in Asia, meaning that Indonesia’s ratio represents the median value in Asia.

contribution to overall expenditure inequality increased from 54 to 63 percent, while the contribution of rural inequality declined conspicuously from 29 to 15 percent.

We find that  $0 < T_1 - T_2 < (\alpha - 1) - \log \alpha$  during the study period.<sup>9</sup> Therefore, based on the proposition in section 2 that  $\alpha$ ,  $T_1$ , and  $T_2$  are constant (that is, the urban–rural ratio and the urban and rural  $T$  are unchanged), overall inequality reaches the maximum when the share of urban households is less than 100 percent. Based on the Theil  $T$ , Figure 1 depicts the Kuznets curve for urbanization in Indonesia. The maximum inequality value would be 0.26 in 1996 if the urban share were 64 percent. But, this value would increase to 0.35 in 2002 if the urban share were 68 percent. Since the 2002 urbanization rate of 46 percent was smaller than 68 percent, further urbanization would lead to a higher overall expenditure inequality if both urban inequality and urban–rural disparity remain high.

### Educational Expansion and Expenditure Inequality in the Urban Sector

According to this study, urban inequality has clearly played an increasingly important role in overall inequality in Indonesia. Our study now considers education as a key component influencing urban inequality. In order to analyze inequality changes associated with a population shift with respect to educational attainment, we classify urban households into lower and higher educational groups. The lower educational group consists of households whose heads have either no formal education or only a primary education, while the higher educational group encompasses those households whose heads have at least secondary education. Table 3 compares the mean monthly expenditures per capita of households in the lower educational group with those in the higher group. Table 4 presents the results of a one-stage inequality decomposition analysis for urban households.

**Table 3. Mean monthly per capita expenditure for urban households**

Education	Mean Expenditure (1,000 Rp)			No. of Households (% Share)		
	1996	1999	2002	1996	1999	2002
Lower Education (L)	75.75	70.34	86.55	48.0	44.2	41.8
Higher Education (H)	130.24	116.84	161.15	52.0	55.8	58.2
Urban Total	104.06	96.28	129.98	100.0	100.0	100.0
Ratio (H/L)	1.72	1.66	1.86			

Source: Calculated by the authors based on *Susenas* (1996, 1999, 2002).

<sup>9</sup> We also have  $0 < L_1 - L_2 < \log \alpha - \frac{\alpha - 1}{\alpha}$ .

**Table 4. One-stage Theil decomposition for urban households by education**

Education	Theil T			Theil L		
	1996	1999	2002	1996	1999	2002
Within-Educational Groups						
Lower Education	0.176	0.182	0.196	0.150	0.162	0.163
(% Contrib.)	(24.7)	(23.5)	(16.4)	(33.7)	(32.5)	(26.5)
Higher Education	0.235	0.240	0.325	0.203	0.211	0.249
(% Contrib.)	(61.4)	(64.7)	(70.9)	(49.5)	(53.5)	(56.1)
One-Stage Decomposition						
Within-Educational Groups	0.214	0.221	0.289	0.178	0.189	0.213
(% Contrib.)	(86.0)	(88.2)	(87.3)	(83.2)	(86.0)	(82.6)
Between-Educational Groups	0.035	0.030	0.042	0.036	0.031	0.045
(% Contrib.)	(14.0)	(11.8)	(12.7)	(16.8)	(14.0)	(17.4)
Urban Total	0.249	0.251	0.331	0.213	0.220	0.258
(% Contrib.)	(100)	(100)	(100)	(100)	(100)	(100)
Peak Value						
Share of Higher Education (%)	60.7	63.7	72.1	65.5	66.8	70.7
Inequality	0.250	0.252	0.334	0.216	0.222	0.260

Source: Calculated by the authors based on *Susen* (1996, 1999, 2002).

Note: % Contrib. is the percentage contribution of each component to urban total inequality.

The population share of the higher educational group increased gradually from 52 to 58 percent during the study period (Table 3). It is interesting to note that even during the crisis period 1996–99, the higher educational group in the urban sector continued to expand significantly from 52 to 56 percent. This increase is in fact larger than that during the post crisis period 1999–2002. The ratio of the mean per capita expenditure of the higher to the lower educational group was 1.72 in 1996. After decreasing slightly to 1.66 in 1999, it increased to 1.86 in 2002.

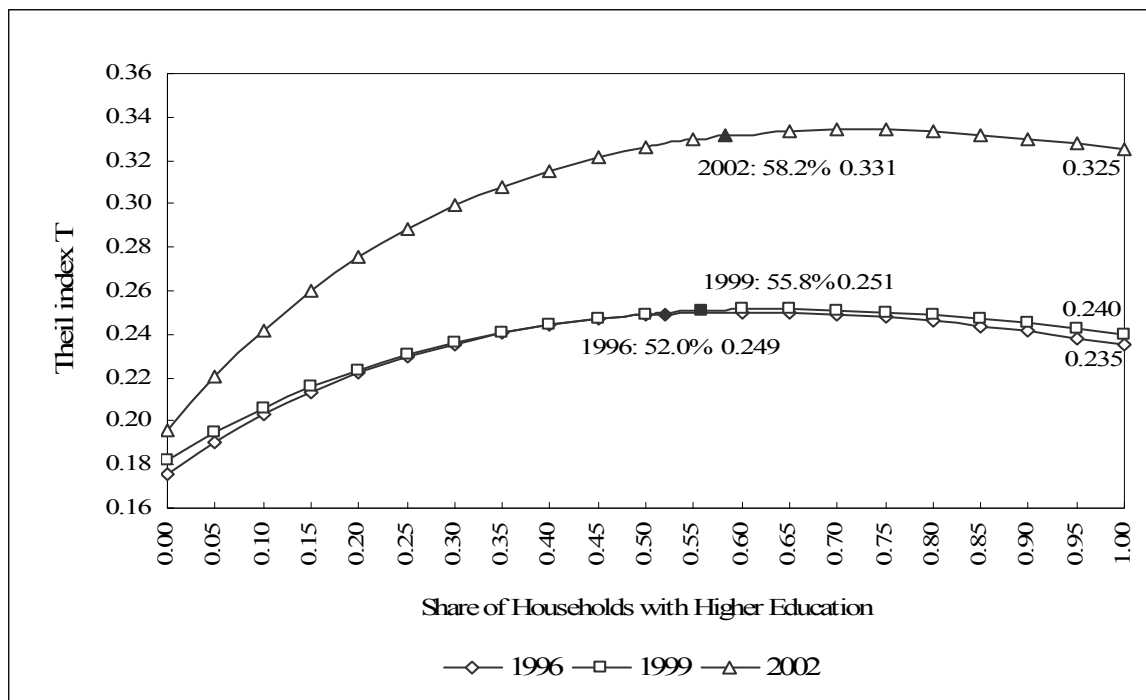
The higher educational group had much larger inequality levels than the lower educational group. According to the Theil  $T$ , inequality within the higher educational group increased conspicuously from 0.24 to 0.33 during the study period, with most of the increase occurring between 1999 and 2002. Inequality also increased within the lower educational group, but not as rapidly as in the higher educational group: thus the difference between the two groups widened from 0.06 to 0.13. A significant rise in urban inequality from 1999-2002 is due mostly to the increase in inequality within the higher educational group in the urban sector.

According to the Theil  $T$ , the between-group component accounted for 14 percent of overall inequality in 1996. While inequality between groups decreased in 1999, it rose to 13 percent in 2002. The contribution to inequality of the within-group component of the higher educational group increased from 61 to 71 percent during the study period, while the within-group component of the lower educational group decreased from 25 to 16 percent.

For the urban sector, we can show that  $0 < T_{11} - T_{12} < (\beta_1 - 1) - \log \beta_1$  during the study period. Therefore, with  $\beta_1, T_{11}$ , and  $T_{12}$  held constant, urban inequality reaches the maximum when the share of

the higher educational group is less than 100 percent. Based on the Theil  $T$ , Figure 2 depicts the Kuznets curve for educational expansion in the urban sector. The maximum inequality value would be 0.25 in 1996 if the population share of the higher educational group were 61 percent. But, this would increase to 0.33 in 2002 if the share were 72 percent. Since the population share of the higher educational group in 2002 was 58 percent and was therefore less than 72 percent, further educational expansion would result in a higher level of urban inequality if within-group inequality of the higher educational group and the disparity between the higher and lower educational groups both remain high.

**Figure 2. Kuznets process for educational expansion in the urban sector based on Theil Index  $T$**



Source: Constructed by the authors based on *Susen* (1996, 1999, 2002).

### Educational Expansion and Expenditure Inequality in the Rural Sector

The share of rural inequality in overall inequality declined in Indonesia during the study period, decreasing from 29 to 15 percent (Table 5). To analyze inequality changes associated with a shift in levels of educational attainment in the rural sector, we classify rural households into lower and higher educational groups. Unlike the urban sector, however, where the lower group includes those with a primary school education, the rural lower educational group is made up of those who have no formal education at all. This is because the share of households whose heads have a primary education has been increasing in the rural sector, while the share of households whose heads have no formal education has been declining. Thus, when we examine the Kuznets process for educational expansion in the rural sector,

it is more appropriate to separate households whose heads have no formal education from those with a primary education. It should be noted that about 80 percent of household heads in the rural sector have either no formal education or only a primary education, and most of the rest have only a secondary education. Table 5 compares the mean monthly expenditure per capita of households in the lower and higher educational groups, while Table 6 presents the results of a one-stage inequality decomposition analysis for rural households.

**Table 5. Mean monthly per capita expenditure for rural households**

Education	Mean Expenditure (1,000 Rp)			No. of Households (% Share)		
	1996	1999	2002	1996	1999	2002
Lower Education (L)	49.67	46.42	53.86	49.6	45.4	41.1
Higher Education (H)	64.08	57.62	64.87	50.4	54.6	58.9
Rural Total	56.93	52.54	60.35	100.0	100.0	100.0
Ratio (H/L)	1.29	1.24	1.20			

Source: Calculated by the authors based on *Susenas* (1996, 1999, 2002).

**Table 6. One-stage Theil decomposition for rural households by education**

Education	Theil T			Theil L		
	1996	1999	2002	1996	1999	2002
Within-Educational Groups						
Lower Education	0.125	0.117	0.116	0.110	0.107	0.105
(% Contrib.)	(33.6)	(31.5)	(29.9)	(39.8)	(37.5)	(34.4)
Higher Education	0.175	0.160	0.151	0.148	0.138	0.132
(% Contrib.)	(61.5)	(64.7)	(67.3)	(54.3)	(58.1)	(62.3)
One-Stage Decomposition						
Within-Educational Groups	0.153	0.143	0.138	0.129	0.124	0.121
(% Contrib.)	(95.1)	(96.2)	(97.1)	(94.2)	(95.6)	(96.7)
Between-Educational Groups	0.008	0.006	0.004	0.008	0.006	0.004
(% Contrib.)	(4.9)	(3.8)	(2.9)	(5.8)	(4.4)	(3.3)
Rural Total	0.161	0.148	0.142	0.137	0.130	0.125
(% Contrib.)	(100)	(100)	(100)	(100)	(100)	(100)
Peak Value						
Share of Higher Education (%)	100.0	100.0	100.0	100.0	100.0	100.0
Inequality	0.175	0.160	0.151	0.148	0.138	0.132

Source: Calculated by the authors based on *Susenas* (1996, 1999, 2002).

Note: % Contrib. is the percentage contribution of each component to rural total inequality.

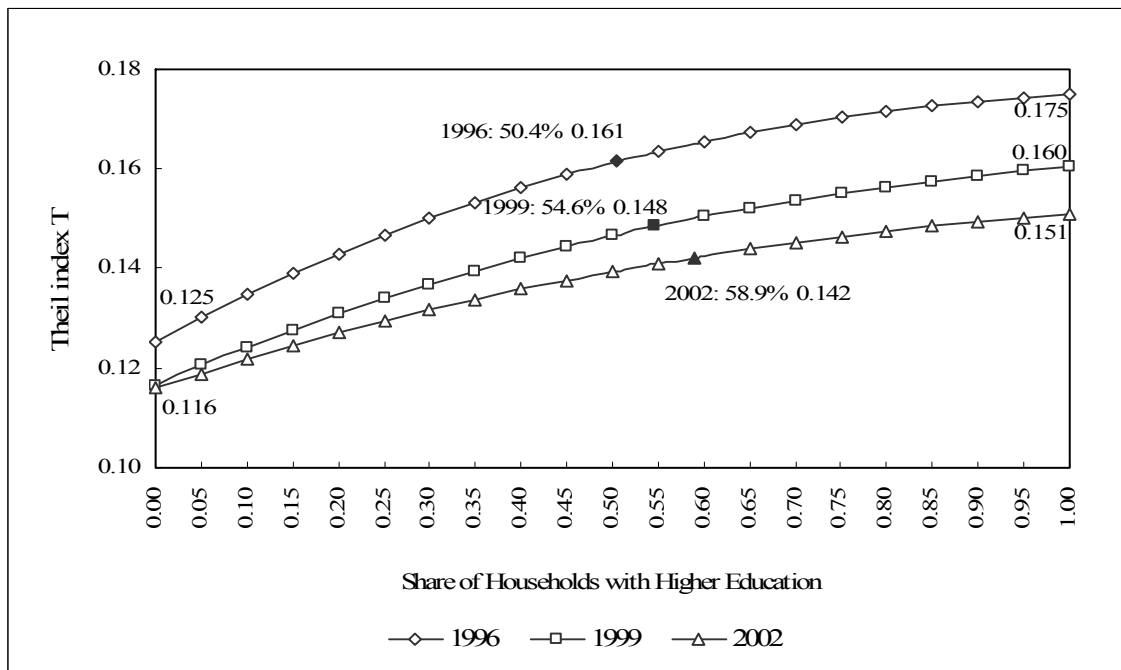
The share of households in the higher educational group increased gradually in the rural sector from 50 to 59 percent during the study period. In the rural sector, the ratio of the higher to lower educational group in mean per capita expenditure was small at 1.2–1.3. Thus, the contribution of the between-group component to rural inequality was minimal: in 1996, it was 5 percent, but it went down to 3 percent in 2002. The higher educational group had a higher level of inequality than the lower. Though its level of inequality declined from 0.18 to 0.15 during the study period, its contribution to rural

inequality rose from 62 to 67 percent. The lower educational group reduced its inequality also but not significantly; its contribution declined to 30 percent.

For the rural sector, we can show that  $T_{21} - T_{22} > (\beta_2 - 1) - \log \beta_2$  during the study period.

Therefore, given that  $\beta_2, T_{21}$ , and  $T_{22}$  are constant, rural inequality would reach the maximum when all rural households were in the higher educational group. Based on the Theil  $T$ , Figure 3 depicts the Kuznets curve for educational expansion in the rural sector. From 1996–2002, educational expansion was accompanied by a decrease in the inequality level of the higher educational group, and thus rural inequality decreased rather than increased. This is due to the fact that in the rural sector, the higher educational group includes those households whose heads have a primary education, and the expansion of the higher educational group was caused mainly by an increase in the share of households with primary education, who had a relatively low level of within-group inequality. Therefore, further educational expansion would result in a decrease, rather than an increase, in rural inequality.

**Figure 3. Kuznets process for educational expansion in the rural sector based on Theil Index T**



## Two-Stage Nested Theil Decomposition Analysis

We are now in a position to combine these findings according to the two-stage nested decomposition framework (see Table 7). We present only the results based on the Theil  $T$ , since the conclusions would not change much if the Theil index  $L$  were used instead.

The within-group component of the educational group ( $T_{WE}$ ) was the main contributor to overall expenditure inequality during the study period, as it accounted for more than 70 percent of overall expenditure inequality. This was followed by the between-sector component, and the between-educational group component. In examining the within-group component of the educational group, it is clear that inequality within the urban sector's higher educational group ( $T_{12}$ ) contributed the most to overall inequality. In 1996, its contribution was 33 percent, increasing gradually to 45 percent by 2002. In contrast, the contribution to overall inequality of all the other educational groups decreased significantly. In 1996, their combined contribution was 40 percent, declining to 25 percent by 2002.

The between-sector component ( $T_{BS}$ ) increased its contribution to overall inequality from 18 to 21 percent during the study period, as a consequence of a rise in urban–rural disparity. However, the contribution of the between-group component among the educational groups ( $T_{BE}$ ) did not show any trend: it accounted for about 8 percent of overall inequality, of which merely 1 percentage point can be attributed to inequality between the two educational groups in the rural sector ( $T_{E2}$ ). This indicates that expenditure inequality due to differences in educational attainment, which could be identified by the one-stage decomposition analysis, can largely be attributed to urban–rural differences in the composition of educational attainments. Especially within the rural sector, inequality between the two educational groups is not a significant contributor to inequality within the rural sector.

**Table 7. Two-stage Theil decomposition for all households Theil index T**

Inequalities or Components	% Contribution	Theil Index T						No. Households (Share)		
		1996		1999		2002		1996	1999	2002
		Inequality	% Cont.	Inequality	% Cont.	Inequality	% Cont.	%	%	%
Urban Sector (T <sub>1</sub> )	(1)+(2)+(3)	0.249	53.6	0.251	56.2	0.331	63.5	39.9	41.5	45.5
Between-Educational Group (T <sub>E1</sub> )	(1)	0.035	7.5	0.030	6.6	0.042	8.1			
Within-Educational Group										
Lower Education (T <sub>11</sub> )	(2)	0.176	13.2	0.182	13.2	0.196	10.4	19.2	18.4	19.0
Higher Education (T <sub>12</sub> )	(3)	0.235	32.9	0.240	36.4	0.325	45.0	20.7	23.2	26.5
Rural Sector (T <sub>2</sub> )	(4)+(5)+(6)	0.161	28.6	0.148	25.7	0.142	15.1	60.1	58.5	54.5
Between-Educational Group (T <sub>E2</sub> )	(4)	0.008	1.4	0.006	1.0	0.004	0.4			
Within-Educational Group										
Lower Education (T <sub>21</sub> )	(5)	0.125	9.6	0.117	8.1	0.116	4.5	29.8	26.5	22.4
Higher Education (T <sub>22</sub> )	(6)	0.175	17.6	0.160	16.6	0.151	10.2	30.3	31.9	32.1
Two-Stage Decomposition										
Between-Sector (T <sub>BS</sub> )		0.046	17.9	0.046	18.2	0.072	21.4			
Between-Educational Group (T <sub>BE</sub> )	(1)+(4)	0.023	8.9	0.019	7.6	0.028	8.5			
Within-Educational Group (T <sub>WE</sub> )	(2)+(3)+(5)+(6)	0.187	73.2	0.187	74.2	0.235	70.1			
Total (T)		0.255	100.0	0.252	100.0	0.335	100.0	100	100	100

Source: Calculated by the authors based on *Susen* (1996, 1999, 2002).

Note: % Cont. is the percentage contribution of each component to overall inequality.

## 6. CONCLUSION

This paper considers urban–rural location and education as the main factors of expenditure inequality and attempts to examine inequality changes associated with urbanization and educational expansion in Indonesia during the period 1996–2002, using Indonesian monthly household consumption expenditure data. It introduces a hierarchical framework of inequality decomposition by population subgroups, in which all households are first classified into rural and urban sectors and then into lower and higher educational groups in each sector. This framework enables us to remove the effects of urban–rural differences in the composition of educational attainments on inequality before analyzing inequality resulting from differences in educational attainment as well as inequality within each educational group in each sector.

The urban sector’s higher educational group is found to have contributed significantly to overall inequality. Its within-group inequality increased significantly after Indonesia recovered from the financial crisis and realized positive growth rates in real GDP. This, together with educational expansion, led to a conspicuous rise in urban inequality. Overall expenditure inequality rose markedly, which can be attributed not only to the rise in urban inequality but also to a widening urban–rural disparity, accompanied by a shift of population from the rural to the urban sector.

According to the two-stage nested inequality decomposition analysis, the within-group component of the educational group accounted for more than 70 percent of the overall inequality; upon closer examination, the contribution to overall inequality of the urban sector’s higher educational group increased from 33 to 45 percent during the study period, while all of the other educational groups in the rural and urban sectors reduced their contributions. In fact, the combined contribution to overall inequality of these other educational groups declined from 40 to 25 percent. The contribution of the between-sector component rose from 18 to 21 percent, as a consequence of a rise in urban–rural disparity, but the between-group component of the educational groups did not change much, accounting for about 8 percent of the overall inequality, of which about 7 percentage points were contributed by the disparity between the two educational groups in the urban sector.

As more people live in urban areas and become more educated, inequality within the urban sector’s higher educational group is expected to play an increasingly important role in the determination of overall inequality. Whether it rises or not is critical to the trend of overall inequality. In this study, the urban sector’s higher educational group consists of households whose heads have at least a secondary education. In order to further explore the determinants of inequality within the urban sector’s higher educational group, we conduct a one-stage decomposition analysis of education within the group, which

is decomposed into households whose heads attended seven different levels of schools (described in chapter 4).

According to this analysis, in 2002 about 13 percent of the expenditure inequality of the urban sector's higher educational group (0.33 by the Theil  $T$ ) was accounted for by the between-group component. This implies that large inequalities existed within some of these seven educational categories in the urban sector. In particular, those households whose heads had attended a four-year university/college had a very high level of within-group inequality (0.43 by the Theil  $T$ ), and its contribution to the total inequality of the urban sector's higher educational group was 25 percent. Those households whose heads had attended a general senior high school also made a large contribution to overall inequality (29 percent), but its within-group inequality was not so large (0.25 by the Theil  $T$ ). In sum, positive economic growth in the aftermath of the crisis seems to have widened inequality among households whose heads attained a tertiary education. This led to a rise in the inequality of the urban sector's higher educational group, which in turn increased urban inequality. As the economy continues to develop, it is likely that even more people will obtain higher education, and more specialized jobs requiring different skills will become available in urban areas. As a result, urban inequality is likely to remain high, given current policies and economic trends. In order to mitigate urban inequality and thus overall inequality, therefore, the government will need to introduce policies that could reduce inequality among households whose heads have a tertiary education.

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