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Abstract

Focusing on Indonesia, this study analyzes the relationship between inequality and the process of urbanization. It performs a panel data regression analysis to test the Kuznets inverted-U hypothesis for urbanization based on a provincial panel data set of 33 provinces over the period 2000-2009, constructed by using the core National Socio-economic Survey (core *Susenas*). Our results support the Kuznets inverted-U hypothesis, whether the Gini coefficient or the Theil indices are used as a measure of inequality. According to our estimates, expenditure inequality would reach the peak at an urbanization rate of around 46-50%. Since the 2010 urbanization rate is 50%, this indicates that expenditure inequality has already attained the peak value. Thus, further urbanization would decrease expenditure inequality, but all other things being equal.

Keywords: urbanization; expenditure inequality; Kuznets hypothesis; panel data regression; Indonesia

JEL classification: O18, R11

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1. Introduction

Kuznets (1955) delineated a process of inequality changes associated with economic development. He argued that inequality in the distribution of income first increases, plateaus, and then decreases as the share of the higher-income, non-agricultural sector rises. In other words, inequality exhibits an inverted U-shaped pattern with respect to economic development. Following Kuznets' seminal article, Robinson (1976), Knight (1976) and Anand and Kanbur (1993) depicted an inverted U-shaped curve formally employing additively decomposable relative inequality measures for an economy where the population shifts from the low-income, low-inequality traditional or rural sector to the high-income, high-inequality modern or urban sector. Since Kuznets (1955), a number of empirical studies have been performed to investigate the relationship between income inequality and the process of economic development.[1] However, due to the paucity of sufficiently long time series data for an individual country, most empirical studies have used cross-country or pooled cross-country data to test the Kuznets inverted-U hypothesis.

In the context of a dual economy consisting of the rural and urban sectors, there are four major factors of income inequality: urbanization level; urban-rural income disparity; rural income inequality; and urban income inequality. By holding urban-rural disparity and rural and urban inequalities constant, the Kuznets hypothesis delineates an inverted-U relationship between inequality and the process of urbanization. In the present study, we focus on urbanization as a key factor of inequality change and test the Kuznets inverted-U hypothesis for urbanization based on a provincial panel data set in Indonesia. It is not realistic to suppose, however, that urban-rural disparity and rural and urban inequalities would remain constant when urbanization proceeds. Nonetheless, it is useful for policy makers to know empirically how urbanization alone has affected the dynamics of inequality, after controlling for some other factors of inequality. Like our study, Angeles (2010) used the share of urban population (urbanization rate) and its square as explanatory variables in its panel data regression analysis of income inequality. But with a panel data set of 226 countries and regions over the period from 1960-2005, it found a U-shaped

[1] For example, Ahluwaria (1976a, 1976b), Knight and Sabot (1983), Saith (1983), Papanek and Kyn (1986), Campano and Salvatore (1988), Ram (1988, 1989, 1990), Anand and Kanbur (1993), Jha (1996), Deininger and Squire (1997, 1998), Matyas et al. (1998), De Gregorio and Lee (2002), Eastwood and Lipton (2004), Huang (2004), Frazer (2006) and Angeles (2010).

relationship, rather than an inverted U-shaped relationship, though not statistically significant; thus the result did not support the Kuznets hypothesis.[2]

The main features of our study are as follows. First, unlike most previous studies, our study focusses on an individual country, i.e., Indonesia. Based on a provincial panel data set for 33 provinces from 2000 to 2009, constructed by using the core National Socio-economic Survey (core *Susenas*), it conducts a panel data regression analysis to test the Kuznets inverted-U hypothesis. Second, our study employs the proportion of urban population (urbanization rate) as an explanatory variable in the panel data regression analysis. It also includes per capita GDP to control for its effects. It should be noted that per capita GDP has been used by most previous empirical studies on inequality and economic development. Third, it employs three relative inequality measures, i.e., the Theil *L* and *T* indices and the Gini coefficient to estimate expenditure inequality.

Indonesia, the largest archipelagic country in the world with more than 17,500 islands, has grown at an average annual GDP growth rate of around 5.5% since it recovered from the 1997 financial crisis. This relatively high growth has been associated with rapid urbanization and the geographical concentration of economic activities, particularly in a few major cities, such as Jakarta. In the 1990s, the proportion of urban population was below 40%; but it has increased gradually and by 2012, exceeded 50%. It is thus useful to know the relationship between inequality and the process of urbanization in Indonesia, since urbanization is one of the major forces of inequality change.[3] A number of studies have been conducted to analyze factors and forces of inequality in Indonesia.[4] This paper contributes to the existing body of literature on inequality and the process of economic development.

2. Data and Method

2.1 Data

This study conducts a panel data regression analysis to test the Kuznets inverted-U

[2] Angeles (2010) also employed the share of employment outside agriculture as an explanatory variable rather than the share of urban population; but, the result did not support the Kuznets hypothesis either.

[3] It should be noted that a large part of urbanization in Indonesia is not due to internal migration, but due to urban sprawl, where rural areas are reclassified as urban areas.

[4] See, for example, Akita and Lukman (1999), Akita, Lukman and Yamada (1999), Asra (2000), Skoufias (2001), Tadjoeddin, Suharyo and Mishra (2001), Cameron (2002), Akita and Miyata (2008), Leigh and van der Eng (2009), Nugraha and Lewis (2013) and Tadjoeddin (2013).

hypothesis on urbanization and inequality in Indonesia based on a provincial panel data set, which was constructed by using the core National Socio-Economic Survey (core *Susenas*). The core *Susenas* has been conducted every year by the Indonesian Central Bureau of Statistics (BPS) in order to collect individual and household-level information about health, education, occupation, consumption expenditure, etc. This study employs household-level data to estimate inequality in per capita expenditure (expenditure inequality) and the proportion of urban population (urbanization rate) for 33 provinces from 2000 to 2009.[5] Thus, there are 330 observations in the panel data set; but, due to missing data, 306 observations are used. In the panel data regression analysis, expenditure inequality is regressed on urbanization rate and its square. But per capita GDP is also included as an independent variable to control for its effects. Constant price provincial GDP data are obtained from *The Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin* (Central Bureau of Statistics, various issues).

2.2 Method

Inequality Measures

In order to estimate expenditure inequality for each province, this study employs the following relative inequality measures: the Gini coefficient and the Theil T and L indices. These inequality measures satisfy several desirable properties, such as anonymity, population homogeneity, income homogeneity, and the Pigue-Dalton principle of transfer (see Anand, 1983; Fields, 2001). Anonymity means that an inequality measure does not depend on who has lower or higher expenditure. Population homogeneity implies that a measure of inequality remains constant if the number of households at each expenditure level is changed by the same proportion, whereas mean independence implies that an inequality measure remains constant when all expenditures are multiplied by the same positive number. Lastly, the Pigue-Dalton principle means that any rank-preserving transfer from a poorer to a richer household raises the value of an inequality measure.

Suppose that an economy consists of n households, who are classified into the rural and urban sectors. Let

[5] It should be noted that expenditures are more equally distributed than incomes; thus, expenditure inequality tends to be smaller than income inequality. In a developing country like Indonesia, expenditure data are more reliable than income data (Akita, Lukman and Yamada, 1999).

μ = mean per capita expenditure of all households,

n_i = number of households in sector *i*,

μ_i = mean per capita expenditure of households in sector *i*,

y_{ij} = per capita expenditure of household *j* in sector *i*,

where *i* = 1 and 2 for the urban and rural sectors, respectively. Then, overall inequality in per capita expenditure is measured by the Theil *L* and *T* as follows:

$$L = \frac{1}{n}\sum_{i=1}^{2}\sum_{j=1}^{n_i}\log\left(\frac{\mu}{y_{ij}}\right) \tag{1}$$

$$T = \frac{1}{n}\sum_{i=1}^{2}\sum_{j=1}^{n_i}\left(\frac{y_{ij}}{\mu}\right)\log\left(\frac{y_{ij}}{\mu}\right) \tag{2}$$

The Theil *L* and *T* indices belong to the generalized entropy class of inequality measures, and are additively decomposable by population sub-group. Using the Theil *T* index, overall expenditure inequality can be expressed as the sum of the within-sector inequality component (T_W) and the between-sector inequality component (T_B) as follows (Shorrocks, 1980; Shorrocks and Wan, 2005)[6]:

$$\begin{aligned} T &= \sum_{i=1}^{2}\left(\frac{n_i}{n}\frac{\mu_i}{\mu}\right)T_i + \sum_{i=1}^{2}\left(\frac{n_i}{n}\frac{\mu_i}{\mu}\right)\log\left(\frac{\mu_i}{\mu}\right) \\ &= \left[\left(\frac{n_1}{n}\frac{\mu_1}{\mu}\right)T_1 + \left(\frac{n_2}{n}\frac{\mu_2}{\mu}\right)T_2\right] + \sum_{i=1}^{2}\left(\frac{n_i}{n}\frac{\mu_i}{\mu}\right)\log\left(\frac{\mu_i}{\mu}\right) = T_W + T_B \end{aligned} \tag{3}$$

where $T_i = \frac{1}{n_i}\sum_{j=1}^{n_i}\left(\frac{y_{ij}}{\mu_i}\right)\log\left(\frac{y_{ij}}{\mu_i}\right)$ is the within-group inequality of sector *i* .

This study also uses the Gini coefficient to measure expenditure inequality. Suppose that y_i is the per capita expenditure of *i*th household. Then the Gini coefficient for the expenditure distribution, $\boldsymbol{y} = (y_1, y_2, \cdots, y_n)$, is given by:

$$G = \frac{2}{n\mu}\mathrm{cov}(i(\boldsymbol{y}), \boldsymbol{y}) \tag{4}$$

where $i(\boldsymbol{y})$ is the ranking of households in the expenditure distribution. We should note that the Gini coefficient also satisfies the above-mentioned four desirable properties.

[6] We can obtain a similar decomposition equation based on the Theil *L* index.

Kuznets Process for Urbanization

In an economy where the population shifts from the rural to the urban sector as the economy develops, we can delineate the Kuznets process for urbanization based on the Theil index *T*. Let $r = \mu_1 / \mu_2$ be the ratio in mean per capita expenditure between the urban and rural sectors and $x = n_1 / n$ be the share of urban households ($0 \le x \le 1$). Then the Theil *T*, as defined by equation (3), can be rewritten as

$$T = T_W + T_B$$

$$= \left[T_2 + (T_1 - T_2) \frac{rx}{rx + (1-x)} \right] + \left[\frac{(r \log r)x}{rx + (1-x)} - \log(rx + (1-x)) \right] \qquad (5)$$

If $r, T_1, \text{and } T_2$ are constant parameters, then the Theil *T* in equation (5) is a function of the share of the urban sector, *x*. With respect to the increase in the share of the urban sector, we can obtain the following proposition.

Proposition

If $r > 1$ and $(r-1) - \log r > T_1 - T_2 > 0$ are true, then the Theil *T* is strictly concave and has the global maximum at

$$x^* = \frac{r(T_1 - T_2) + r \log r - (r-1)}{(r-1)^2} \quad \text{where} \quad 0 < x^* < 1. \qquad (6)$$

On the other hand, if $r > 1$ and $T_1 - T_2 \ge (r-1) - \log r > 0$, then the Theil index *T* has the global maximum at $x^* = 1$.

According to the previous studies on inequality in the rural and urban sectors in Indonesia and other countries (Akita and Alit, 2010; Eastwood and Lipton, 2000; Shorrocks and Wan, 2005), we can safely assume that the ratio in mean per capita expenditure between the urban and rural sectors is greater than 1 (i.e., $r > 1$) and the urban sector has a higher expenditure inequality than the rural sector (i.e., $T_1 > T_2$). Under these conditions, the proposition above delineates the Kuznets process for urbanization, which is described as follows (see Figure 1). When all households are in the rural sector, overall

expenditure inequality is the same as rural inequality. But as the share of urban households (urbanization rate) rises, it increases gradually. Under the condition that $(r-1)-\log r > T_1 - T_2 > 0$ holds, it reaches the peak before all households are in the urban sector. When all households are in the urban sector, overall inequality amounts to urban inequality. In sum, there is an inverted U-shaped relationship between urbanization rate and expenditure inequality. This process can be termed the Kuznets process for urbanization. It should be noted, however, that T_1, T_2 and *r* could change as the proportion of urban households increases, whether expenditure inequality follows the Kuznets inverted-U curve is an empirical issue.

Figure 1

Panel Regression Analysis

This paper conducts a panel data regression analysis to test the Kuznets hypothesis for urbanization, i.e., an inverted-U relationship between urbanization rate and expenditure inequality using the panel dataset for 33 provinces from 2000 to 2009. In the panel regression analysis, we will estimate the following regression model:

$$INEQ_{it} = \alpha + \beta_1 UR_{it} + \beta_2 UR_{it}^2 + \beta_3 PG_{it} + \beta_4 PG_{it}^2 + \boldsymbol{x}_{it}\boldsymbol{\gamma} + a_i + u_{it} \quad (7)$$

where $INEQ_{it}$ is expenditure inequality as measured by the Gini coefficient or the Theil *T* and *L* indices in province *i* in year *t*, while UR_{it} is urbanization rate in province *i* in year *t*. a_i and u_{it} are, respectively, the unobserved provincial effects and the idiosyncratic error term. In order to control for per capita GDP, which has affected expenditure inequality and has a positive correlation with urbanization rate, we include per capita GDP (PG_{it}) and its square in addition to UR_{it} and its square.[7] Finally, $\boldsymbol{x}_{it}$ is a row vector of other independent variables, which include year dummies and interaction terms between regional dummies and urbanization rate. According to the proposition above, it is expected that β_1 is positive, while β_2 is negative.

[7] Per capita GDP could serve as a proxy for urban-rural disparity and urban inequality, since it appears to have a positive relationship with these variables.

3. Empirical Results

Table 1 presents expenditure inequality from 2000 to 2009, as measured by the Theil *T* index and the Gini coefficient. It also exhibits the 95% confidence interval for expenditure inequality, which is obtained by using the bootstrap standard error. According to Table 1 and Figure 2, expenditure inequality has been fluctuating. It attained the highest value in 2005, whether it is measured by the Theil indices or the Gini coefficient. In 2005, all but one province experienced an increase in expenditure inequality. Therefore, factors which have affected inequality in 2005 should be uniform across provinces. One possible factor would be the rise in food and energy prices. In response to this price hike, lower income groups have reduced their spending prominently, while higher income groups have not. This would have raised expenditure inequality significantly in 2005.

Table 1 and Figure 2

Table 2 presents top 5 and bottom 5 provinces in terms of urbanization rate, per capita GDP and the Gini coefficient. Since all households in Jakarta are classified as urban households, Jakarta's urbanization rate is 100% in all years. Besides Jakarta, Yogyakarta, East Kalimantan, and Bali have appeared in the top 5 list in the period from 2000 to 2009. It should be noted that Banten joined the top 5 list when it was separated from West Java, following the introduction of decentralization policies. Since 2005, the urbanization rates of all top 5 provinces have been greater than 50%. It should be noted that in 2004, the province of Riau Islands was established by being separated from Riau. It is a very small island province near Singapore including Batam and Bintang islands; but its estimated urbanization rate of 80% in 2006 seems to be very upward biased. In 2009, its estimated urbanization rate is 53%. On the other hands, East Nusa Tenggara, Central Sulawesi, and Lampung have been among the bottom 5 provinces in the period.

Table 2

As to per capita GDP, Jakarta, East Kalimantan and Riau have been among the top 5 provinces, while East Nusa Tenggara and Maluku have been among the bottom 5 provinces in the period. West Papua and the province of Riau Islands joined the top 5, when they were separated, respectively, from Papua and Riau. It should be noted that another newly established island province, Bangka Belitung in Sumatra, is ranked 7^{th} from the top in 2009. On the other hand, Gorontaro, North Maluku and West Sulawesi joined the bottom 5

provinces, when they were separated from North Sulawesi, Maluku and South Sulawesi, respectively. This observation indicates that except Banten in Java, new provinces, which have been established since the introduction of decentralization policies, appear to have been either very rich provinces or very poor provinces. We should note that there is a positive correlation between per capita GDP and urbanization rate. In other words, those provinces with larger per capita GDP tend to have higher urbanization rates.

In the case of the Gini coefficient, no consistent pattern is observed. Top 5 and bottom 5 provinces have changed from year to year in the period. But, Yogyakarta has always registered a very high expenditure inequality due to its high urban inequality together with its large urbanization rate (next to Jakarta).[8] Yogyakarta is the only province that has been listed among the top 5 provinces. West Papua, newly established in 2003, has also been having a very high inequality since its establishment. Though not always in the top 5 list, Jakarta, West Java, East Java and Banten have been having relatively high expenditure inequalities.[9] This is attributable mainly to their large urbanization rates, compared to non-Java provinces. In contrast, most Sumatra provinces have been having relatively small expenditure inequalities, particularly since 2006. In 2009, 7 out of 10 Sumatra provinces are in the bottom 10 provinces. It should be noted that North Maluku has an exceptionally small inequality in 2003. But this estimated inequality figure may not be reliable since a sample was collected amidst religious conflict in North Maluku.

In order to examine the roles of urban and rural inequalities and urban-rural disparity in overall expenditure inequality, we conduct a Theil decomposition analysis based on equation (3). The result is shown in Table 3. Since the result is qualitatively similar whether the Theil index L or T is used, we explain the result based on the Theil T. The ratio in mean per capita expenditure between the urban and rural sectors is around 1.6-1.8, meaning that the urban-rural disparity accounts for around 15% of overall inequality. Conversely, about 85% of overall inequality is due to within-sector inequalities. As expected, urban inequality is much larger than rural inequality (i.e., $T_1 - T_2 > 0$); its contribution to overall inequality amounts to around 60%. Over the period from 2000 to 2009, urbanization rate has increased from 42% to 49% in Indonesia, while the expenditure

[8] In urban Yogyakarta, expenditure inequality due to educational differences is very large, accounting for more than 40% of urban inequality, which is compared to 20% in Jakarta.

[9] Central Java has registered a relatively low expenditure inequality among Java provinces, owing to its small urban-rural disparity.

share of the urban sector has risen from 54% to 62%. In the study period, $(r-1)-\log r > T_1 - T_2 > 0$ (in the proposition above) is satisfied; thus, by holding T_1, T_2 and *r* constant, the Theil *T* would attain the peak when urbanization rate is smaller than 100%. In 2009, the peak inequality value would be 0.24 when urbanization rate is 71%, which is much larger than the 2009 urbanization rate of 49%.

Table 3

However, when urbanization proceeds, urban-rural disparity and urban and rural inequalities could change. Thus, we conduct a panel data regression analysis to test the Kuznets hypothesis for urbanization, i.e., an inverted U-shaped relationship between urbanization rate and expenditure inequality based on a panel data set for 33 provinces from 2000 to 2009. It should be noted that since samples from Maluku and North Maluku in the period from 2000-2003 (period of internal conflicts) are not reliable, we exclude 8 observations from the panel data set. This results in 298 observations in panel regressions.

Table 4 presents the descriptive statistics of the dependent variable and independent variables. It shows that there are large variations in both the dependent and independent variables. Table 5 exhibits the results of panel regressions. We only provide the results for the fixed effects estimator, since according to the Hausman test, the chi-square statistic exceeds 20 whether the Gini coefficient or the Theil indices is used as the dependent variable and thus we can reject the null hypothesis that the individual-specific effects are uncorrelated with independent variables.

Tables 4 and 5

The coefficients associated with urbanization rate and its square are both statistically significant at the 1% significance level and have expected signs whether the Theil *L*, the Theil *T* or the Gini coefficient is employed as the dependent variable. This empirical result supports the Kuznets inverted-U hypothesis for urbanization. In other words, expenditure inequality rises as urbanization rate (i.e., the share of urban households) increases, but reaches the peak at an urbanization rate smaller than 100% and then declines as urbanization proceeds. According to our estimates, expenditure inequality would reach the peak at an urbanization rate of around 46-50%. Since the 2010 urbanization rate is 50% in Indonesia (ADB, 2013), this suggests that expenditure inequality has just attained the peak.

Therefore, further urbanization would decrease expenditure inequality, but all other things being equal.

The coefficients associated with per capita GDP and its square are also significant at the 1% or 5% significance level and have expected signs. This result supports the Kuznets hypothesis for economic development; namely, expenditure inequality follows an inverted-U curve with respect to per capita GDP. Among interaction terms, only the coefficients for the Sumatra interaction terms are significant. This implies that in Sumatra, the peak expenditure inequality is attained at an urbanization rate different from other regions.

4. Conclusion

Focusing on Indonesia, this study has attempted to analyze the relationship between expenditure inequality and the process of urbanization, as urbanization is considered to be one of the main forces of inequality change. According to the Theil decomposition analysis by urban and rural locations based on the core National Socio-economic Survey data (core Susenas), the urban sector not only has a much larger mean per capita expenditure but also a much higher expenditure inequality than the rural sector; thus inequality within the urban sector accounts for 60% of overall expenditure inequality by the Theil *T*. If the 2009 values of urban-rural ratio in mean per capita expenditure and urban and rural expenditure inequalities are kept constant, overall expenditure inequality would attain the peak value of 0.24 by the Theil *T* when urbanization rate is 71%.

However, when urbanization proceeds, urban-rural disparity and urban and rural inequalities could change. Thus, we have conducted a panel data regression analysis to test the Kuznets inverted-U hypothesis for urbanization based on a provincial panel data set for 33 provinces from 2000 to 2009. The regression results show that the coefficients for urbanization rate and its square are both statistically significant and have expected signs, whether the Theil *L*, the Theil *T* or the Gini coefficient is used as the dependent variable. Our empirical result has thus supported the Kuznets hypothesis, i.e., expenditure inequality follows an inverted-U curve with respect to urbanization.

According to our estimates, expenditure inequality would reach the peak at an urbanization rate of around 46-50%. Since the 2010 urbanization rate is 50%, this indicates that expenditure inequality has already attained the peak value. Therefore, further

urbanization would decrease expenditure inequality, but all other things being equal. According to Cornwell and Anas (2013), expenditure inequality has risen significantly since 2009; in 2011, the Gini coefficient exceeded 0.4 for the first time. This suggests that factors other than urbanization have influenced expenditure inequality greatly over the last few years. One possible factor would be a rise in urban inequality due to a widening disparity among different educational groups under intensifying globalization and economic liberalization. To mitigate inequality, policy makers should pay attention to the effects of educational expansion, particularly in the urban sector, in addition to urbanization.

Unlike Angeles (2010), we have found support for the Kuznets hypothesis for urbanization. We should note, in this regard, that our study differs from Angeles (2010) in the following respects. First, it focused on Indonesia and used provincial panel data for 33 provinces. We could safely assume that all provinces follow a similar development path. Second, expenditure inequality within each province was measured by the same method (inequality indices, unit of measurement, etc.) based on household expenditure data from national socio-economic surveys, which have been conducted by the Indonesian Central Bureau of Statistics. Our study thus does not suffer from the problem of comparability.

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Table 1

Inequality Trend
Gini Coefficient and Theil T Index
2000-2009

	Gini Coefficient			Theil T			
		95% Conf. Interval			95% Conf. Interval		
	Estimate	Lower	Upper	Estimate	Lower	Upper	Sample Size
2000	0.319	0.316	0.321	0.200	0.192	0.209	189,339
2001	0.325	0.322	0.327	0.204	0.199	0.210	227,345
2002	0.350	0.347	0.353	0.256	0.241	0.271	227,341
2003	0.331	0.328	0.333	0.210	0.200	0.221	264,197
2004	0.337	0.334	0.339	0.231	0.219	0.243	264,130
2005	0.389	0.386	0.392	0.309	0.301	0.317	273,061
2006	0.351	0.349	0.353	0.244	0.235	0.253	283,193
2007	0.327	0.325	0.328	0.195	0.192	0.198	290,295
2008	0.369	0.367	0.372	0.264	0.257	0.271	287,339
2009	0.353	0.351	0.355	0.236	0.232	0.240	296,312

Table 2

Urbanization Rate, Per Capita GDP and Gini Coefficient
Top 5 and Bottom 5 Provinces

2000		2003		2006		2009	
Urbanization Rate							
Top 5 Provinces							
Jakarta	100%	Jakarta	100%	Jakarta	100%	Jakarta	100%
Yogyakarta	61%	Yogyakarta	64%	Riau Islands	80%	Yogyakarta	72%
East Kalimantan	56%	East Kalimantan	56%	Yogyakarta	69%	East Kalimantan	62%
West Java	49%	Banten	55%	Banten	56%	Banten	61%
Bali	47%	Bali	45%	East Kalimantan	54%	Bali	55%
Bottom 5 Provinces							
West Kalimantan	26%	Southeast Sul.	20%	Aceh	22%	Lampung	26%
Southeast Sul.	21%	Central Sulawesi	20%	Lampung	21%	Southeast Sul.	23%
Lampung	20%	Lampung	20%	Central Sulawesi	20%	West Papua	22%
Central Sulawesi	19%	East Nusa Teng.	15%	East Nusa Teng.	16%	Central Sulawesi	21%
East Nusa Teng.	15%	North Maluku	10%	West Sulawesi	15%	East Nusa Teng.	17%
Per Capita GDP							
Top 5 Provinces							
East Kalimantan	29.6	East Kalimantan	32.9	Jakarta	34.8	Jakarta	40.3
Jakarta	22.4	Jakarta	30.5	East Kalimantan	32.7	East Kalimantan	33.3
Riau	11.7	Riau	18.1	Riau Islands	24.3	Riau Islands	25.3
Central Kalimantan	6.0	West Papua	10.8	Riau	16.8	Riau	17.7
South Kalimantan	6.0	Aceh	10.0	West Papua	9.3	West Papua	10.9
Bottom 5 Provinces							
Northeast Sulawesi	3.2	West Nusa Teng.	3.5	West Sulawesi	3.3	West Sulawesi	3.9
Bengkulu	3.2	Maluku	2.4	Maluku	2.7	Maluku	3.0
West Nusa Teng.	3.1	North Maluku	2.4	North Maluku	2.5	North Maluku	2.9
Maluku	2.3	East Nusa Teng.	2.2	East Nusa Teng.	2.4	Gorontalo	2.8
East Nusa Teng.	1.6	Gorontalo	2.0	Gorontalo	2.3	East Nusa Teng.	2.6
Gini Coefficient							
Top 5 Provinces							
North Maluku	0.389	West Java	0.352	West Papua	0.390	West Papua	0.416
Jakarta	0.377	Banten	0.332	Yogyakarta	0.367	Yogyakarta	0.399
Yogyakarta	0.372	Yogyakarta	0.330	Jakarta	0.364	Papua	0.379
Riau	0.326	East Java	0.316	East Kalimantan	0.353	East Nusa Teng.	0.371
East Kalimantan	0.321	West Kalimantan	0.312	East Nusa Teng.	0.342	Banten	0.363
Bottom 5 Provinces							
North Sumatra	0.273	Aceh	0.228	Lampung	0.297	South Sumatra	0.302
West Nusa Teng.	0.270	Maluku	0.225	Central Java	0.288	Jambi	0.287
Central Kalimantan	0.265	Central Kalimantan	0.183	Central Kalimantan	0.281	Bangka Belitung	0.285
Bengkulu	0.262	West Nusa Teng.	0.167	Bangka Belitung	0.275	West Sumatra	0.283
Jambi	0.261	North Maluku	0.084	North Maluku	0.257	Riau	0.275

Table 3

Decomposition of Expenditure Inequality by Urban and Rural Sectors
In Selected Years between 2000 and 2009

		Theil L		Theil T		Gini	Population	Expenditure
		Value	Contrib.	Value	Contrib.		Share	Share
2000	Urban	0.183	46.5%	0.220	59.6%	0.335	42.2%	54.3%
	Rural	0.103	35.7%	0.112	25.5%	0.251	57.8%	45.7%
	W-sector	0.137	82.2%	0.171	85.1%			
	B-sector	0.030	17.8%	0.030	14.9%			
	Total	0.166	100.0%	0.200	100.0%	0.319		
2002	Urban	0.219	46.4%	0.275	62.0%	0.364	42.4%	57.7%
	Rural	0.105	30.3%	0.119	19.7%	0.254	57.6%	42.3%
	W-sector	0.153	76.6%	0.209	81.7%			
	B-sector	0.047	23.4%	0.047	18.3%			
	Total	0.200	100.0%	0.256	100.0%	0.350		
2004	Urban	0.202	43.5%	0.249	56.7%	0.351	39.8%	52.8%
	Rural	0.118	38.3%	0.139	28.5%	0.268	60.2%	47.3%
	W-sector	0.151	81.8%	0.197	85.2%			
	B-sector	0.034	18.2%	0.034	14.8%			
	Total	0.185	100.0%	0.231	100.0%	0.337		
2006	Urban	0.209	44.0%	0.248	57.8%	0.358	42.1%	57.0%
	Rural	0.117	33.7%	0.135	23.9%	0.267	57.9%	43.0%
	W-sector	0.156	77.7%	0.199	81.7%			
	B-sector	0.045	22.3%	0.045	18.3%			
	Total	0.200	100.0%	0.244	100.0%	0.351		
2008	Urban	0.232	49.1%	0.265	61.4%	0.372	48.0%	61.3%
	Rural	0.153	35.0%	0.171	25.1%	0.301	52.0%	38.7%
	W-sector	0.191	84.1%	0.229	86.5%			
	B-sector	0.036	15.9%	0.036	13.5%			
	Total	0.227	100.0%	0.264	100.0%	0.369		
2009	Urban	0.207	50.0%	0.235	61.7%	0.357	48.8%	62.0%
	Rural	0.127	32.3%	0.146	23.5%	0.280	51.2%	38.0%
	W-sector	0.166	82.3%	0.201	85.2%			
	B-sector	0.036	17.7%	0.035	14.8%			
	Total	0.202	100.0%	0.236	100.0%	0.353		

Table 4

Descriptive Statistics

Variable	No. of Obs.	Mean	Std. Dev.	Min	Max
Theil *L*	298	0.1618	0.0431	0.0342	0.3612
Theil *T*	298	0.1853	0.0535	0.0437	0.4034
Gini	298	0.3106	0.0415	0.0987	0.4571
Urbanization rate	298	38.6%	18.0%	4.2%	100.0%
PGDP	298	8.05	7.59	1.61	40.27

Table 5

Panel Data Regression Analysis
Fixed Effects Model

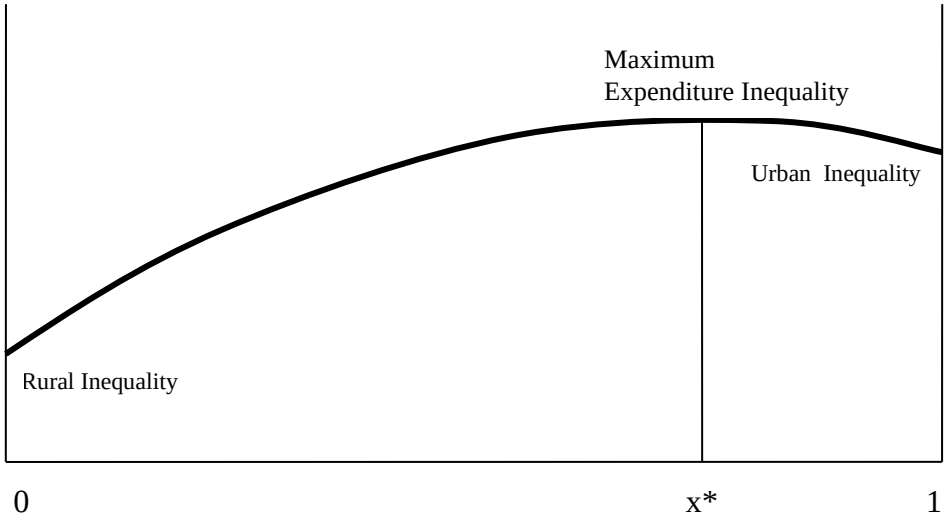
	Theil *L*			Theil *T*			Gini		
Ind. Variables	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
UR	0.6525	0.1457	***	0.7340	0.1860	***	0.9735	0.1362	***
UR^2	-0.7130	0.1355	***	-0.7636	0.1729	***	-0.9647	0.1266	***
PG	0.0095	0.0037	**	0.0131	0.0048	***	0.0077	0.0035	**
PG^2	-0.0002	0.0001	**	-0.0003	0.0001	***	-0.0001	0.0001	**
Sumatra*UR	-0.5382	0.2899	*	-0.6360	0.3700	*	-0.8935	0.2709	***
Java/Bali*UR	-0.4134	0.7061		-0.1285	0.9011		-0.5948	0.6597	
Kalimantan*UR	-0.1502	0.8559		0.1254	1.0923		-0.1330	0.7997	
Sulawesi*UR	-0.4270	0.6150		-0.5982	0.7849		-0.8647	0.5746	
Sumatra*UR^2	0.5978	0.2471	**	0.6474	0.3154	**	0.8826	0.2309	***
Java/Bali*UR^2	0.6217	0.6940		0.3420	0.8857		0.7381	0.6484	
Kalimantan*UR^2	0.2172	0.9061		-0.2882	1.1564		0.1620	0.8466	
Sulawesi*UR^2	1.0169	1.0616		1.3196	1.3549		1.4971	0.9919	
Y2002	-0.0036	0.0069		-0.0027	0.0087		-0.0020	0.0064	
Y2003	-0.0191	0.0069	***	-0.0235	0.0088	***	-0.0228	0.0065	***
Y2004	0.0013	0.0071		0.0026	0.0090		0.0019	0.0066	
Y2005	0.0119	0.0071	*	0.0158	0.0091	*	0.0095	0.0066	
Y2006	0.0071	0.0071		0.0055	0.0091		0.0069	0.0067	
Y2007	-0.0006	0.0070		0.0017	0.0090		-0.0004	0.0066	
Y2008	-0.0078	0.0069		-0.0132	0.0089		-0.0068	0.0065	
Y2009	-0.0004	0.0070		0.0001	0.0090		0.0026	0.0066	
Constant	0.0294	0.0493		0.0075	0.0630		0.1655	0.0461	***

(Note) 1. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
2. Sumatra, Java/Bali, Kalimantan and Sulawesi are regional dummies, while Y2002, Y2003, … are year dummies.

Figure 1

(a) Kuznets Process for Urbanization based on Theil T

When $r > 1$ and $(r-1) - \log r > T_1 - T_2 > 0$



(b) Kuznets Process for Urbanization based on Theil T

When $r > 1$ and $T_1 - T_2 \geq (r-1) - \log r > 0$

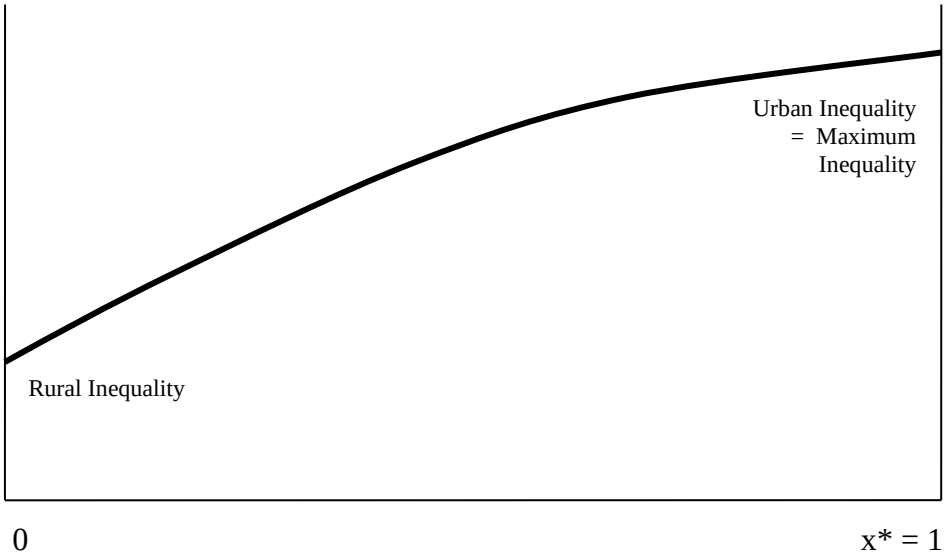
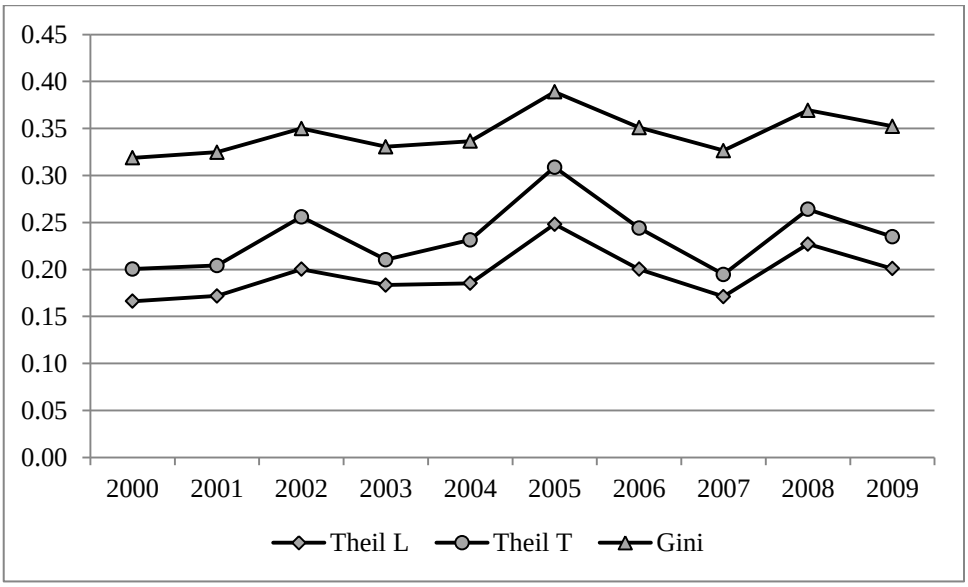


Figure 2


0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Theil L
Theil T
Gini