Kasetsart Journal of Social Sciences 40 (2019) 40–46

Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

Top income shares and inequality: Evidences from Thailand

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Article Info

Article history:
Received 30 January 2017
Revised 4 June 2017
Accepted 19 July 2017
Available online 7 August 2017

Keywords:
Gini coefficient,
income inequality,
Pareto distribution,
top-income share

Abstract

This paper attempts to improve a traditional measure of income inequality in Thailand, that is, the Gini coefficient, by incorporating information about top income groups from tax return data. Traditionally, the Gini coefficient is calculated by using individuals' income data from the socio-economic survey (SES). In the SES, the poor are relatively well-represented, while the rich or the top income groups are mostly absent. Therefore, the survey-based Gini coefficient may not give an accurate account of the true state of the income distribution in Thailand. We followed the Alvaredo methodology by making use of the tax returns data in estimating the share of the top income group and incorporating this group into the calculation of an alternative Gini coefficient. The "corrected" Gini coefficient overturned the prediction of the Kuznets hypothesis that foresaw an improved income distribution in Thailand to continue in 2007 and 2009. Our calculation showed that the income distribution worsened in 2009. This was in line with the findings on the top income shares from tax returns data.

Introduction

This paper incorporated top income shares obtained from tax returns data with the household survey in order to improve a measure of income inequality. Traditionally, researchers use household survey data to calculate the Gini index in order to gauge the degree of inequality. However, most household income survey data lack proper coverage for the high income groups. The omission of the top income groups from the Gini calculation consequently shifts the mass from the right tail of the income distribution towards the center and results in a more equitable income or lower value of the Gini index. Our paper attempted to improve upon the traditional calculation by incorporating information about top income groups from tax returns data.

Tax returns data are regarded as a vital source of information about top income groups. As in Feenberg and Poterba (1993), Piketty (2003), Piketty and Saez (2003), and Atkinson (2005), tax returns data are used to measure top income shares in the net national income. A higher fraction of national income accrued to the top groups indicating a widening gap of income between the rich and the rest of the economy. Piketty and Saez (2003) used tax returns data to construct a series of the top share of pretax income and wages in the United States from 1913 to 1998. They found that the top income and wage shares in the United States had gained more weight in recent times after dropping down during the Great Depression and World War II. Piketty (2014) showed that the share of the richest 1 percent in the United States has risen significantly since 1980, reaching nearly 20 percent in 2012. Atkinson (2005) found a rise in income inequality in the United Kingdom followed a similar pattern to that of the United States, while Piketty (2003) found the opposite trend in France.

Alvaredo (2011) showed how the top income share, obtained from the tax returns data, can be a supplementary source of information about the missing rich individuals in calculating the Gini coefficient. He showed that when the top income share is not infinitesimal in the income

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Peer review under responsibility of Kasetsart University.

http://dx.doi.org/10.1016/j.kjss.2017.07.010

distribution, one can use the estimates of top income share from the tax returns data to improve or "correct" the Gini coefficient obtained from the survey data.

In this paper, we applied the above method to Thailand data. We estimated the top income share from the tax returns data during 2004–2009. In particular, an income share of the top 1 percent and the top 0.1 percent were estimated. We found that the top 1 percent of taxpayers accounted for around 64.9–83.7 percent of total income, while the top 0.1 percent of taxpayers accounted for 46.1–61.6 percent of total income. This finding showed the concentration of income in a small group of rich individuals in Thailand. Though the share of those top income groups has come down recently, the degree of income concentration is still alarming.

We applied the Alvaredo (2011) methodology to compute the corrected Gini in 2004, 2006, 2007, and 2009. We found that the corrected Gini and the traditional Gini had similar patterns except for 2009. That is, both measures showed that the inequality rose in 2006 from the level observed in 2004, before lowering in 2007. However, the traditional Gini exhibited a continued decline in inequality in 2009 while the corrected Gini showed the opposite path. To my knowledge, this study was the first to use tax data to calculate top income share in Thailand.

In addition, our calculation showed great disparity between the traditional Gini and the one that incorporated the top income share. We found that the corrected Gini could be as high as 30–40 percent above the traditional measures. With that level of income inequality, Thailand could be ranked among the world's most unequal income distribution.

Our results provide a different perspective for policy discussion on inequality in Thailand. Recent studies, such as Pootrakul (2013) and Kilenthong (2014), related the declining trend in the Gini indices to the inverted-U shape Kuznets curve, which traces inequality indicators along the economic development process. According to the Kuznets hypothesis, income inequality rises during the early stage of economic development and falls down as the economy progresses. One implication from those studies is that we should see more equal income distribution to continue in the future. Our results provided a contrasting view. The income distribution might worsen as suggested by the estimation of corrected Gini coefficient. Thus, both policymakers and academics should not feel complacent with the past income redistribution policies and think more seriously about inclusive-growth policies.

The rest of this paper proceeds as follows. In the next section, we provide an overview of income inequality in Thailand. Section Estimating Top Income Shares describes the methodology for estimating the top income share applied with tax data from the Revenue Department. In Section Recalculating the Gini Coefficients, we calculate alternative measures of income inequality by incorporating the income shares obtained from the previous section. The final section concludes the paper.

Income Inequality in Thailand

Despite impressive growth performances during the 1980s–2000s, income inequality in Thailand has hardly changed. The Gini coefficient in 2013 was 0.484. This figure is not much different from the one previously observed in 1988, which equaled 0.487. After two decades of economic progress, Thailand's income inequality still lagged behind the levels in more advanced economies, such as the OECD group. In a recent cross-country comparison, only the Sub-Saharan African and the Latin American and the Caribbean group of countries fared worse than Thailand in terms of income inequality (See Balakrishnan, Steinberg, & Syed, 2013).

However, the previous paragraph provides only a rough picture of income inequality in Thailand by simply mentioning two end points. If one goes through the development process during 1988–2013, a different view would emerge. As the Thai economy took off on a rapid growth path in the late 1980s, its income inequality rose. The inequality peaked during the high growth period of 1988–1992, when the Gini reached a value of 0.536, before it subsequently fell toward the current level.

One can argue that this observation is consistent with the Kuznets hypothesis (Kuznets, 1955), which predicts that income inequality can worsen in the early stage of economic development before improvement in the income distribution takes over in the latter stage. Drawing on the Kuznets hypothesis, we may expect to see a more equitable income distribution in the near future.

In Figure 1 below, we plotted the Gini coefficients in various years since 1988 together with the regression line that fitted the data with the linear function of time and squared-time. The fitted line seems to track the general tendency in the Gini coefficients quite well. The line not only exhibits recent decline in income inequality but can also be regarded as a part of the inverted "U" curve of the Kuznets hypothesis.

Ikemoto and Uehara (2000) explained that higher inequality during the 1980s was due to the emergence of export-oriented manufacturing industries supported by the influx of foreign direct investment. Those capital inflows were attracted by low-cost labor in Thailand. As a result, labor was mobilized from the low-earning agricultural sector to the better-paid manufacturing sector. Initially, this structural change caused more income disparity as only a few laborers made the transition. The economic development process envisioned by the Kuznets hypothesis would generate a better income distribution as the manufacturing sector absorbed more and more labor. The turning point would be reached and a more equal income distribution would be observed. However, such a prediction had not yet materialized in the early 1990s. Ikemoto and Uehara (2000) argued that the reason we did not observe a decline in inequality was due to the series of financial liberalization measures introduced in the early 1990s, such as the acceptance of Article 8 of the International Monetary Fund Agreement and the abolishment of the interest rate ceiling. Such changes triggered a boom in the construction and financial sectors and pushed even higher the wage rates of skilled laborers, like engineers or investment bankers. As the Thai economy entered the bubble phase leading up to the economic crisis in 1997, income inequality became more severe.

However, the economic crisis in 1997 brought about the turning point in the Kuznets curve. In the post-crisis era,

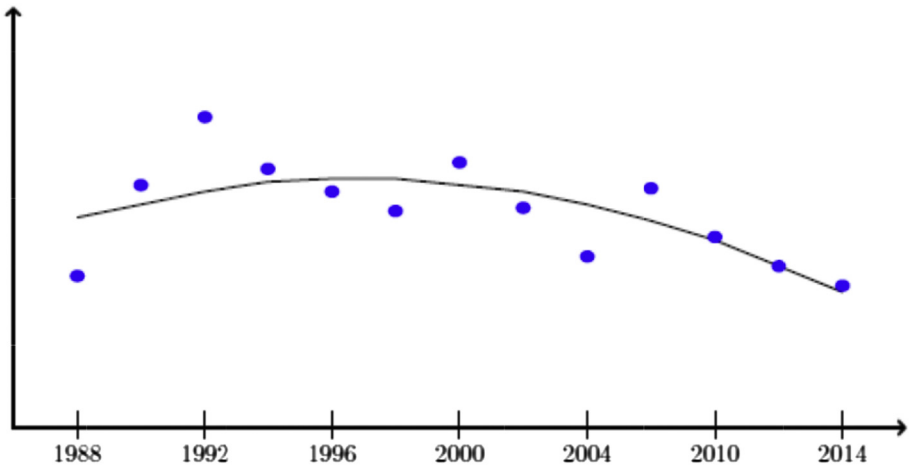

Figure 1 Gini coefficients and the Kuznets Curve
Source: National Statistical Office (2015) and author's calculation

the declining trend in the Gini coefficient is easily seen in Figure 1, as emphasized in recent studies (see Pootrakul, 2013; Kilenthong, 2014).

Pootrakul (2013) showed that Thailand has successfully reduced income inequality in the past two decades. He also found that household income series, truncated for the top and the bottom of the income distribution, exhibited a high rate of convergence comparable to the empirical studies in Europe and the United States. However, the income disparity between the top 10 percent and the bottom 10 percent was much higher than in advanced countries. The top 10 percent group had income more than 25 times greater than the bottom 10 percent.

Kilenthong (2014) used various proxies of wealth accumulation and economic progress in Thailand over the years to document improved well-being and better income distribution in Thailand. Those proxies were (i) car and pick-up truck ownership, (ii) mobile phone ownership, and (iii) bank branch location. Over the years, a larger proportion of the Thai population owns either a car or pick-up truck, possesses a mobile phone and has better access to financial services. This evidence coincides with the declining Gini indices.

The Gini coefficient which measures how far away an existing income distribution is from a completely equitable allocation is computed by using survey data of the National Statistical Office (NSO) that provides detailed information about the income and expenditure of permanent households in all types of areas, villages, and regions throughout the Kingdom. This survey is known as the "Socio-Economic Survey" (SES). In the latest survey (2013) the SES covered around 126,261 individuals in 42,738 households. However, the survey was criticized for its poor coverage of the rich or the top income groups. As a result, some economists doubted whether the recent decline in the Gini coefficients (in other words, a reduction in income inequality) genuinely reflected an improved income distribution in Thailand or was a representation of the income distribution among those who were not in the top income groups.

Estimating Top Income Shares

As shown in Atkinson (2007), when top income groups account for a negligible fraction in the total population, the Gini coefficient can be approximated by the following formula, $G^*(1-S)+S$, where G^* is the Gini coefficient calculated from the survey that omits the top income groups and S is the share of the richest group in total income. Thus, if we suspect that the survey did not cover the top 1 percent of the income group, then the "corrected" Gini would be $G^* \times 0.9 + 0.1$. For example, if the G^* in 2009 was 0.488, then the corrected Gini would be 0.5392.

Alvaredo (2011) extended the Atkinson (2007) formula by exploring a general formula where the top income group was not infinitesimal. Before we examine Alvaredo's extension, let's look at how the top income group can be measured.

Studies of the top income group date back to Pareto (1896) who found that the upper-tail distribution of the number of people with an income higher than a critical level, x, is proportional to $\left(\frac{1}{x}\right)^{\alpha}$, where α is the parameter that determines the shape of the distribution. The lower α, the more disperse is the income at the higher end, or the thicker is the tail of the distribution.

In addition, α also determines the expected income above the critical level x, that is, the expected income above x is given by $\frac{\alpha}{\alpha-1} * x$ or $\beta * x$.

Thus, if the threshold income under consideration is the 99th percentile of an individual's income, denoted x_{P99}, then the expected income above the 99th percentile will be $\beta * x_{P99}$. The total income accrued to the top 1 percent of the income distribution can be calculated using Equation (1):

$$\text{Top 1\% income } share = \frac{0.01 * \beta x_{P99}}{\bar{x}} \quad (1)$$

where $\bar{x}$ is the average income of all individuals.

To estimate the parameters of interest, we used tax returns data from the Revenue Department during 2004 −2009. It should be noted here that these tax returns data are for tax units, not individuals. Atkinson (2005) defines 'tax units' as " … a married couple, or … a single adult or … a single minor with income in his or her own right". Under Thai law, a married couple can choose to file tax returns separately or together. Thus, the taxable income data in Table 1 represent either a family income or an individual income. The calculation of the share of the top income group in subsequent sections was based on the tax units' income.

Taxable incomes were classified into 14 brackets, where the highest bracket was open ended. An example of data for the fiscal year 2004 is provided in Table 1.

The number of tax units in each bracket was used to obtain the sample distribution function of taxable income. The distribution function of taxable income, denoted $F(x)$, informs us about the fraction of tax units that has income lower than or equal to a certain income bracket. Therefore, a proportion of tax units that has income above that bracket can be found by subtracting the corresponding cumulative probability from 1. We show such probability, $1 - F(x)$, in the last column of Table 1.

To estimate α, we picked the threshold income that we believed the distribution function of taxable incomes beyond that level was Pareto. In this study, we chose the 90th percentile as a cutoff income level, called x_C. From Table 1, one can notice that the income level that is closest to the 90th percentile is at THB 300,001. Then, we selected the second cutoff point, called x_T, that was above the first one. Here we chose the lower bound of the next income bracket (THB 500,001−750,000) as x_T. The shape parameter of the Pareto distribution can be estimated from the following formula, as in Parker and Fenwick (1983), Feenberg and Poterba (1993) and Piketty (2003):

$$\widehat{\alpha} = \frac{ln(C/T)}{ln(x_T/x_C)}$$

where C denotes the number of tax units with income above the lower cutoff and T represents the number of tax units with income above the second cutoff.

To calculate the top income share, we first calculated the income accrued to the top 1 percent and top 0.1 percent in each year, as in the formula above. The income accrued to those groups was measured by multiplying the average income above the 99th percentile and the 99.9th percentile with the corresponding numbers of tax units.

Table 1
Example of income tax data

Income Bracket (THB)	Number of tax units	$1 - F(x)$
0–100,000	2,017,716	0.723
100,001–150,000	1,555,437	0.51
150,001–200,000	1,020,266	0.371
200,001–300,000	1,181,818	0.209
300,001–500,000	777,659	0.102
500,001–750,000	335,595	0.056
750,001–1,000,000	158,959	0.034
1,000,001–2,000,000	170,140	0.011
2,000,001–4,000,000	51,203	0.0041
4,000,001–6,000,000	14,284	0.0021
6,000,001–8,000,000	6,108	0.0013
8,000,001–10,000,000	2,947	0.0009
10,000,001–20,000,000	4,385	0.0003
20,000,0001 up	1,886	0.0000

Source: Ministry of Finance (2015)

Table 2
Tax units: Filers vs census

	Tax filers	Tax units from the census
2004	7,298,403	35,715,370
2005	6,729,492	36,294,751
2006	8,070,297	36,874,132
2007	8,578,410	37,453,513
2008	9,271,741	38,032,894
2009	9,218,028	38,612,275

Sources: Ministry of Finance (2015), National Statistical Office (2015) and author's calculation

It turned out that the measurement of "the corresponding tax units" was quite tricky. The obvious candidate was the number of tax units in the tax return data. However, the total tax filers in each year was remarkably low, not to mention those in the top income bracket. In 2004, there were only 7,298,403 tax units filed for tax returns. The figure is rather low compared to the adult population, net of married women, obtained from the census, which equals 35,715,370 units. This observation was not just specific to 2004, though. A discrepancy of a similar magnitude between the number of tax filers and the tax units from the census was found in other years as well (see Table 2 below).[1] Using the number of tax filers in each year for the number of total tax units would give an inaccurate measure for the top income share. As a result, we explored several measures of top income share in order to shed some light on the range of possible magnitudes of income accruing to the top groups.

Among those candidate measures are: i) total tax units from the census—to justify this choice, we made an assumption that the fraction of top income in the total tax units is the same as the fraction observed in the tax returns data. ii) total population—this method might arguably overestimate the top income group, however, we used it as an upper bound on the top income shares, not for the purpose of gauging the actual top groups' contribution. In both measures, the top income shares were estimated as a fraction of the national income per capita. However, in the first measure, the average income above the threshold level was multiplied by the total tax units from the census, while the denominator was the net national income. In the second measure, the top income share was calculated as a certain fraction of the average net national income, that is, net national income divided by the population, as shown in Equation (1).

We compared the three methods of calculating the top 1 percent share in Table 3.

The first method, which used the number of tax filers in each year as a tax unit, produced the lowest share among all the calculations. The third method produced the largest

[1] Since the National Statistical Office conducts a census survey every 10 years, we have to interpolate the total population between 2000 and 2010. By assuming that the population grew at a constant rate in that 10-year period, we are able to estimate the number of total tax units during 2004–2009.

Table 3
Top 1 percent share

	2004	2005	2006	2007	2008	2009
Method 1	0.094	0.146	0.124	0.101	0.105	0.112
Method 2	0.460	0.786	0.567	0.442	0.431	0.468
Method 3	0.785	1.34	0.946	0.728	0.702	0.747

share in Table 3 since the total population was used as the unit of taxation. The second method which obtained tax units from the census was an intermediate case.

Even though each method gave a different estimate of the size of top 1 percent share, their development over the years moved in tandem. In addition, all of our estimates indicated that the inequality, as measured by the top income share, worsened in 2009, relative to both 2008 and 2007.

We observed a similar pattern in the top 0.1 percent share, as shown in Table 4.

In sum, the top income share in all methods indicated that the top group enjoyed a bigger share of total income in 2009. This was in stark contrast with the observation from the SES that showed a steady improvement in income distribution since 2006. Our calculation of the top income shares, both the top 1 percent and the top 0.1 percent, followed a similar pattern, but in year 2009, the income gap widened again. In all of the data in Tables 3 and 4, the income distribution in 2009 was even worse than in 2007. Our findings in this section contradicted the prediction of the Kuznets hypothesis.

The graph of the top 1 percent and top 0.1 percent shares, calculated from method 2, are shown in Figure 2.

Recalculating the Gini Coefficients

In this section, we provide the "corrected" Gini coefficients during 2004–2009. The recalculation of the Gini indices was made possible by the methodology outlined in Alvaredo (2011) which incorporated the top income shares in the traditional Gini formula. This approach extended the result put forth by Atkinson (2007) which argued that if a negligible fraction of individuals in top income group commands a finite share of income, say S, then the Gini coefficient can be approximated as $G^*(1-S)+S$, where G^* is the Gini coefficient calculated from the rest of the population.

Alvaredo (2011) extended the Atkinson formula by showing that if the top income group is not infinitesimal and occupies a fraction P in the total population, then the corrected Gini coefficient can be expressed as:

$$G = \frac{\beta - 1}{\beta + 1} PS + G^*(1-P)(1-S) + S - P$$

where β is the inverted Pareto coefficient.

Table 4
Top 0.1 percent share

	2004	2005	2006	2007	2008	2009
Method 1	0.067	0.112	0.091	0.071	0.074	0.078
Method 2	0.329	0.604	0.417	0.313	0.304	0.328
Method 3	0.561	1.029	0.695	0.516	0.495	0.523

We have already calculated β and the inverted Pareto coefficient and the top income shares, from the tax returns data in the previous section. For the top income shares, we opted to use the intermediate case, (method 2) to represent the top income shares in Thailand.

We used the Gini coefficient calculated from the SES as G^*. We carried out two hypothetical scenarios—one in which the top 1 percent was completely missing from the SES survey and the other for the case that only the top 0.1 percent was absent. By doing this, we expected to augment the missing section of the high income groups into the traditional Gini calculation. The share of the top 1 percent and the top 0.1 percent were represented in the formula above under the different scenarios, where p would be assigned to be either .01 or .001, correspondingly.

All the parameters values needed to calculate the corrected Gini are presented in Table 5. We provided our calculations only in 2004, 2006, 2007 and 2009 when the individuals' incomes were surveyed in the SES. The survey was conducted every other year prior to 2006. Since then, it has become an annual survey. However, the income data are still available on a bi-annual basis. As a result, we can only match the tax return data with the SES survey for limited periods.

As we have already seen in the introduction, the Gini coefficient from the SES showed that the income inequality became less severe after 2006. The declining trend continued into 2009 when the coefficient reached its lowest level since 1988. However, once we corrected the traditional Gini for the missing top income groups, we reached a different conclusion, especially for the 2009 observation.

First, we saw a huge discrepancy between G^* and G, especially where the top 1 percent is missing. In 2007 and 2009, the magnitude of the differences could be as large as 30–40 percent, that is, G^* equaled 0.499 and 0.488 in 2007 and 2009, respectively, while the corrected Gini indices were 0.711 and 0.719, respectively, if the top 1 percent share were augmented and equaled 0.655 and 0.656, respectively, if only the top 0.1 percent were included.

Apart from the differences in magnitude of the inequality measure, we also observed a divergence in the trend of G^* and G. While the traditional measure G^* showed an improvement in income distribution and continued in 2009, G exhibited a higher inequality in 2009. Table 5 shows that this uptick in the corrected Gini reflects a gain in the top income shares during 2007–2009. That is, the reason that our corrected Gini increased in 2009 was that the SES might completely miss the high income group and that showed in the data as a lower inequality in that year.

From the World Bank database of 112 countries in 2013, the 10 countries with the most unequal income distribution and their corresponding top 10% income share are shown in Table 6.

One can notice the top 1 percent group in Thailand was comparable to the top 10 percent group in countries like Central African Republic and Honduras. The corrected Gini indices in Table 5 showed more severe income inequality than the 10 countries with the most unequal income distribution in the World Bank database. Thus, Thailand's quest for income equality might be an elusive goal for a long while.

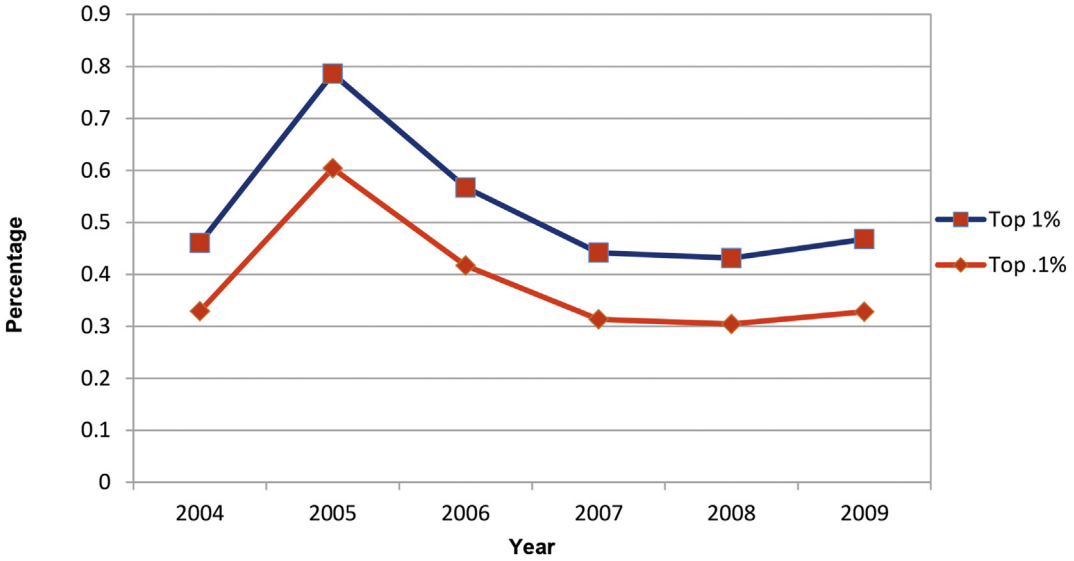

Figure 2 Top 1 percent and 0.1 percent income shares: 2004–2009

Table 5
Top income shares and Gini coefficient

	Top 1% income share from tax data	Top 0.1% income share from tax data	Gini coefficient from SES	β	Gini coefficient corrected for top 1% income share	Gini coefficient corrected for top 0.1% income share
2004	0.46	0.329	0.508	6.85	0.725	0.669
2006	0.567	0.417	0.514	7.48	0.782	0.717
2007	0.442	0.313	0.499	6.71	0.711	0.655
2009	0.468	0.328	0.488	6.47	0.719	0.656

Source: Author's calculation

Table 6
10 most unequal income countries in 2013

Country	Gini coefficient	Top 10% share (%)
South Africa	0.65	53.8
Namibia	0.61	51.8
Botswana	0.60	49.6
Zambia	0.58	47.4
Honduras	0.57	45.7
Central African Republic	0.56	46.1
Lesotho	0.54	41.0
Colombia	0.53	42
Brazil	0.527	41.7
Guatemala	0.524	41.8

Source: World Bank (2015)

Conclusion and Recommendations

This paper attempted to provide an alternative measure of income inequality in Thailand. Previous studies relied on the survey data of the NSO, that is, the SES, which does not have proper coverage on the top income groups. We followed the Alvaredo (2011) methodology by making use of the tax returns data during 2004–2009 to calculate corrected Gini indices. We found a greater degree of income inequality in 2009 and, based on this, we rejected a claim that the Thailand growth process followed the Kuznets hypothesis.

This paper sheds a new light on the size of income disparity in Thailand. It is the first research paper to use tax income to calculate top income shares and incorporate them with the Gini indices computed from survey data. However, we stopped short of providing an explanation on why income inequality worsened in 2009. This loose end could be tidied up by further investigations in the future.

Conflict of Interest Conflict of Interest

The author declares that there is no conflict of interest.

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