

Income Inequality by Income Sources and Effects of Government Transfer: Evidence from Thailand

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Abstract

This paper examines income inequality in Thailand over the period 2006 and 2013 using household surveys as database and discusses effect of income transfer on poverty reduction. A decomposable inequality by income sources is adopted to analyze the contribution each income source to total inequality. Two hypotheses are proposed: i) that there was inequality reduction (measured by Gini coefficient) due to redistributive politics and entitlement program; and ii) that income transfer from government assistance was fairly well targeted with the poor household the beneficiary of income transfer. Our study reveals three results: First, there was a reduction in Gini coefficient as expected but only marginally despite huge increase in government assistance in the past decade; b) four income items were found to be characterized as inequality-augmenting whereas three income sources have inequality-dampening effect; c) there was evidence of budget leakage in the sense that the assistance was not well-targeted in that the nonpoor received a transfer as well as the poor. There seems to be possibility to improve efficiency of government assistance provided that the assistance program be targeted to poor households in the future course of development.

Keyword: decomposable Gini coefficient, household income by source, income transfer, targeting for the poor, Thailand

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1. Introduction

Poverty incidence has dropped significantly in Thailand over the past few decades yet an income inequality remains high and a topic of public debate (TDRI reports). Currently Thailand is in the process of drafting a new Constitution and many proposals for reform to reduce inequality been officially articulated.² Earlier Motonishi (2005) noted that income inequality based on Thai household survey, had risen significantly between 1975 and 1998 and disparity between nonagriculture and agriculture income had widened. In the past two decades, Thai government regimes had poured higher fiscal resource for education, health and social protection – and this was consistent with constitutional rules (1997 and 2007). In other words more government intervention to help poor people and to lessen inequality: To mention few examples of government programs: a) the universal health care program, started in 2001, that covers nearly 50 million persons who were formerly not accessible to health care insurance;³ b) a monthly stipend for elderly on a universal basis, since 2007, prior to that the scheme was limited to only poor elderly; c) an educational grant for all school children following the “12-year free education” mandated by Constitution of 1997. There were other schemes initiated by political parties such as the rice-pledging scheme, the rubber- and crop price intervention, and farmer income insurance. These policies were being criticized as populism. In effect these led to increase in government spending but their effectiveness (from perspective of poverty- and inequality reduction) are unclear. According to the national income statistics, the rate of growth of government consumption expenditure outpaced that of GPP over the period 1990-2010,⁴ with implication that an elasticity of government spending is greater than 1. If this trend continues the ratio of government spending to GDP will definitely increase. And

² These include a proposal for establishment of land bank, labor bank, property tax and inheritance tax.

³ Prior to 2001, there were 2 health insurance schemes: the civil service health insurance and the social security. Both schemes covered approximately 15 million of Thai citizen.

⁴ The growth rates for government consumption expenditure averaged to 9.4 percent per annum, compared with that of GDP 7.4 percent per annum (both in currently value).

this implied that the government will have to raise tax and the tax / GDP will rise. It may be assumed that government welfare in the form of income transfer reached poor households, according to the Pigou-Dalton principle, income inequality should be reduced at least to a certain extent. It is interesting to test whether a theoretical conjecture is verified by evidence. This paper takes a case study of income inequality over the period and tries to investigate how income transfer from government assistance was distributed. We draw upon two household surveys conducted by the National Statistical Survey in 2006 and 2013 as database.

This paper is set for two modest goals: First, to examine change in household income over the period and to measure income inequality decomposed by income sources with a presumption that inequality might have decreased partly because of income transfer from government assistance. Secondly, to investigate how income transfer from government was distribution among income classes with a presumption that a transfer was targeted for poor. In other words there was no “budget leakage”.

The paper is organized into sections. Section II that follows an introduction explains our research questions, methodology, and institutional change in Thai politics, government spending, and welfare programs. Section III describes data source, definition of terms, unit of measurement, and comparative statistics over the period and our findings. Section IV comments on distribution of income transfer in case there is evidence of leaky budget or mis-targeting; there is a possibility to revise the process of delivering welfare and government assistance. Section V conclusion, limitation of study, and suggestion for further study.

2. Research Questions and Method of Study

Institutional Background

Thailand is a middle income country in transition with strong economic growth of 6 percent per annum prior to the financial crisis in 1997, after the crisis, economic growth has decelerated with the recent record of GDP growth fluctuated around 3-4 percent per

annum. Since 1980s our productive structure changed significantly with industrialization and an export-led growth strategy the main driving force, evidently in higher percentage share of service sector and industrial sector in GDP and a decline of agricultural share. The period 1980 and 1997 witnessed an unprecedentedly high growth of GDP with unprecedentedly inflow of foreign investment and financial capital. Prior to the financial crisis (in 1997), there were economic boom in the land- and the asset- markets. During the past decades an incidence of poverty had significantly declined but income inequality remains on high level. Institutionally, the country is ruled by monarchical democracy since the Revolution in 1932 – throughout the period an influence of military, bureaucrat and elite in government policy is undeniable. There has been gradual evolution toward democratic government with series of political unrest and protests (in mid 1970s, and 1992) that call for general election and the prime minister elected by people. After long-series of struggling for democracy there was evolutionary change toward democratic government in accordance with the Constitution of 1997 that led to reform of governance and bureaucratic system. In brief member of parliament has been playing more important role in policy formation and public administration whereas the bureaucrat played supporting role.

Economic policy is formulated by politicians and as such it is important to see a connection of how economic policy responded to political change. The Constitution 1997 mandated a bureaucratic reform toward decentralization and “the state basic policy” (นโยบายพื้นฐานแห่งรัฐ) is laid which include entitlement programs, social protection, free education for all, assistant program for the poor and needy, and others. After 1997 witnessed a rise of elected politicians in cabinet and ministries and more involvement in government budgeting. To cite few examples of new government programs with impact on public service and higher government expenditures: i) the universal health care insurance, began in 2006, that covered approximately 50 million persons and the monetary cost about 5% of the annual government expenditure; ii) the village fund in which the government injected 1 million baht for each village as seeded fund for village development and liquidity needs of villagers (about 70,000 units in total) in 2002 and, later on, more money rejected

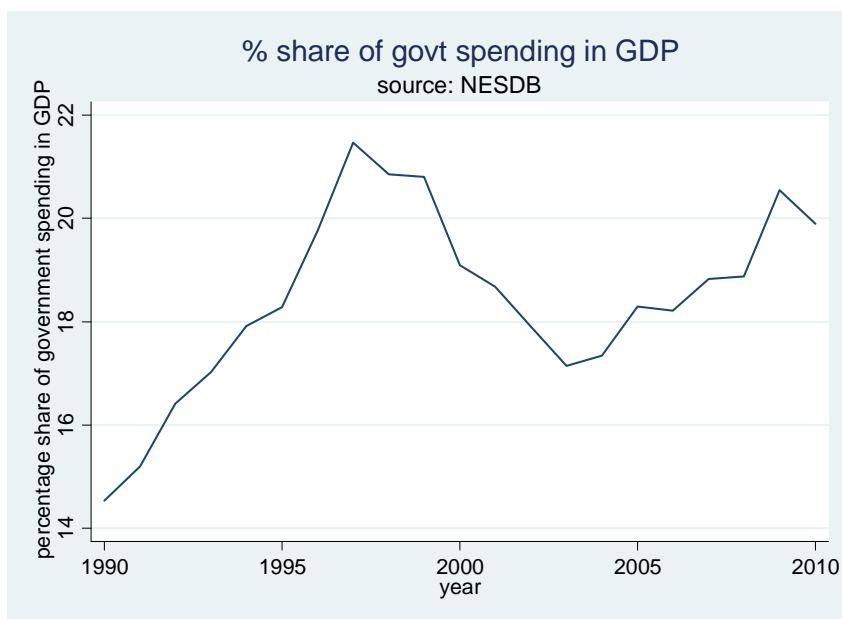
again in 2011; iii) intergovernmental grant for thousands of local administration (7,853 units in 2013) which amounted to about 10% of annual government expenditure.

Figure 1 shows an increasing trend of the government spending as percent of GDP between 1990-2010. Currently the share of government expenditure stood at about 20 percent of GDP. Government spending data can be classified under into two components: consumption expenditure and investment expenditure. Within the first component can be disaggregation into 10 functions, for instances, administration, defence, education, health, and so on. Patmasiriwat (2015) did calculate an elasticity measure, which defined to be a percentage change of GCE(i) where GCE = government consumption expenditure for the i^{th} function in association with a percentage of GDP. Period of study: 1990-2010. The elasticity estimates are as follow:

Government spending elasticity ⁵	
● Government expenditure	1.12
● Government consumption expenditure	1.27
● Government investment expenditure	0.79
● GCE, social protection	1.71
● GCE, environment	2.08
● GCE, health	1.59
● GCE, education	1.15
●	

Figure 1: graph of government expenditure as % of GDP, 1990-2010

⁵ Detail of estimates are given in Appendix



Some

3. Research questions:

Statistics based on the National Income Accounts indicate that Thai government spending increased more rapidly than that of GDP, and measurable by elasticity estimates greater than one. It may be reasonable to assume that part of government spending was income transfer that benefited low income people and as such reduced inequality at least to a certain extent - yet, we need to confirm the hypotheses with empirical evidence.

Two research questions for this study are:

H1: The hypothesis that income inequality might have been reduced in Thailand due to institutional change led by entitlement program and policy measure to raise income of the poor. Help. As earlier discussed, over the past years, there were policy reform that aimed at raising income for poor and the welfare program (health care, elderly stipend, and student loan, etc.) along the mandate of our Constitution. To what extent was change in income inequality given that fact that income transfer from government assistance increased significantly

H2: The hypothesis that Thai government assistance was well directed or targeted for the poor households.

Q2: the poorest group (agriculture) performed compared to other profession

Decomposable Gini coefficient

Our case study draws upon advancement in poverty and inequality measurement pioneered by Shorrocks (1978), Lerman and Yitzhaki (1983) and others. The same techniques were applied to many case studies around the world, for instances, Jenkins (1991). Household income is normally generated from working members under different categories, such as wage income, farm income, nonfarm income, remittance income. Applied economists are interested in the contribution or accounting of inequality; i.e., which income components are characterized as “inequality-augmenting” and which are “inequality-dampening”. Another method applied in this case study is concentration index (CI) pioneered by Kakwani (1980)—specifically an application to income transfer from government assistance. Normatively speaking income transfer should be targeted for the poor, as such the concentration would be negative (favorable for the low-income household than otherwise). But positively, an income transfer from government may be not so. It is possible that the nonpoor be the beneficiary of government assistance programs. These would reflect in the CI measure which can be positive or negative.

Following Mussard and Richard (2012) the multi-decomposition Gini can be expressed in the following formula. The term multi-decomposition means the decomposition analysis by income groups (say, poor and nonpoor) and their contribution to overall inequality. Naturally there are between- and within- variations.

$$\text{Overall Gini: } G = \sum \sum |x_i - x_j| / 2 n^2 \mu$$

$$\text{Specific Gini by income source: } G_{kk} = \sum \sum |x_{ik} - x_{rk}| / 2 n_k^2 \mu_k$$

Subscript i denote for different groups and k for the source of income

Another contribution pioneered by Lerman and Yitzhaki (1985) in which inequality is decomposed by income sources. In short, the Gini coefficient can be expressed in formula.

$$\text{Decomposable Gini by income source: } G(v) = R * G * S$$

Where

R = correlation coefficient

S = income share of the source

G = Gini coefficient for each income source

Concentration index (CI) is another tool pioneered by Kakwani (1980) to focus on distribution of income source (in our case study it is used to analyze the effect of income transfer to test the properties of negative (pro-poor policy). The same technique was applied in Kakwani, Wagstaff and van Doorslaer (1997) for measurement of health inequality.

4. Empirical Evidence

Data

Income for each household is normally generated by the working members in different forms, for instances, wage income, farm income and nonfarm income. Our case study utilizes the house survey conducted by the National Statistical Office; in particular the surveys for 2006 and 2013 were used to observe structural change, incidence of poverty and income inequality. Household income is classified by income sources as follow:

- *Wage income* refers to earned income from working which is inclusive of bonus and overtime payment.
- *Farm income* refers to the net income of farm operation
- *Nonfarm income* refers to the net income from nonfarm enterprise
- *Capital income* refers to rental income, interest, and dividend
- *Pension income* refers to the old age pension scheme

- *Remittance income* refers to an income remitted from member or relative who live outside the village
- *Government income transfer* which refers to an assessed value of government assistance

Unit: baht per month per household

First it may be sensible to note a big picture of household income distribution and its change over the period 2006 and 2013. Table 1 provides summary statistics (in per capita income) and how income was distributed according to income decile. The per capita monthly income was averaged to 9,941 baht per person in 2013, compared with 7,145 baht per month in 2006—implied the growth rate of income by 4.83 percent per annum in average. Of note is that the rate of growth for middle income levels were higher than the richest or the poorest groups. Income disparity can be expressed in many ways, the ratio- statistics such as p90/p10, p90/p50 and p50/p10 are commonly utilized (Salverda, Nolan, and Smeeding 2009). All three ratios were found to be lowered in 2013 than those in 2006 – indicating that the degree of income inequality reduced at least to a certain extent.

Table 1: distribution of household income and change over 2006 and 2013

Income decile	2013		2006		rate of growth per annum
	Frequency	Mean	Frequency	Mean	
1 poorest	3,220	966	3,441	938	0.42
2	3,566	2,729	3,819	1,575	8.17
3	3,734	3,513	4,002	2,119	7.49
4	3,898	4,299	4,144	2,685	6.96
5	4,047	5,185	4,261	3,333	6.52
6	4,205	6,283	4,344	4,153	6.09
7	4,418	7,720	4,659	5,270	5.61
8	4,839	9,834	4,979	6,948	5.09
9	5,119	13,535	5,211	9,885	4.59
10 richest	5,692	32,281	6,012	24,757	3.86
sum / average	42,738	9,941	44,872	7,145	4.83
mean income	<i>baht/month</i>	9,941		7,145	
median income	<i>baht/month</i>	6,504		4,172	
10th percentile	<i>baht/month</i>	2,572		1,459	
p90/p10	Ratio	3.87		4.90	
p90/p50	Ratio	1.53		1.71	
p50/p10	Ratio	2.53		2.86	

Source: National Statistical Office, SES2006 and SES2013; calculation by the author

Another dimension of interest is the household classification by socio-economic classes.⁶ The author regrouped the NSO original classification into 5 categories, namely, inactive, agricultural, entrepreneurial, professional, and general worker for ease of interpretation. These are shown in Table 2. The agricultural household earned 6,875 baht per person, the lowest in comparison to other groups. But the per capita asset among agricultural households was quite high, at least significantly higher than those of general worker and entrepreneurial groups. Remind that farmers farm land, equipment and housing asset. The professional group earned highest income (21,890 baht per person) and their asset also the highest (1.1 million baht per capita).

Table 2: income- and asset per capita statistics by socio-economic groups as of 2013

socio-economic groups	no of sampled household	Per capita income (baht/month)	Per capita asset (baht/person)	Household size (person)
inactive, retired	8,791	7,798	622,050	2.2
Agriculture	8,384	6,875	710,028	3.4
Entrepreneur	8,139	11,570	618,942	3.1
Professional	4,383	21,890	1,136,251	3.0
Worker	13,041	8,323	265,932	3.1
Sum	42,738	9,941	582,786	3.0

Source: National Statistical Office, SES2556; calculation by the author

Table 3 presents the measurement for income inequality by application of decomposable method to take note contribution of each income source to the overall inequality. The first column (denoted as S_x or simply a share) refers to a percentage of

⁶ According to NSO, there

each income source to total income. The share is utilized as a “weight” or how importance of each income source in explaining inequality. Wage income accounted for 47 percent of the total income – this is not surprising because a majority of households tend to have at least one member who provides labor services in exchange for wage and salary. The nonfarm and the farm income ranked below wage income with their share were 25 percent and 15 percent of total income. It is interesting to note that property income accounted for merely 1.6 percent of the total income which seems to be too little; the author is of an opinion that this income component might be underestimated or under-reported—but we have to use this figure for the time being until more information is available. The second column (denoted as G_k) measures a degree of inequality by each income source. These measures G_k tend to be very high by nature because the missing cases are treated as zero, for instance, those households that did not report property income for that year would be treated as zero. The overall Gini coefficient was estimated to be 0.53 which indicates high degree of inequality in comparison to the similar studies in European and North American countries. The third column (R_k) measures correlation between each income source to total income – they can be may be positive or negative. The correlation coefficient for income transfer shows negative sign as expected which meant poor households had more chances of receiving income transfer from government assistance. The fourth column (shortly referred as share) indicates the normalized figure whose sums is 1 (or 100%). The last column provides a marginal estimate in the sense of a contribution to change in inequality. Of notes are: 4 income sources may be characterized as “inequality augmenting” (positive sign), and 3 income sources “inequality reduction” (negative sign). Remittance income, farm income, and income transfer are the items that help poor people—this implies that if these income sources increase, then income inequality would be reduced.

Table 3: contribution of each income source to income inequality measure, 2013

Source	[1] S_k	[2] G_k	[3] R_k	[4] Share	[5] % Change
Wage income	0.472	0.734	0.763	0.498	0.027
Farm income	0.145	0.923	0.484	0.122	-0.023
Nonfarm income	0.245	0.951	0.711	0.312	0.067
Property income	0.016	0.963	0.675	0.020	0.004
Pension	0.034	0.979	0.722	0.045	0.011
Remittance income	0.072	0.839	0.043	0.005	-0.067
Income transfer	0.017	0.746	-0.087	-0.002	-0.019
Total income		0.530			

Source: NSO, SES2013

Table 4 reports similar statistics calculated from SES survey in 2006 for comparison sake. Of notes are: a) The Gini coefficient for the year 2006 was 0.54 implying higher degree of inequality but only marginally; b) the correlation measure and the marginal contribution to the total inequality in 2006 were similarly to those found in SES2013; and c) an income transfer from government assistance for 2006 was little (0.2 percent).

Lessons learnt from Tables 3 and 4. First, we learn that there was a reduction in income equality (measured by Gini coefficient) in 2013 than 2006 which is good sign—but only marginally. Secondly, an income transfer had increased significantly in 2013 which is consistent with the macro budgeting data that there were huge increase in government spending in various forms, health care budget, educational budget, welfare and government assistance programs – these were partly led by political motive and altruistic toward the poors. Thirdly, there income sources that have a characteristic of “inequality-dampening” are confirmed for both SES2006 and SES2013 – these refer to remittance income, farm income, and income transfer from government assistance.

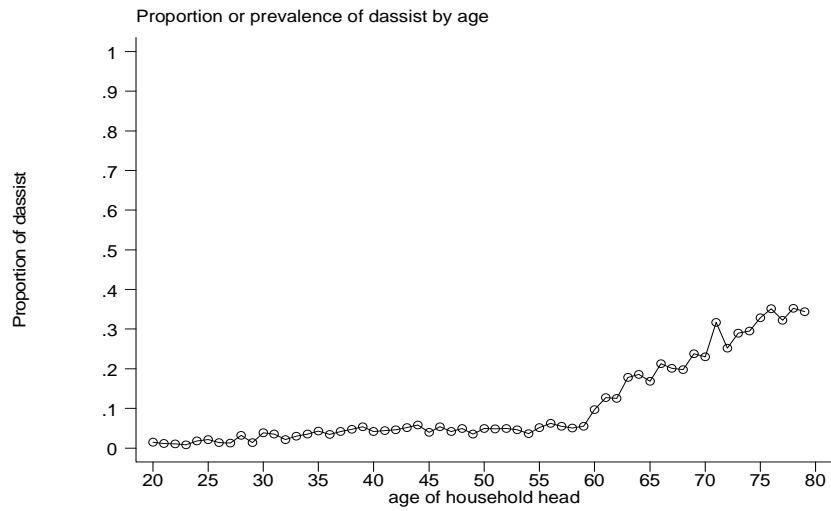
Table 4: contribution of each income source to total inequality, 2006

Source	[1] S_k	[2] G_k	[3] R_k	[4] Share	[5] % Change
Wage income	0.473	0.731	0.775	0.493	0.020
Farm income	0.110	0.950	0.484	0.093	-0.017
Nonfarm income	0.287	0.857	0.705	0.319	0.032
Property income	0.023	0.961	0.749	0.031	0.008
Pension	0.032	0.981	0.731	0.042	0.010
Remittance income	0.073	0.851	0.196	0.022	-0.051
Income transfer	0.002	0.951	-0.118	-0.001	-0.003
Total income		0.544			

Source: National Statistical Office, SES2006 calculated by the author.

Income transfer from government assistance is treated as policy variable under control of government, and, normatively speaking, it should be designed to be pro-poor. We track data further by investigating who received income transfer through the dummy variable (0/1). Those households that said they received income transfer from government were recorded as 1. Figures 2 and 3 indicate the proportion of household that had benefited from government arranged by age of household head. Nearly 30 percent of the elderly households were beneficiary of government assistance in 2006 – in the year 2013 the beneficiary elderly rose to nearly 100 percent which is a drastic change. This was not evolutionary change, but should be described as shift of policy led by political motive; specifically, the Decentralization Committee them (under Abhisit government) decided (in 2010) to expand “elderly stipend” (เบี้ยยังชีพผู้สูงอายุ) for all elderly citizen—before that only selected senior citizens who were poor and without care from their offspring were entitled to receive a monthly stipend (500 baht per month).

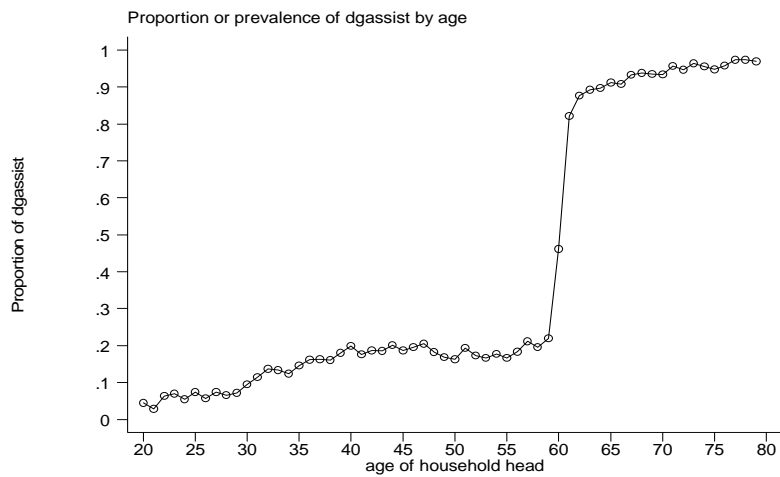
Figure 2: the proportion of beneficiary of government assistance in 2006



Source: National Statistical Office, SES2006

Dummy 0/1 1= those household that received government assistance in 2006

Figure 3: the proportion of beneficiary of government assistance in 2013



Another measure reported in this paper is called “concentration index” (CI) pioneered by Kakwani (1980). CI measures how income (or tax) was distributed similarly to the Lorenz curve according per capita income rank, expressed in number whose number can be negative or positive sign. CI has been widely used to analyze tax progressivity (by comparing CI for income, and CI for personal income tax; in case that $CI(y)$ and $CI(t)$ are equivalent then “neutral taxation”, where $CI(y) < CI(t)$ meant tax progressivity, and where $CI(y) > CI(t)$ meant tax regressivity. The negative sign for “income transfer” would mean the government assistance was distributed in favor of low income household. Table 5 provides estimates of CIs for three income items for both years. Of note is that the CI for income transfer reduced noticeably; in the former year, the CI was -0.17 ; in the latter year, the CI was -0.129 . This confirms what earlier said that the elderly stipend used to be based on a selective basis but switched to a universal program, as such it was “less pro-poor”.

Table 5: concentration index by income sources: 2006 and 2013

	CI estimates: mean and std err	
	2013	2006
income transfer from government	-0.129 (.011)	-0.171 (.063)
remittance income	0.098 (.007)	0.195 (.008)
pension income	0.692 (.007)	0.67 (.008)

Source: National Statistical Office, SES2013 and SES2006

In parenthesis are standard error of estimate

In Table 6 reports an imputed value of income transfer grouped by socio-economic class. The NSO's database recorded whether a household received income transfer from government and the monetary equivalent of assistance; we arranged them by socio-economic class for analytical purpose and discussion. The first column indicates a frequency (the number sampled households in total) whereas the third column the frequency for those that received income transfer. On national average, 9 percent of household confirmed they had benefited from program and expressed in monetary term, 413 baht per month on average. The imputed value of benefit did not varied much, only the proportion figures varied quite significantly—the inactive group and the agricultural group had benefitted (in proportional term) from government income transfer than the other groups.

Table 6: an imputed value of income transfer from government assistance

	[1]	[2]	[3]	[4]
socio1	Frequency	proportion	Frequency	Mean
				baht/month
inactive, retired	7,534	0.18	1,368	516
Agriculture	7,447	0.13	965	333
Entrepreneur	10,455	0.06	614	386
Professional	5,567	0.03	180	494
Worker	13,869	0.07	995	352
sum / mean	44,872	0.09	4,122	413

Source: National Statistical Office, SES2013

5. Discussion

This section discusses how income transfer was distributed based on SES2013. Specifically the author explores distribution of income transfer ranked by their per capita

income. Only those households with positive income transfer are taken and their mean values and the summation are reported in Table 7. There were 16,941 units of household that received government assistance and this accounted for 39% of the total sampled households. The mean values refer to an imputed value of income transfer whose average equal to 945 baht per month per household—interestingly, the nonpoor groupss (defined for this purpose as those in decile 5-10) received income transfer as well as the poors (decile 1-4). This indicates “budgetary leakage” (Arthur M. Okun used this term since 1970s, and since then others follows) – interestingly, the estimate for leakage is very high, 56.6%. This may be worth reconsideration and it indicates the possibility to improve welfare program if the same money were redistributed to the poors instead of the riches.

Table 7: how income transfer from government was distributed, 2013

Decile	frequency	mean	Sum	Remark (budget leakage)	
1	1,625	939	1,526,326		
2	1,992	948	1,887,691		
3	1,991	900	1,792,224		
4	1,977	879	1,738,293	6,944,534	43.4%
5	1,950	871	1,699,399	(deciles 1-4)	
6	1,825	845	1,542,372		
7	1,611	905	1,457,980		
8	1,503	887	1,332,542		
9	1,337	1,022	1,366,174		
10	1,130	1,482	1,674,602	9,073,069	56.6%
Total	16,941	945	16,000,000	(deciles 5-10)	(leakage)

To learn a bit more, the author performs a policy simulation by assuming that had income transfer redistributed, from nonpoor to poor households, the then benefit for poor would be raised on condition that the fiscal cost of government assistance program unchanged. Specifically, the amount of income transfer for poor would be raised in the range from 2,075 to 2,144 baht per month per household—equivalent to an increase of 130 percent. Lesson learn: there is a possibility to improve government assistance for reduction in poverty and income inequality with an institutional reform. In the author's opinion, it may be sensible to review an elderly stipend on universal basis – a redesign of such program according to targeting for the poor would be welfare enhancement, the poors would benefit more under the same amount of budget.

6. Conclusion

This paper presents a case study of income inequality using decomposable technique applied for Thai household surveys to investigate change over time (2006 and 2013). Our theses are that: a) income inequality might have be lowered in the latter year due to institutional change along the entitlement principle, mandated by our constitutional law, and political motive; b) an income transfer from government benefits poor people. Findings: First, the Gini coefficient had dropped but insignificantly in magnitude, i.e., from 0.54 to 0.53. Second, the share of income transfer increased significantly due to elderly stipend which used to be provided according to a selective basis but later on a universal basis. Third, of all 7 income sources, three income sources were found to possess “inequality-dampening” characteristic. As such inequality can be reduced through expansion of farm income, remittance income and income transfer from government. Fourth, there was evidence of budgetary leakage with an estimate of 56%. This is an important message: it may be worthwhile to review our government assistance program. And there exists a scope for policy improvement if we adopt the “targeting for the poor” approach for welfare program, an income transfer for poor could be raised significantly under the same fiscal cost.

There are some limitation in our case study and the suggestion for further research: (a) the change as discussed was based on 2 surveys – it could be extended to cover longer period of study; (b) as earlier mention, the author is of an opinion that the property income might be biased on the low side due to under report of under representation of high income household; (c) with an increasing role of local administration in Thailand, the next study should try to include social protection spending by local administration as well.

Reference

- Adams, R. and H. Alderman (1992) 'Sources of Income Inequality in Rural Pakistan: a Decomposition Analysis', *Oxford Bulletin of Economics and Statistics*, 54 (2): 591–608.
- Akdede, Sacit Adi 2012 "Income inequality and political polarization and fractalization: an empirical investigation of some European countries," *Bulletin of Economic Research*, 64(1): 20-30.
- Jenkins, S.P. 1995 "Accounting for inequality trends: decomposition analyses for the U.K., 1971-1986," *Economica* 62: 29-63.
- Kakwani, N. C., Wagstaff, A., van Doorslaer, E., 1997. Socioeconomic inequalities in health: measurement, computation, and statistical inference. *Journal of Econometrics* 77, 87-103),
- Leibbrandt, Murray, Christopher Wood, and Ingrid Woolard 2000 "The contribution of income components to income inequality in the rural former homelands of South Africa: a decomposable Gini analysis," *Journal of African Economies*, 9(1): 79-99.
- Lerman, R.I. and S. Yitzhaki. 1985 "Income inequality effects by income source: A new approach and applications to the United States," *Review of Economics and Statistics* 67: 151-156.

Motonishi, Taizo 2005 “Why has income inequality in Thailand increased? An analysis using surveys from 1975 to 1998” *Japan and the World Economy*, 30: 1-24.

Mussard, Stephane and Patrick Richard 2012 “Linking Yitzhaki’s and Dagum’s Gini decompositions,” *Applied Economics*, 44: 2297-3010.

Shorrocks, A.F. 1982 “Inequality decomposition by factor components,” *Econometrica* 50: 193-212.

Shorrocks, A. (1983) ‘The Impact of Income Components on the Distribution of Family Income’, *Quarterly Journal of Economics*, 98: 311–26

Yitzhaki, S.1983 “On an extension of the Gini inequality index,” *International Economic Review*, 24: 617-28.

Appendix:

Table A1: elasticity estimate for government consumption expenditure

Functional type	elasticity
• General administration	1.399
• Defence	0.821
• Internal order	1.177
• Economic	1.344
• Environment	2.086
• Housing	2.004
• Public health	1.592
• Recreational, religion	1.956
• Education	1.152
• Social protection	1.713

• <i>Total government spending</i>	1.126
<i>Govt consumption</i>	1.27
• <i>Govt investment</i>	0.79

Source: NESDB, National Income Accounts

Elasticity = $d(\ln GF)/d(\ln GDP)$ based on regression technique